Stakeholder Engagement and Sustainability-Related Project Performance in Construction

Menoka Bal

A thesis submitted in partial fulfilment of the requirements of Liverpool John Moores University for the degree of Doctor of Philosophy

January 2014

Acknowledgement

My most grateful sincere thanks goes to my supervisor Dr. David Bryde for his support, friendship and wise guidance throughout this research. I am very thankful to Edward Ochieng and Damian Fearon from the School of the Built Environment, Liverpool John Moores University for their comments, valuable advice and direction in my thesis writing and their utmost contribution to researches on construction sustainability in the UK. The efforts of teaching and administrative staff in School of Built Environment are also highly appreciated and respected.

My thanks likewise go to the respondents who were interviewed and surveyed during the research. I am really grateful to all those participants for finding time to respond to my questions despite of their busy schedules and also for helping in the data collection.

I would like to thank my parents and brother for their encouragement, support and sacrifice. All of my achievements are dedicated to them.

My special warm acknowledgement goes to my husband Sabuj Mallik for his kindness, patience, full support and sacrifice during all the period of my study, without which I would not have been able to complete my study.

Abstract

Stakeholders are considered to be one of the key drivers for any construction project. On the other hand, the performance of construction projects is primarily driven by sustainability-related targets. Hence, there is a need for a systematic approach to engage the stakeholders, as part of the Project Management process, to achieve the construction sustainability. This research focused on stakeholder engagement with the aim to improve the construction project performance through achieving construction sustainability. A framework is developed which integrates stakeholders with sustainability driven project performance.

This research performs an empirical investigation through mixed-method research as the appropriate research technique. Data collection of this research is carried out in two stages. A series of semi structured interviews were carried out with 16 experienced UK construction professionals. Prior literature were used to design the interview questions about different issues related to the stakeholder engagement, construction sustainability and construction project performance. The aim of the interview is to investigate the current issues and practices of the construction projects are facing relating to engaging stakeholder to make the construction sustainable to improve the construction project performance. Some of the hypotheses are generated relating to the findings from the interviews and literature reviews.

After analysing the interviews, a questionnaire is designed based on the findings from the interviews. Questionnaires were mailed to 500 UK construction companies and 233 (46 per cent) responses were received. The aim of this survey is to find out a structured and appropriate methodology to accomplish the requirements of making the construction sector more sustainable by improving its performance. Typically, questionnaires will be used to get the participants opinion in order to produce data to follow. These data will be used to test the hypothesis. These two approaches were adopted to align the participant's opinions and beliefs and to develop jointly acceptable strategies with agreed long-term, sustainable solutions.

Statistical Package for Social Science [SPSS] is selected and used to analyse the questionnaire responses. Correlation analysis revealed that the extent of the impact of stakeholder engagement to achieve the construction sustainability and improving the construction project performance. ANOVA revealed the variation of the perception of participant's roles and companies' strategic focuses towards the stakeholder's engagement, construction sustainability and construction project performance.

In essence, adhering to the various levels of implementation presented will ensure that construction sector can derive the maximum benefit from stakeholder engagement and that the decision-making process and the actions regarded as critical are taken into consideration. Based on the findings from the interview and questionnaire survey a conceptual framework is set out that underline the preparation and presentation of stakeholder engagement to improve the construction project performance through achieving construction sustainability. This derived framework demonstrates that such engagement can be valuable in anticipating the expectations of the different stakeholders from the projects, which may impact on behaviour. Finally, this research provides recommendations from both a theoretical and practical point of view to improve the stakeholder's impact on construction sustainability and construction project performance.

Content

Chapter Five: Interview Exploring the Interviews with the Industrial Participants

Chapter Six: Quantitative Data Analysis – Questionnaires Survey Results

Chapter Seven: Findings and Discussion

Chapter Eight: Conclusions

List of Tables

List of Figures

Chapter One: Introduction

1.1 Introduction

This chapter aims to provide an introduction to this thesis through a description of the study, research problem and rationale for the study. The research aim and objectives are outlined. The scope of the study is described and how the research question links to the proposed methodology is introduced. The next part of the chapter will outline the structure of the rest of the thesis discussion.

1.2 Background of Study

There is a going pressure on the construction sector to act responsibly and comprehensively to bring innovation in a sustainable way. The energy consumed in constructing, occupying and operating buildings accounts for about half of all the UK's carbon dioxide emissions, contributing to climate change, consuming non-renewable resources and adding to pollution. As the construction is suffering from a poor location, costly repairs, a terminal failure condition or under-utilisation and difficulty to cope up with the changing society and organisational needs, a growing interest for sustainability in construction has gathered momentum in recent times (Wyatt, 2000). By addressing on different risks and disruptions in construction sectors, one can make the construction more sustainable through positive changes. The practice of sustainability in construction not only helps the environment but also can improve the economic profitability and help to get good relations with stakeholder groups. McMullen, (2001, pp. 4) mentioned that "Many companies are pursuing sustainability because they are finding business value in it".

The construction industry has a major role to play, i.e. sustainable planning, sustainable design, sustainable construction, sustainable buildings and infrastructure (Hill and Bowen, 1997; Adetunji et al., 2003; Kaatz et al., 2006), to address the "triple bottom line" (TBL), a combination of environmental, economic and social concerns (Elkington, 1994). Triple bottom line (TBL) suggests that sustainability will be achieved in the intersection of social, economic and environmental performance, where a decision will not only result in economic benefit, but also affects environment and society in a positive way. There is a need to make progress against an appropriate research and development agenda, such that companies can participate in sustainability practising in a consistent, comparable and accessible way which has enduring value for both themselves and a diverse set of stakeholders, who are yet to be positively engaged in reporting processes and outcomes (Glass, 2012). Despite this interest,

the concept of stakeholder engagement, including its practical implementation, in terms of delivering sustainability is still relatively unexplored (Sachs and Rühli, 2005). Yang et al. (2009), also determined the importance of stakeholder engagement in construction projects to deal with issues such as complexity in many process and parties involved, temporary relationship among stakeholders and their different interests, poor understanding of their own duties and roles and finally to address the causes of time delays and cost overruns. Very little research has been done which focuses on how stakeholder engagement contributes to minimising the degree of project and stakeholder related risk and maximising the value to assist in providing sustainable buildings in a sustainable manner. This study is intended to develop a structure for integration, evaluation, investigation and engagement of stakeholders, for achieving sustainability to improve the construction project performance.

1.3 Research Aim

This research has a specific aim which is "To develop a framework for engaging stakeholders to achieve sustainability related project performance in construction".

1.4 Research Impetus

According to Bryde (2007), the issue of poor project management performance and sub-optimized practices on construction- related projects continues to be of concern to academics, practitioners and policy makers. The UK Construction Industry has an annual turnover of more than £100 billion and accounts for almost 10% of the country's GDP (Strategic Forum for Construction, 2010) and provides employment for around 3 million workers. The Construction Industry forms one of the most diverse and unstable sectors within the UK economy and it faces wide fluctuating demand cycles, project specific product demand, uncertain production conditions and has to combine a diverse range of specialist skills within geographically dispersed short term project environments (Dainty et al., 2001). Constructing, maintaining and using buildings for residence and employment have an immense impact on the environment, which is why sustainability in the construction industry is becoming increasingly important. The report "Strategy for Sustainable Construction" (Dobson et al. 2013) illustrates how seriously the government is taking the promotion of a sustainable construction industry. Its core aims are: to reduce the construction industry's carbon footprint and consumption of natural resources; and to create a safer and stronger industry by training and retaining a skilled and committed workforce. Government is committed to effective engagement with industry, and wider stakeholders in the construction arena.

The complexity in a typical construction project arises from the fact that it consists of a number of stages that represent different processes and involve different stakeholders. In this new global economy, engaging these stakeholders is increasingly becoming a part of construction project practice to deliver excellent project outcomes. As each stakeholder usually has their own interest in the project this may cause different priorities, conflicts and dramatically increase the complexity of the situation (Karlsen et al., 2008). Maintaining a good relationship with the construction supply chain partners helps the stakeholders to work together to increase the comfort and quality of life, while decreasing negative environmental impacts and increasing the economic sustainability of the project. The construction activities impacts on the environment all through the life cycle of infrastructures by taking out raw materials, erecting and using the facilities and having inadequate construction standards; the lack of sound urban planning regulations further aggravate environmental degradation (Majdalani et al., 2005). A number of research have been done on stakeholder management and construction sustainability but no one has emphasized on integrating stakeholder management with the construction sustainability to improve the construction project performance (Olander and Landin, 2005; Ei-Gohary et al., 2006; Olander, 2007, Chinyio and Akintoye, 2008; Smyth, 2008). Moreover, very few researchers have identified the issues that create obstruct to accomplish the sustainability in construction.

Considering all these above issues in construction the focus of this research project is on ways to gain sustainability by engaging stakeholders to minimise risks and maximise the project value along the construction project. This research is therefore motivated by the need to fill the above gap in knowledge by generating empirically tested data focused on the stakeholders' engagement and construction sustainability to improve the construction project performance that could underpin the decision making and implementation by the sector. In order to improve the construction sustainability related project performance, this research concentrates on engaging the stakeholder to improve the construction project performance through making the construction sustainable.

1.5 Main Research Questions

From the aforesaid issues this research attempts to answer the question "How does the stakeholder engagement influence to improve the construction sustainability related project performance?" To investigate these issues, this research poses several questions which are pertinent to the overall scope of research: -

Q1. What is the current trend of UK Construction Sector Implementing Stakeholder Engagement Process in terms of the achieving Construction Sustainability?

Q2. How does the Stakeholder Engagement Method influence to achieve the Construction Sustainability?

Q3. How do the Stakeholder Engagement's impacts on Construction Sustainability improve the Construction Project Performance?

Q4. What are the enablers and barriers for the Stakeholders to adapt the Sustainability in Construction?

Q5. What type of conceptual framework needs to be considered for engaging the Stakeholders to achieve Construction Sustainability by the adoption of robust and replicable methodology which could improve the Construction Project Performance?

1.6 Research Objectives

To support the overall aim of the research and address the research question the following objectives have been developed.

1. To identify the current level of stakeholders' engagement in relation to meeting the sustainability targets to improve construction project performance,
2. To analyse the impact of stakeholders on construction sustainability to improve project performance,
3. To explore the barriers and enablers to meeting sustainability targets within the construction sector,
4. To propose a conceptual framework for stakeholder engagement to achieve construction sustainability in order to improve the construction project performance.

1.7 Significance of Study

The conceptualisation of this research is guided by an extensive review of literature within a relevant theoretical construct. Earlier studies on stakeholder engagement were related to the manufacturing and service providing sector. Very few construction companies and various sub-sectors use the concept of sustainability in different ways and are not yet engaging with new methods of reporting to build an interactive relationship with stakeholders (Glass, 2012). It appears that this research has the potential to bridge the current gap in existing research and also contributes construction management knowledge on the theoretical development of stakeholder engagement in the construction sector. By providing a method of engaging stakeholders to achieve construction sustainability and improving the construction project performance, this research report could be used as a strategic document to influence the

direction of both the construction stakeholders and regulatory bodies concerned with improving the construction project performance through achieving the construction sustainability. Research has been carried out that considers production and manufacturing companies (Olson and Wu, 2010) and small medium sized enterprises (Faisal et al., 2007) but few authors have focused their research on the construction sector. This research study will fill that gap and make a contribution to knowledge and project management by developing the understanding of approaches for identification, evaluation, integration and engagement of stakeholders to achieve sustainability in construction sectors. Finally, this research will propose a conceptual framework which will identify the stakeholder's engagement relationship with construction sustainability related project performance. This framework will contribute to knowledge through integrating the stakeholder engagement with the sustainability targets and the improvement of the project performance in construction. The consideration of both the tactical and strategic impacts of comprehensive stakeholder engagement on construction sustainability aids the top management in making decisions for benchmarking project performance.

1.8 Developing Conceptual Framework

This paper proposes a conceptual framework to explore the factors that have an influence on stakeholder engagement to achieve the sustainability related project performance. A conceptual framework is designed based on the information collected from the interview findings and questionnaire findings. A conceptual framework is a device that organizes empirical observations in a meaningful structure (Shapira, 2011). The conceptual framework incorporates different dimensions into one area and it is used to make conceptual distinctions and organize ideas (Bhattacharya et al., 2013). The proposed framework incorporates stakeholder engagement, construction sustainability and construction project performance dimensions. The significance of this conceptual framework lies in its ability to incorporate different themes of the research objectives into a common ground. The purpose of the framework is to better understand the different factors of stakeholder engagement impacting on the construction sustainability targets and construction project performance.

1.9 Organisation of Thesis

Table 1.1 shows the contribution of Chapters in relation to the Research Objectives.

- **Chapter 1 – Introduction:** It provides an overview of the thesis structure and details the focus of the study carried out.

- **Chapter 2 – Critical Elements of Stakeholder Engagement and Construction Sustainability and Construction Project Performance:** It begins with the central concepts and prior literatures in the domain of construction sustainability, stakeholder engagement and construction project performance.
- **Chapter 3 - An Integrative Approach:** This chapter presents the integration of stakeholder engagement with construction sustainability and construction project performance. It also explains how integrating stakeholder engagement with construction sustainability improves the construction project performance.
- **Chapter 4 – Research Methodology:** It presents the methodology which is employed based on the conceptual framework, studies derived from the previous chapters. This chapter initially involves an analysis of the types of methodology. Qualitative and quantitative methodology is described followed by a discussion on the methodology and the grounds for its adoption. The use of triangulation is then presented in order to outline its purpose in improving the quality of the resultant data throughout the findings of the research.
- **Chapter 5 - Interview Analysis –** This chapter describes carrying out a series of interviews held with the key informants in the industry to validate the findings from the literature review in Chapter 2 and 3. The processes involved with the selection of interviewees are described along with a brief explanation of the interview process adopted and a summary of the outcomes at this stage in the research. This chapter seeks detailed information on the participants understanding and current implementation of construction sustainability to improve construction project performance and identification of stakeholder engagement program to achieve construction sustainability. This chapter also includes the development of deductive hypotheses to be tested in the confirmatory phase of the research.

Goals	Chapter
- To identify the current level of stakeholders' engagement in relation to meeting the sustainability targets to improve construction project performance,	Chapter Two: Literature Review Chapter Three: An Integrative Approach to Improve Construction Project Performance
- To analyse the impact of stakeholders on construction sustainability to improve project performance, - To explore the barriers and enablers to sustainability amongst the construction sector	Chapter Five: Interview Exploring the Interviews with the Industrial Participants Chapter Six: Quantitative Data Analyses – Questionnaires Survey Results
- To propose a conceptual framework for stakeholder engagement to achieve construction sustainability in order to improve the construction project performance.	Chapter Seven: Findings and Discussion

Table 1.1: The Research Goals of the Study

- **Chapter 6 – Questionnaire Analysis –** This chapter describes the large scale of questionnaire which is conducted within the specific population of construction sector throughout the UK. Several objectives of the study were developed in order to explore the extent of construction sustainability experience and the perceptions with regard to stakeholder engagement associated with successful implementation. Statistical procedures and analyses are presented along with research questions and hypotheses findings are obtained.
- **Chapter 7 – Findings and Discussion –** Discusses the results from relevant research methods employed in accordance with the conceptual framework established for stakeholder engagement to achieve construction sustainability related performance. Relevant findings from both exploratory and confirmatory phases are presented based around the aims and objectives undertaken for this research
- **Chapter 8 – Conclusion, Contribution and Direction for future Research -** Further conclusions of study are outlined in this final chapter. This chapter also provides a range of limitations of study and targeted recommendations from the identified results.

Figure 1.1 shows the systematic approaches which are followed to conduct this research –

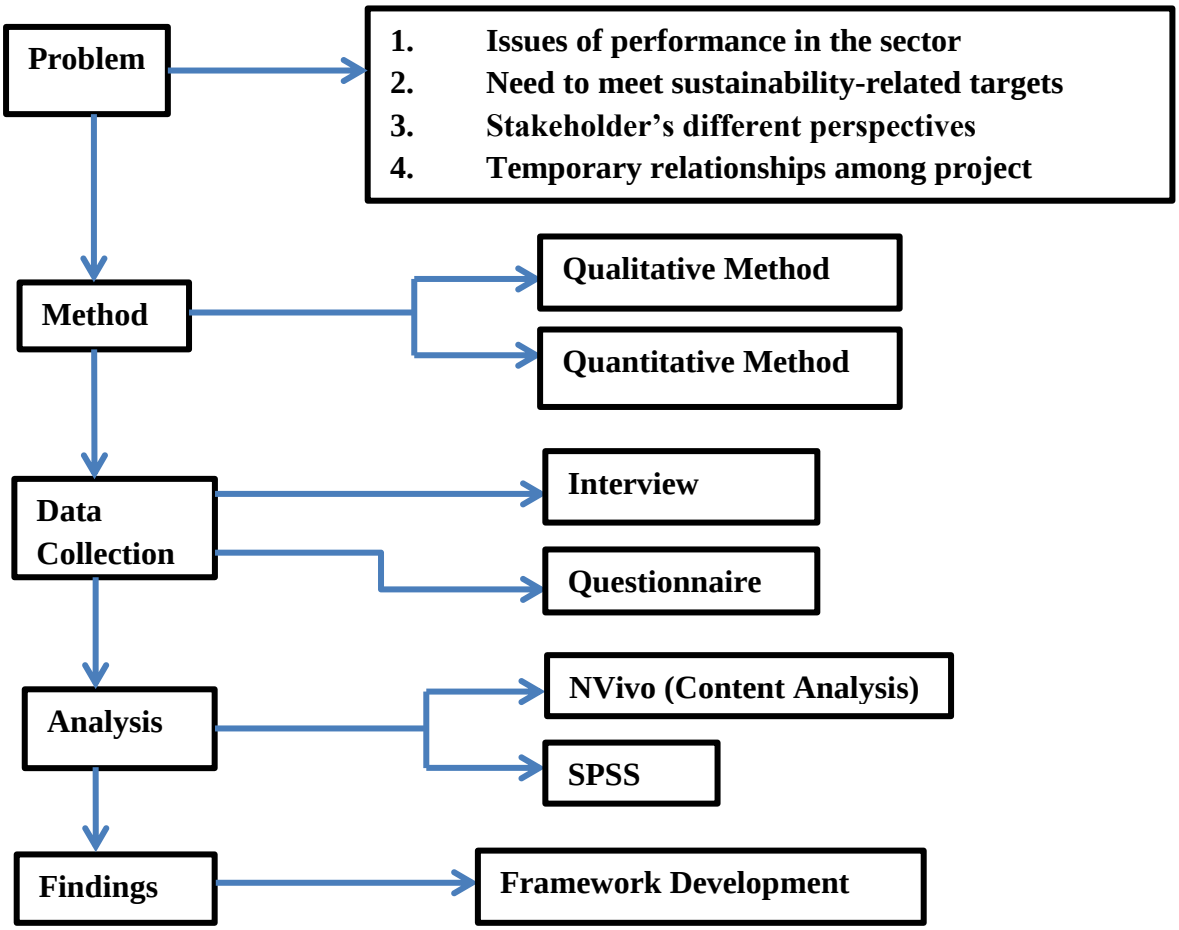


Figure 1.1: Research Approach

Summary

This chapter has provided the reader with an overview of the understanding of the importance of sustainability in the construction sector. It provides an idea of the contribution of stakeholder engagement in construction sustainability to improve project performance. This chapter also provides the aim and objectives and proposed methodology for the study along with how this study has the potential to contribute to existing knowledge in the Construction Sector and Construction Project Management. The next chapter will discuss the theoretical literature used to develop the ideas and concepts used within the study.

Chapter Two: Literature Review

2.1 Introduction

Given that the initial objective of the research is to identify and review the current level of performance of stakeholder engagement in relation to meeting the sustainability targets to improve the construction project performance. This chapters aims to present a critical review of the existing body of knowledge on construction sustainability, stakeholder engagement and construction project performance.

The chapter will begin with the definition and overview of construction sustainability practice that one must be familiar with in relation to the management measures. This leads onto a discussion of the literature regarding the concept of construction project performance. This will be followed by literature regarding current thoughts on the concepts of stakeholder engagement. This section also includes the introduction of the different stakeholder engagement processes identified from the prior literature, with attention being drawn to the breadth and complexity of these processes.

2.2 Concept of Sustainable Development

Generally, the concept of sustainable development is broad. It concerns the attitudes and judgment to ensure long-term ecological, social and economic growth in society through the efficient allocation of resources, minimum energy consumption, low embodied energy intensity in building materials, reuse and recycling, and other mechanisms to achieve effective and efficient short-term and long-term use of natural resources when applied to project development (Ogunbiyi et al., 2014). While the phrase "Sustainable Development" predominantly refers to a measure of effective use of resources and reduction of greenhouse in the mainstream literature, a holistic approach to quantification of sustainable outcomes in projects still remains a topic for investigation (Doloi, 2012). In 1987 the UN Commission on Environment and Development (The Brundtland Commission) used the term "Sustainable Development" to relate the concept of sustainability to human endeavour (Murray and Cotgrav, 2007). Sustainable development is becoming increasingly a major concern for world development since the Rio Summit in 1992 and one of the major challenges on the international agenda in the face of worsening indicators of most resource-use and worsening environmental impact (Djeflat, 2010). Sustainable development has become associated with business, not only through the ecological footprint left by industrial activity, but also in the

more general sense of how it is managing its economic, environmental and social impacts (Eskerod and Huemann, 2013). Achieving sustainable development knowledge begins with an exploration of the general definition of sustainable development and its three spheres; the economic, the ecological, and the social (Abidin et al., 2013). They also includes that sustainable development literacy includes the more traditional environmental and ecology, and if these literacies are absent some familiarity with them will be needed as a first step in sustainable development education. According to Cavagnaro and Curiel (2012, p. 50), on the societal level "the ultimate goal of sustainable development is securing the better quality of life for all, both now and for future generations, by pursuing responsible economic growth, equitable social progress, and effective environmental protection". This emphasis on social, environmental and economic outcomes is based on the triple bottom line model (Elkington, 2006; Wikstro¨m, 2010), and is grounded in systems theory and postulates that sustainable development can be achieved only when there in a balanced attention to all three main elements (social, environmental and economic) of the system. Figure 2.1 shows the themes of sustainable development.

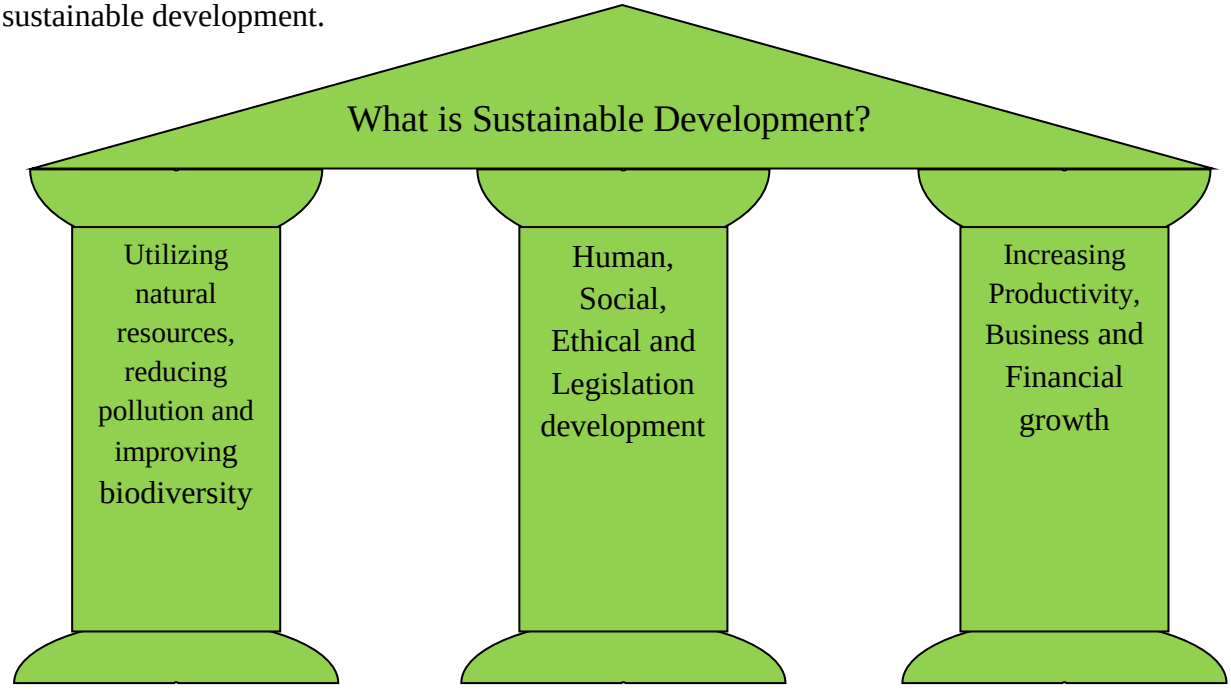


Figure 2.1: Themes of Sustainable Development

Knowledge can make substantial and essential, contributions to sustainability across a wide range of places and problems (Craig et al., 2013). A Knowledge system is viewed as consisting of a network of linked actors, stakeholders, organisations and objects that perform a number of knowledge-related functions (including research, innovation, development, demonstration, deployment and adoption) that link knowledge and knowhow with action

(Djeflat, 2010). Sustainable development education encourages learners to develop problem definitions from several perspectives, and most critically, from interdisciplinary and trans disciplinary critiques and perspectives (Abidin et al., 2013). Sisaye (2013) argued that a prerequisite is to develop sustainable construction is a satisfactory working definition of the concept, and Jickling (2000) argued that sustainable development education requires an adequate conceptualisation of sustainable development. The Bruntland Report 1987 (World Commission on Environmental and Development (WCED), 2007) stated that sustainable development needs to meet the needs of the present without compromising the ability of the future generations. It must be seen as a process, not a goal; it is a constantly moving target whose boundary domains evolve as the dynamics between the three imperatives shift (Abidin et al., 2013). They also mentioned that the goal of sustainable development is to explore the reconciliation of critical ecological, social and economic imperatives, and these imperatives need not be seen as completely ideological.

2.3 Concept of Sustainability in the Construction Sector

Sustainable construction is an emerging field of science that aims to incorporate the general sustainable development concepts into conventional construction practices (Matar et al., 2008). The government announced that by 2016 all new domestic buildings built in the United Kingdom will be zero emission on heating and cooling, with non-domestic buildings to follow by 2019. The terms "sustainability" is most commonly associated with such concepts as 'long-term', 'durable', 'sound', and 'systematic' (Ehnert, 2006). The term Green Build, Eco-Building and high performance building and sustainable construction are often used interchangeably in sustainability concepts (Presley and Meade, 2010; Kibert, 2008). Lindberg and Monaldo, (2008) indicated that the construction industry is a significant industry accounting for between 4 and 5 percent of the gross domestic product including building materials and associated professional services. Sustainable construction is the set of processes by which a profitable and competitive industry delivers built assets (buildings, structures, supporting infrastructure, and their immediate surroundings), which: enhance the quality of life and offer customer satisfaction; offer flexibility and the potential to cater for user changes in the future; provide and support desirable natural and social environments, and maximise the efficient use of resources (Ogunbiyi et al., 2014). The market for sustainable buildings is increasing as the construction industry has acknowledged that they may mitigate the impact on the environment and bring significant social and environmental benefits (Ries et al., 2006; Zhao et al., 2012; Thormark, 2006).

Construction organizations are currently engaged in the sustainability debate and are formulating business strategies to respond to the increasing demand from governments and the wider public for sustainable construction products (Zhao et al., 2012; Opoku and Ahmed, 2014). Pitt et al. (2009) found that financial incentives and building regulations, client awareness and client demand were the main areas that would force changes in company behaviours towards sustainability. The mission of the main body of the UK Green Building Council is to improve the sustainability of the built environment by radically transforming the way it is planned, constructed, maintained and operated (UKGBC website, 2009).

Murray and Cotgrave (2007) stated that the meaning of sustainability and sustainable development is evolving over time and commonly the terms are interchanged, as they are in this study, to broadly describe an approach that addresses the social, economic and environmental challenges mankind faces. The construction industry, which is important to improve the quality of life in terms of housing, workspace, utilities and transport infrastructure, is of high economic significance and has serious environmental and social consequences (Burgan and Sansom, 2006).

To help conceptualise sustainability the triple bottom line (TBL) is a catchphrase coined by Elkington as a three-pronged pursuit of "economic prosperity, environmental quality and social justice" (Elkington, 1998). Smith and Sharicz (2011, p. 135) defined triple bottom line (TBL) sustainability as "the result of the activities of an organization, voluntary or governed by law, that demonstrate the ability of the organization to maintain viable its business operations (including financial viability as appropriate) whilst not negatively impacting any social or ecological systems". DETR (2000), considered sustainable construction supports the triple-bottom line by embracing the following objectives:

- Being more profitable and more competitive;
- Delivering buildings and structures that provide greater satisfaction, well-being and value to customers and users;
- Respecting and treating its stakeholders more fairly;
- Enhancing and better protecting the natural environment; and
- Minimizing its impact on the consumption of energy (especially carbon-based energy) and natural resources.

2.3.1 Social Sustainability

Renukappa, (2012), mentioned that Sustainability does not stop at economic or environmental dimensions; there is a need for efficient and reliable housing, transport, energy distribution, health-care, communications and utilities. The social bottom line is the organisation's record of social or people performance as it affects employees, consumers, and communities (Renukappa, 2012). This also refers to fair, ethical, and beneficial business practices toward employees, community and region in which a corporation performs its business (Smith and Sharicz, 2013; Jones et al., 2014). Social sustainability identifies the needs of individuals considering their well-being (OGC, 2007). Renukappa (2012), stated that social performance shows stakeholder management especially with the workforce and the local community. Social sustainability requires that firms embrace the economic, legal, ethical, and discretionary expectations of all stakeholders, not only financial shareholders (Carroll, 2010).

2.3.2 Economic Sustainability

In triple bottom line economic bottom line is the organisation's record of economic performance (revenue and profit) and integrity (Zhou et al., 2013). They also mentioned that even though the companies make profits in the business where the profit is treated as the economic benefit for the enjoyment of the employees and community as a whole within a sustainability framework. Economic sustainability in construction focuses on the importance of stable economic growth and working within the capacity of the natural environment, adopting measures from fair and rewarding employment to compete and trade (OGC, 2007). The construction economic performance reflects the success of the organizations having in the marketplace and their stewardship towards shareholders (Sridhar, 2012). Zadek et al. (2005) defined the economic sustainability as the creation of material wealth, including financial income and assets for the organisation. He further mentioned organisations that wish to align their strategies, operations and communications with some or all of the principles of sustainability for whatever reasons will need to be able to understand, manage and communicate how their "economic impacts", are linked to social and environmental outcomes.

2.3.3 Environmental Sustainability

Environmental sustainability is concerned with protecting and conserving biodiversity and the environment, by reducing waste, preventing pollution and using natural resources efficiently (OGC, 2007). Environmental performance shows the compliance towards government

mandates and regulations and stewardship towards a group of environmentally aware customers. Operating under an environmentally sustainable perspective, organisations should use only natural resources that are consumed at a rate below of natural reproduction or at a rate below the development of substitutes (Renukappa, 2012). A sustainable environment ensures that it does not cause emissions that accumulate in the environment at a rate beyond the capacity of the natural system to absorb and to assimilate and it does not engage in activity that degrades eco-system services (Dyllick and Hockerts, 2002). The environmental sustainability's bottom line is the organisation's record of performance as it considers all the issues related with environmental sustainability concerns (Opoku and Vian Ahmed, 2014). They also mentioned that the environmental bottom line is the organisation's record of performance as it considers all the issues related with environmental concerns.

2.3.4 Drivers for Construction Sustainability

Improving the quality of life within the earth's carrying capacity to ensure equity within the current generation and between the present and future generation is the main focus of sustainability (Ogunbiyi et al., 2014). The UK Government has set an ambitious and legal binding target to reduce the national greenhouse gas emissions by at least 80% by 2050 with an intermediate target of a 34% reduction by 2020 (SteelConstruction.info, 2013, Arif et al., 2009). Royal Institution of Chartered Surveyors (RICS), were critical of the impact of carbon emissions, for example, although The Carbon Trust helps the UK move to a low-carbon economy, RICS (2006) believed that more needs to be done to reduce carbon emissions of existing buildings.

The government is driving the sustainability agenda with a number of fiscal incentives and introduced Landfill tax in 1996 at a cost of £7 per tonne of active waste and £2 per tonne of inactive waste (The Sustainability Construction Task Group, 2002; Pitt et al., 2009). This has increased gradually over the years and in the 2006 budget the chancellor proposed plans to increase this further by £3 annually for active waste until £35 per tonne level is achieved (HM Treasury, 2006; Pitt et al., 2009). To get rid from this situation and for business development most of the stakeholders feel that it needs to change the traditional approach they design and build the building specially to move on sustainable development (Saravanan, 2011). CIEF (2009) and Saravanan (2011), suggest sustainable construction as a solution for significant cost savings, to bring innovations and to enhance competitiveness for the long term survival of any organisation.

Pitt et al., (2009) and CIC (2003) considered the corporate and social responsibility practices that are also now a key driver for organisations to move towards the encouragement of sustainable practices, for example, companies listed under the FTSE4 Good Index and Dow Jones Sustainability Index seem to outperform companies rated under other indices. Diyana and Abidin (2013), considered 4 main drivers for green construction: financial, image, business strategy and ethical. Ogunbiyi et al., (2014) identified the drivers of sustainability are legislation, customer requirements, broad level support reputation and brand integrity, regulators, shareholders or investors' expectations, increasing competitive advantage, business pressure, government policy and regulation, new client procurement policies, environmental concerns, long-term survival of business, improved corporate image, cost savings/operational efficiency, enhanced relations with suppliers, peer pressure within the industry and increased realisation of the importance of construction image. Arif et al, (2008) proposed regulations, cost savings through reduction in energy costs and waste minimization, promotion of corporate green image and corporate social responsibility as the major drivers behind adaptation of green. After conducting an in-depth interview with 49 infrastructure stakeholders Ku¨htz (2007), considered the fundamental role of education, culture and way of thinking for the implementation of sustainability in construction.

2.4 Construction Sustainability Awareness

To promote the required awareness for sustainable construction among defined stakeholders different researchers and authorities have taken different approaches. A recent review of sustainable building activity found that a very small proportion of England's building stock can claim to be sustainable in any way, whether judged on sustainable construction, design or performance in use (Williams and Lindsay, 2005). Smith (2012) states that attitudes towards sustainability need to be changed so that people can adopt a deeper learning approach when being taught about sustainability. Haugh and Talwar (2010), discussed various learning strategies used for embedding sustainability in organizations, including action learning, field projects, and knowledge management. A comparison of articles on institutionalizing ethical business cultures (Ardichvili and Jondle, 2009; Foote and Rouna, 2008); and embedding sustainability in organizational cultures (Garavan and McGuire, 2010; Garavan et al., 2010) shows that in both cases the ultimate goal to adopt sustainability is to achieve lasting changes in employee attitudes and behaviour, as well as in organizational value systems. Much emphasis has been given to the role of management training and managers as role models (Smith, 2012; Craig and Allen, 2013). The UK Govt. took the initiatives to achieve the

excellence in construction to sustain improvement in construction procurement performance and in the value for money achieved by government on construction projects, including those involving maintenance and refurbishment (BREEAM, 2013). Alternatively Bryant and Eves, (2012) stated that the increase in sustainability awareness has been driven by the need for comfort rather than an awareness or concern for energy use. As awareness is a key issue in sustainability, education is necessary (Alkhaddar et al., 2012).

However, a different highly informative article explores advocates that experiential learning has a key role to play in developing the awareness of sustainability (Garavan et al., 2010). One of the dominant theories in strategic management, the resource-based theory of the firm, postulates that human resources and knowledge and intellectual capital are the key sources of long-term, sustainable competitive advantage (Sisaye, 2013). However, despite an overall increase in consciousness and efforts to pursuit of sustainability, the general scenario appears to be one of the increasing commitments by a small group of supporters, rather than the emergence of a renovated mass culture (Renukappa et al, 2012). One of the reasons for this difficulty is that the philosophical underpinnings of sustainability may not be well understood by the population (Onwueme and Borsari, 2007). Therefore, a question confronting most organisations that have implemented or are planning to implement in the near future is: what does sustainability mean to them; what sustainability initiatives can be pursued; and how business should shift into a true sustainability framework yet remain within the confines of the dominant competitive market model (Ehrenfeld, 2005; Hart, 2005; Laszlo and Zhexembayeva, 2011).

2.5 Barriers to Construction Sustainability

The additional financial cost of providing the measures to improve the sustainability of construction was cited by many of the social housing project managers as being a major barrier to the realisation of their schemes (Arif et al, 2008; Sponge, 2004). Despite concerns about energy use since 1970s, it can be perceived that ordinary citizens have not yet understood the necessity of changing attitudes and behaviour for more rational use of energy and Sustainable Development implementation (Kühtz, 2007). BSHF, (2013), noted that UK construction industry is at present suffering from a number of problems that includes:

- A shortage of skilled labour
- Under-investment in training
- A poor image that leads to the inability to recruit newcomers into the industry

• Inefficient working practices
• A lack of coordination and communication between the partners responsible for different aspects of the project

Sponge, (2004) identified affordability as one of the key barriers to sustainable construction. Sponge also identified that one of the key barriers to develop a more "sustainable" industry was a lack of understanding of key issues and many of its respondents stated that sustainability should be a "cornerstone in education for construction". Telegan (2005), considered Education and Training as a sustainability barrier and stated that one of the more frequently raised issues concerning sustainable design is consideration of the maintenance of a building and knowledge of its materials and systems. Telegan Also considered Vision and Leadership as obstacles that deserved more in-depth study because without them, any significant push for sustainable design method is impossible.

Sobol, (2008), considered that a lack of understanding of the importance of governance for sustainability and for local development has been identified on the practical level of local policy making. Sobol also indicated the inactivity of inhabitants as one of the key problems in the context of local sustainable development and this inactivity can be perceived as a barrier, because when people are not engaged in a process, they do not feel important and responsible for it. Warren-Myers (2013) mentioned that due to the values lack of reporting or consideration of sustainability in the valuation process, valuation is considered to be the barrier to investment in sustainability. Weber (1997) considered that lack of awareness of using energy efficiently, organisational and peoples traditional behaviours as big barrier to adopt sustainability.

Arif et al, (2008), considered poverty, lack of technology, adverse impact of cultural evaluation, lack of sustainability knowledge, less research and development in greener issues, as obstacles to adopting sustainability in construction and also suggested that these lists can provide practitioners, regulators, and academics with knowledge about means to focus their future efforts in implementation of green. Based on the organizational and financial barriers Richardson and Lynes (2007), have identified some of the obstacles from the previous literature: higher initial capital cost; low levels of innovation among designers/architects, weak building processes and policies, lack of quantitative sustainability indicators, lack of internal leadership regarding sustainability issues; lack of collaboration/communication –

harnessing academic knowledge and internal skills; financial constraints (Hydes and Creech, 2000; Johnson, 2000; Orr, 2004; von Paumgartten, 2003).

2.6 Construction Project Performance

Project success has different meanings to the different people. Hence what needs to be done to improve project performance (PP) has been voiced as a perennial and troublesome problem in construction (Love et al., 2011; Zhang and Fan, 2013). The project manager needs to control the project performance in the early stages of the construction process as the pre-project stage hasn't always performed well in the construction industry and as a result it has suffered from poor performance due to poor project scope definition, changes that result in cost overruns and time delays (Gibson and Hamilton, 1994; Zhang and Fan, 2013).

Albert and Ada (2004), mentioned that the criteria of project success are constantly enriched. They also mentioned that a systematic critique of the existing literature is needed to develop the framework for measuring construction success both quantitatively and qualitatively. The performance of the construction industry has been comprehensively reviewed in recent years. The reports prepared under the direction of Sir Michael Latham and Sir John Egan, (Constructing the Team and Rethinking Construction), are key examples. Within each of these reports performance targets are set. The Latham Report proposes a "30% reduction in cost" (Latham, 1994: p.80), whilst Egan's targets include "annual reductions of 10% in construction cost and construction time and defects in projects should be reduced by 20% per year" (Egan, 1998). Generally, for projects of medium and small scale, Project Managers may achieve project success eventually through the good use of strong technical knowledge and intelligence quotient (IQ), though their Emotional Intelligence levels are relatively low (Zang and Fan, 2013). Neely et al. (2002) defined performance measurement as the process of quantifying the efficiency and effectiveness of past actions and a performance measure was defined as a parameter used to quantify the efficiency and/or effectiveness of past actions. Bititci et al. (1997) explained the distinction between performance management and measurement, and defined the performance measurement as the process of determining how successful organizations or individuals have been in attaining their objectives, while the performance management as a closed loop control system which deploys policy and strategy, and obtains feedback from various levels in order to manage the performance of the system.

In response to calls for improvement of the Business Performance Measurement, several new performance measurement frameworks are incorporating financial measures and Business Drivers have emerged in the management literature (Lynch and Cross, 1991). Some examples include: the performance measurement matrix (Keegan et al., 1989); the performance pyramid (Lynch and Cross, 1991); the balanced scorecard (Kaplan and Norton, 2001); and the "Baldrige" Award (Anonymous, 1999). Eriksson (2010) considered that improving the construction supply chain collaboration and performance is central for achieving short-term business objectives as well as long term competitive advantage to improve the project performance (Eriksson 2010; Moore and Dainty, 1999). Eriksson (2010), also considered that lean thinking is an approach that has been adopted in many different industrial settings as a means for improving the construction project performance. Haponava and Al-Jibouri (2009), argued that other factors such as, for example, the quality of relationship between the stakeholders involved and their flexibility have a great effect on the project's success. However, measurement of the performance of the construction projects on the basis of time, cost and quality is in many cases insufficient to ensure project success (Ward et al., 1991; Mohsini and Davidson, 1992; Ghalayini and Nobel, 1996).

2.6.1 Key Performance Indicators (KPI's) to Measure the Construction Project Performance

In construction, attempts have been made over recent years in several countries to establish and measure construction performance over a range of its activities to meet a set of improvement targets. A performance indicator is a measurement of performance (Fitz-Gibbon, 1990). KPIs are general indicators of performance that focus on critical aspects of outputs or outcomes (Chan and Chan, 2004). In response to Egan's (1998) Rethinking Construction report, Constructing Excellence (CE) launched the first set of UK construction industry KPIs in 1999, addressing many other critical issues such as safety, productivity, profitability, predictability, and client satisfaction (Constructing Excellence, 2006). The results of such attempts have produced a number of indicators; see for example, KPIs in the UK (DETR, 2000), the construction performance measures developed by the CII in the USA and KPIs developed by the CDT in Chile (CDT, 2002).

Feurer and Chaharbaghi (1995) developed tools for measuring performance and recommended to keep the focus of measurement on processes rather than on the functions of the project. Koskela (2000) highlighted that project performance is an important feature of

performance indicators to improve process transparency so that the relevant and invisible attributes of the process become visible. In recent years, the most important performance indicators include client satisfaction, business performance, health, safety, environment, and so on (Yu et al., 2007).

2.7 Construction Project Stakeholders

In one early study, Freeman (1984), defined the stakeholder in an organization as any group or individual who can affect or is affected by the achievement of the organization's objectives. They can be grouped as owners, non-owners, rights holders, contractors, influencers, resource providers and dependents of the firm (Mitchell et al., 1997). Hill and Jones (1992) argued that those people who have legitimate claim on an organisation are stakeholders. Carroll (1993) agrees with Hill and Jones but adds that it also includes those who can exact influence over the organisation. Clarkson (1995) has sought to narrow this claim to some form of risk. Thus, for him a stakeholder should have some form of capital either financial or human put at risk by an organisation's activities. Table 2.1 depicts some of the different stakeholders to construction projects.

According to PMI Standards Committee (2000), project stakeholders are defined as, individuals and organisations who are actively involved in the project or whose interests may be affected by the execution of the project or by a successful project. The conception of stakeholder has taken on greater importance due to public interest, greater coverage by the media and concerns about corporate governance (Mainardes et al., 2011). Stakeholders in fact, have the capability to influence the project and receive both gain and loss from the success or failure of a system. They are interested in participating in the formulation and implementation that follow the successes of the project. Stakeholders are important for a successful completion of the project because their unwillingness to continuously support the vision or objectives of the project leads many projects to fail. A project could also fail if the relative power or positions of key stakeholders are not properly recognised and the stakeholder management activities are not appropriately adjusted. Clarkson (1995) used the ‘‘affect criterion’’ in order to identify primary stakeholders for companies as: shareholders and investors, employees, customers, suppliers, governments and communities.

Classifying the stakeholders is the first step of stakeholder analysis. These stakeholders can be classified into groups to aid effective management (Clarkson, 1995). Primary stakeholders

Category	Type of Individuals
Internal Stakeholders	Director, Analyst, Research Scientist, Project Manager, Environmentalists, Conservationists, Archaeologists
External Stakeholders	Local Authority/council, Providers, Service users, Customers, Suppliers, Funders, Quality Assessors, Media, buyer, distributors, Local Residents, Contractor, Sub Contractor
Primary Stakeholders	Shareholders, Investors, Employees, Customers, Local Communities, Suppliers, Other Business Partners, future generations non-human species
Secondary Stakeholders	Government, regulators, civic institutions, social pressure groups, media and academic commentators, trade bodies, competitors, Environmental pressure groups
Influencing the Project	Developer, Client, Owner, Investor, Designer, Banks, Insurance, Professional consultants such as architectural, financial, structural, engineering etc
Influenced by the Project	Users of the buildings, spaces, facilities etc. Local/surrounding community members, General Public, Local community groups such as resident associations, or other community-based groups, Regulatory agencies, Specific demographic groups such as those based on race, The media etc
Demand Side	Client Customers, Client Employees, Client Tenants, Client Suppliers, Financiers, Client
Supply Side	Mechanical Suppliers, Architects, Engineers, Principle Contractors, Trade Contractors
Others	Environmental/social campaigning organisations., Researchers/ Academics, Media, Others who may be interested Potential users/clients for future projects

Table 2.1: Different Construction Project Stakeholders (Mathur et al., 2007)

generally include investors, employees, customers, suppliers and the company's stockholders (O'Higgins and Morgan, 2006). O'Higgins and Morgan, (2006), mentioned some "public stakeholder groups" (e.g. government and communities) are also primary as they provide infrastructure for the company's operations. Secondary stakeholders, on the other hand, have been defined by Clarkson (1995: p. 95) as "those who influence or affect, or are influenced or affected by, the corporation, but they are not engaged in transactions with the corporation and are not essential for its survival". They are less influential but have some level of power to garner support and affect the organisation (Frooman, 1999). Persson and Olander, (2004), classified the stakeholders in a project into internal and external stakeholders. Internal stakeholders are people who are already committed to serving the organization as board members, staff, employees and management and donors. External stakeholders are people who are impacted by the organisation as clients/constituents, community partners, customers, competitors, suppliers and others.

2.8 Engaging Construction Stakeholders

The logic of stakeholder engagement is that once an agreement has been reached based on mutual respect, dialogue and collaboration, there is less conflict (Ihugba, 2012). The Institute of Social and Ethical Accountability (ISEA, 1999; p. 91) defines stakeholder engagement as "the process of seeking stakeholder views on their relationship with an organisation in a way that may realistically be expected to elicit them". Simultaneously, a number of institutions and professional bodies worldwide are also attempting to provide elaborate guidelines for building and managing effective stakeholder engagement and reporting (Boesso and Kumar, 2008). It appears logical that the more importance a firm attaches to a stakeholder group, the higher will be the level of interaction between the firm and the stakeholder group and the more frequent will be the stakeholder dialogues addressing the interests of the group, through a variety of communications (Boesso and Kumar, 2008). Stakeholder engagement is crucial as it assists in achieving the goal of delivering the project on time, to budget and to quality (Romenti, 2010; Sallinen et al, 2013). Engaging stakeholders in business models allows the organizations to build up their ability to deliver value in the project more efficiently and consequently to satisfy the need the multiple categories of stakeholders (Mathur et al., 2007).

A number of researchers considered Stakeholder Engagement as the key to sustainable development of any project and is crucial in achieving the goal of delivering the project on time, to budget and to quality. According to Johansson (2008), stakeholder engagement is important for a projects success because it helps an organization to achieve its strategic objectives by involving both the external and internal stakeholders to create a positive relationship among them through good management. Engaging different stakeholders in the construction sector allows the organizations to develop the ability to deliver value to their stakeholders more efficiently and consequently, to enhance their ability to satisfy the needs of multiple categories of stakeholders (Yang et al, 2009). According to Romenti (2010), engaging stakeholder acts as a lever that can propel and translate corporate identity into concrete organizational behaviour. He also added that, it allows the organization to be consistent and maintain a temporal alignment between stakeholders' expectations and organizational behaviour.

Andriof and Waddock (2002), noted that one of the major manifestations of the belief that trust and cooperation could give firms a competitive advantage is the development and popularity of the stakeholder engagement approach. That trustworthy and cooperative

relationships can result in competitiveness are also based on arguments from the proponents of relational contracting (Foo, 2007). Yang et al (2009), noted that Stakeholder Circle tool certainly can support the project manager to develop the stakeholder engagement strategies, but the weighing value of the stakeholder attributes is somewhat subjective and it cannot reflect the interrelationship of the entire stakeholder relationship network. Researchers (Foo, 2007; Mathur *et* al. 2007; Yang *et* al. 2009; Haigh and Sutton, 2012) mentioned ranges of perspectives that are important for engaging stakeholders. Loosemoore (2010) emphasized on technical communication while technology is often associated with traditional scientific approaches to risk management which can offer a potential solution to stakeholder engagement. By giving importance to stakeholder mapping, Mathur *et* al. (2007) mentioned that appropriate engagement techniques at different stages of a project and understanding any potential conflicts make the mapping effective. Yang et al (2009) considered that Stakeholder Engagement is important in managing construction projects and also mentioned the reasons for engaging stakeholders in construction projects include:

- The construction projects are complicated with many process and parties involved.
- The relationships among stakeholders in construction projects are temporary.

Researchers indicated different requisites to make the stakeholder engagement process successful. Table 2.2 indicates that extended research has been done on stakeholder engagement and different standpoints are used as a provision of engagement process. Communication between the stakeholders is considered to be important as it ensures the involvement of all stakeholders through reducing conflict and generating new ideas (Loosemore, 2010; Dawkins, 2004). To make the engagement process more effective researchers (Spitzeck and Hansen, 2010; Johansson, 2008; Ihugba, 2012) also considered the importance of managing the stakeholders as it keeps them more organised and active. Researchers (Mainardes et al., 2012) considered that through managing stakeholder's relationship, organizations can understand stakeholders' needs and concerns and develops approaches to proactively inform, involve and inspire stakeholders to build rights to engage them. Researchers also investigated whether stakeholder analysis and mapping enables the organisation to identify the individuals with a concern or interest who need to be involved (O'Higgins and Morgan, 2006; Mathur et al., 2007). Similarly, after involving project stakeholders different academics considered managing stakeholder risk and stakeholders' performance as it is important to protect and maximise the stakeholder value (Cooper, 2007).

The following table provides a detailed summary of the extant literatures on stakeholder engagement. They are presented in reverse chronological order:

Study	Year	Country of data collection	Main Findings	Methodology
Meding et al.	2013	UK	- Stakeholder management and corporate culture are key areas of an organisation's success, and that this importance will only grow in future,	Semi-structured interviews, Questionnaire Survey
Eskerod and Huemann	2013	World Wide	- The research findings suggest that stakeholder issues are treated superficially in the project management standards, while putting stakeholder management in the context of sustainable development would ask for a paradigm shift in the underpinning values. - It also suggests that the current project stakeholder practices represent mainly a management-of-stakeholders approach,	Analyses of selected PM standards: the Guide to the Project Management Body of Knowledge, the International Competence Baseline, PRINCE2
Ihugba	2012	Nigeria	- Stakeholders Engagement appears controlled and lacking in authenticity; and a framework of stakeholder engagement needs to be developed to improve informed and balanced stakeholder participation and progressive Corporate Sustainability Reporting programmes.	Case Study: British American Tobacco Nigeria (BATN)
Mainardes et al.	2012	Portugal	- To explain the relationship between the stakeholder and the organization, the traditional needs-satisfaction vision was expanded, - Simplifying stakeholder classification and in explaining the relationships between parties.	Semi-structured interviews, Questionnaire Survey
Ayuso et al.	2011	World Wide	- Engaging with key stakeholders of the firm – internal and external – has a positive impact on a company's sustainable innovation orientation.	Questionnaire: n = 656
Harvey	2011	UK	- Stakeholder analysis is important to measure issues such as trust and perception of risk, - Organizations need to consider stakeholder's influence so that by anticipation of influence some attempts need to manage proactively instead of reaction-based management	Conceptual Paper, literature review
Lam et al.	2010	Hong Kong	- The overall research finding was to use sustainable materials by drawing up suitable clauses and collaborating with the stakeholders (architects, engineers and surveyors) to get up-to-date feedback from them.	Interview: 16
Spitzeck and Hansen	2010	UK	- The research finds that stakeholders are granted a voice regarding operational, managerial as well as strategic issues.	Case Study: 46 Companies
Loosemore	2010	Australia and New Zealand	- Multimedia is a highly effective, engaging, and innovative way to capture and harness stakeholders' collective knowledge in managing risks and opportunities.	Case Study: Australian and New Zealand Health authorities
Yang et al.	2009	Worlwide	- Very few methods and tools are available to identify all stakeholders and their interests, - Limited studies involve the change management about the stakeholders' influence and relationship, - Few studies are capable of reflecting the influence of the entire relationship network in practice	Conceptual Paper, literature review
Boesso and Kumar	2008	Italy and USA	- This paper prioritized the stakeholders according to their power and legitimacy and this prioritization put the greater effort to engage the stakeholders.	Conceptual Paper

Johansson	2008	Sweden	- This paper proposed a stakeholder system model introduced by Simmons and Lovegrove (S&L model) to demonstrate how organisations can be managed in order to achieve organisational sustainability.	Case Study: Case organisation was a Swedish clothing design enterprise
Lim and Yang	2008	Australia	- This research identified the different perceptions and priority needs of the stakeholders and issues that impact on achieving sustainability objectives to develop sustainable infrastructure.	Interviews: group of 20 senior and high-ranking infrastructure project stakeholders
Co and Barro	2008	USA	- Two groups of stakeholder strategies are identified: aggressive strategies and cooperative strategies. Aggressive strategies feature some form of forceful attitude or behaviour toward stakeholders in an attempt to alter other stakeholders' behaviour. Cooperative strategies feature supportive attitudes or behaviours towards its stakeholders	Conceptual Paper, literature review
Cooper	2007	UK	- There are ethical and practical difficulties with calculating value with stakeholder resources, - It seems to prefer a multi-dimensional approach to stakeholder performance measurement that does not use any particular valuation.	Conceptual Paper, literature review
Mathur et al.	2007	UK	- The study revealed the importance of identifying and mapping the stakeholders for stakeholder engagement to bring sustainable development.	Conceptual Paper, literature review
Foo	2007	UK	- Existing interpretations of stakeholder theory and corporate social responsibility are heavily influenced by the west and developed countries. Firm-stakeholder interactions are overwhelmingly rule-governed will develop a trustworthy and cooperative relationship with stakeholders result in competitiveness.	Examines a range of current theories
O'Higgins and Morgan	2006	Ireland	- To rate these stakeholders on salience as represented by power, legitimacy and urgency and to describe extent and intensity of their party engagement with these stakeholders.	10 Political Parties
Adam & Frost	2006	Europe, Australia	- Understanding of the advantages of using the web as part of a communication strategy on all aspects of corporate performance, - Lack of resources made available for web-based communication limited its potential.	Questionnaire: 150; Interviews: 3 European, 3 Australian
Persson and Olander	2004	Sweden	- This study proposed the Stakeholder-Urban Evaluation (STURE) model which systematises the input of sustainability factors, depended on the Stakeholder's views and demands.	Conceptual paper: estimating methods and evaluating tools
Dawkins	2004	UK	- Effective communication depends on a clear strategy which evaluates both the opportunities and the risks to the brand and tailors the messages to different stakeholder groups, - Works as coordinated approach - Internal communication as an under-utilised and potentially powerful channel for enhancing a company's reputation for responsibility among its key stakeholders	Case Study
Gregory	2003	UK	- Demonstrates how active stakeholder involvement formulates an effective mission and organisational structure which determine management priorities and organisational behaviour.	Case Study: National Health Service Mental Health Trust

Table 2.2: Detailed summary of the extant literatures on Stakeholder Engagement

Given the limited number of empirical works available regarding the different process of engaging stakeholders, it is imperative to note that one must be cautious when utilising construction industry reports and generalising research findings from broad stakeholder groups carried out 10 or more years ago, as to grasp the gap/missing elements that may affect future development of the focus area. Overall, results from the precedent works have revealed that communication with stakeholders, managing stakeholders, stakeholder analysis and mapping, stakeholder performance measurement, stakeholder risk management have significant impact on the success of Stakeholders' Engagement. As a comprehensive set of management objectives, all these processes are outlined below -

2.8.1 Communication with Stakeholders

Communication plays a vital role as people try to regulate their own activities and to participate in efforts to reach common ends (Birth et al, 2008; Siew et al, 2013; Wright, 2009). Gregory (2003), emphasized on maintaining dialogue to engage stakeholder for mutual understanding and this dialogue enables partners in discussion to exchange views in order to reach agreement on cultural structures, action and events. Gregory also mentioned that rigorous debate helps to discover truth, increases knowledge, exposes the reasoning processes and facilitates the formulation of correct choices and policies. Rondinelli and London (2002) highlighted on information flow for effective communication among the stakeholders. The demand for information from a broader group of stakeholders has resulted in the development of a variety of forms of stakeholder dialogue (Payne and Calton, 2002; Rondinelli and London, 2002; Carlone and Hill, 2008). Adams and Frost, (2006) considered that the internet has become an increasingly important media for corporate communication. Some companies are taking this a stage further and using the internet as part of a stakeholder engagement strategy involving dynamic interaction as expectations regarding the roles of companies with respect to their stakeholders change (Andriof et al., 2002).

Siew et al, (2013), revealed that to meet the demands of a diverse group of stakeholders, corporations have used a variety of media in an attempt to present social and environmental information in a form accessible to stakeholders. It also quickly builds a bond that sets the foundation for trust and ultimately lasting business relationships. The 450° feedback process ultimately implemented was designed to provide partners with the tools to compare self-perceptions of their performance (and what they thought they were doing, and how they were acting) with averaged ratings provided by others representing a number of different working

relationships (Burström and Jacobsson, 2013). By receiving feedback, both from members of the "internal" engagement team (i.e. direct reports, peers, and supervisor), as well as external clients, partners use the data to develop a composite picture of their service relationships. Grunig and Grunig (1992) suggest that ''symmetrical dialogue'' is a superior form of Communication among the stakeholders where both parties are involved in a ''conversation'' (Andriof, 2001) where information is exchanged and knowledge acquired. Chan and Tam (2000), analysed 110 building completed projects and found that most of the projects' target is to provide the customers, project managers, designers and contractors with information that can help them become more efficient with their limited resources and, as a result, achieve better quality outcomes.

There are specific challenges inherent in communicating on corporate responsibility. The challenge for companies trying to communicate in this space is that different stakeholder audiences have different expectations of companies, different information needs and they respond differently to the various communication channels available. In particular, against a backdrop of public cynicism towards companies, the credibility of corporate messages on social, environmental and ethical issues is often called into question (Dawkins, 2004). By putting stakeholder engagement at the centre of the reputation development model, corporate communication reaches its full potential by assuring, a continuous alignment between corporate identity and organizational behaviour on the one side, and between stakeholders' expectations and organizational behaviour on the other side (Romenti, 2010).

2.8.2 Stakeholder Management

The concept of stakeholder management has gained considerable attention in the field of management recently and has its origins in the resource-based theory of the firm (Loosemore, 2010). Stakeholder management is becoming increasingly recognised as a central element in the effective stakeholder engagement (Meding et al, 2013). However, Newcombe (2003) pointed out that different stakeholders have different levels and types of investment and interest in construction projects and can be seen as multiple clients or customers for the project in which they are involved. In reality, no stakeholders are identical according to their interests and power. If their interest could not be met up finally it will jeopardise the project objectives and its smooth implementation (Meding et al, 2013). Cleland (1999) offers a process for managing stakeholders being: identifying appropriate stakeholders; specifying the nature of the stakeholder's interest; measuring the stakeholder's interest; predicting what the

stakeholder's future behaviour will be to satisfy him/her or his/her stake; and evaluating the impact of the stakeholder's behaviour on the project team's latitude in managing the project. As a stakeholder management approach assists in making partners and maintaining good communication, it helps the project participants to work together to face the challenge (Kolk and Pinkse, 2007). According to Gareis et al., (2013), the aim of organisational sustainability will be accomplished if the organization can continue to meet the wants and expectations of the stakeholders. Meding et al, (2013), considered that stakeholder management is a proactive approach that stops things going wrong in the first place. The importance of effective stakeholder management can be evidenced when considering the assertion of Kolk and Pinkse (2007) that "stakeholder mismanagement", is actually characterised by a lack of moral responsibility. Figure 2.3 shows project management of stakeholders as interpreted by Cleland (1986).

Loosemore (2010) mentioned, Stakeholder management theory conceives an organization as a complex, dynamic and interdependent network of multidimensional relationships with a wide variety of stakeholders. A sustainable development perspective is applied in managing project stakeholders if the following principles are considered (Gareis et al., 2013):

- to consider underpinning values for decisions,
- to consider and balancing the project stakeholders' economic, ecologic, and social interests;
- to broaden of the temporal scale to consider not only short-, medium-, but also a long-term perspectives, including considerations of future stakeholders; and
- broadening of spatial scale to consider local, regional as well as global project stakeholders who are even further away from the project.

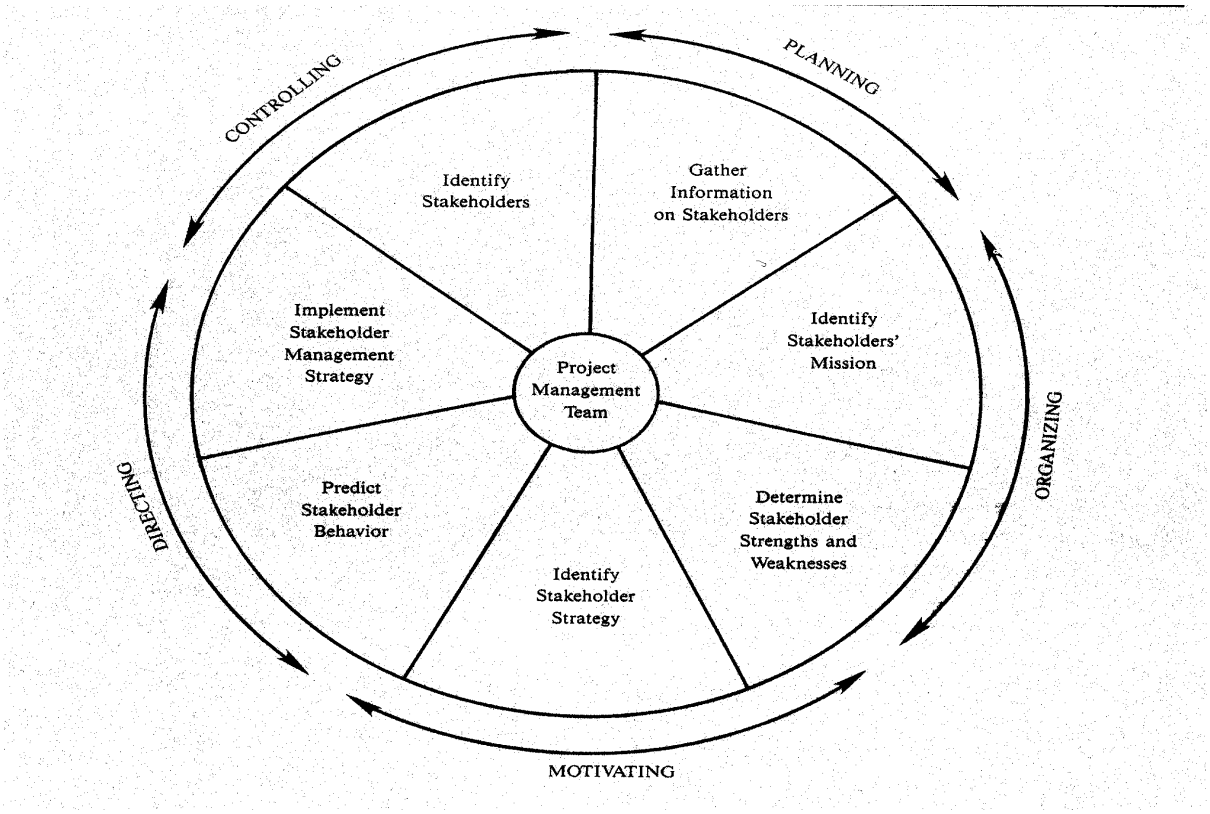


Figure 2.2: Project Stakeholder Management Process (Cleland, 1986)

Persson and Olander (2006) mentioned that a successful management of stakeholders ensures to engage them properly via actively giving them support and working together to devise, plan and develop new business solutions. Rowlingson and Cheung (2008) argued that modes of stakeholder management will lead to learning and innovation. Meding et al, (2013), suggested that in the future, companies might address the demands of corporate culture alongside consideration of stakeholder management approaches, given the identifiable relationships that have been established between the two.

2.8.3 Stakeholder Mapping

Mapping is an important step to understand who the key stakeholders are, where they come from, and what they are looking for in relationship to the business (BSR, 2011). Because of the complexity of relationships, one decision making can cause stakeholders' various reactions, and the project manager should balance the interests of the entire stakeholder set (Yang et al, 2009). Therefore, to describe how organisations respond to stakeholders, scholars must consider how the multiple and interdependent interactions of stakeholder relationships in a project system influences the Organisation's behaviour (Rowley, 1997). Bourne (2005), proposed stakeholder circle, to map stakeholders as a means to provide a useful and effective way to visualise stakeholder power and influence that may have pivotal impact on a project's

success or failure. The stakeholder-circle tool is developed for each project through a methodology that identifies and prioritises key project stakeholders and then develops an engagement strategy to build and maintain robust relationships with those key stakeholders (Bourne and Walker, 2008).

Many researchers (Newcombe, 2003; Bourne and Walker, 2005) use the power/interest or impact matrix to analyse the impact of stakeholders in a project which indicates the kind of relationship a project manager wishes to establish with each group. Stakeholders can be mapped by identifying appropriate stakeholders; specifying the nature of the stakeholder's interest; measuring the stakeholder's interest; predicting what the stakeholder's future behaviour will be to satisfy him/her or his/her stake; and evaluating the impact of the stakeholder's behaviour on the project team's latitude in managing the project (Gibson, 2000; Cleland, 1999). Stakeholder mapping offers after the first step of identifying stakeholders, a simple way to visualise stakeholders and their likely impact and influence (Cleland, 1999). Cleland also mentioned the approach is simply to list stakeholders along one axis of a table, list the significant stakeholder interest along another axis of the table and to then indicate the perceived magnitude of their interest. Social network mapping is a useful tool for visualising power and influence patterns which extends the concept of an organisation chart as mapping people's position in a hierarchy to one of their position as influencer and shaper of ideas and opinion (Bourne and Walker, 2005). They also stated that stakeholder mapping provides more project management tools to better visualise stakeholder potential impact.

2.8.4 Stakeholder Analysis

Stakeholder analysis has become an established framework to identify and examine the interactions between organizations and constituents in an external environment. It was originally advocated by Freeman (1984) as a tool for managers to engage proactively with their external environment in the face of a rapidly changing global marketplace. Stakeholder analysis has been used to identify the effects associated with the entry of a large format retailer into a new market (Arnold and Luthra, 2000). Researchers mentioned that, stakeholder analysis is akin to a 360-degree approach, but there is still a debate about the identification, types and level of stakeholder (Harvey, 2011). Simmons and Lovegrove (2005), mentioned that stakeholder analysis is both a relevant research tool as well as a means of identifying different stakeholder claims in the performance management context and arbitrating between them. The rationale is that incorporating stakeholder analysis within decision-making models

is crucial where the viability of the developed system is dependent on its acceptability to different stakeholder groups – or where decision quality or acceptability are likely to be enhanced by incorporation of different stakeholder viewpoints (Banville et al., 1998). Researchers considered that stakeholder analysis can be widely applied in strategic management and corporate governance (Burgoyne, 1994; Donaldson and Preston, 1995), as well as in information systems studies.

Identifying stakeholders relative to their level of interest and power, provides an opportunity to bring those stakeholders within the judgment process who might have interest and authority to bring sustainability related performance and who might have interest in different sustainability related issues as well (Zsolnai, 2006). Heidrich et al. (2009) proposed a multi-dimensional scoring mechanism that allows the different roles of stakeholders to be considered and then rated on power, legitimacy, urgency, as proposed by Harvey, (2011) and additionally on importance and the time-span of influence. Whysall (2000), addressed ethical issues in retailing and the importance of taking a stakeholder perspective. Loan-Clarke *et* al. (2000), used a stakeholder approach as applied to competence-based management development in small and medium-sized enterprises, while Agle et al. (1999) examined the relationships among the stakeholder attributes of power, legitimacy, urgency and salience. Mitchell et al. (1997) have developed stakeholder theory to aid managers and organisation to identify the power of certain stakeholders, and their salience to the organisation (Simmons and Lovegrove, 2005).

Harvey (2011), stated that the first stage of the stakeholder analysis generates the list of stakeholders, the second stage is to build the roles and effects table and the third stage is to rate the stakeholders on specified dimensions. In terms of dimensions for the third stage of the analysis, Mitchell et al. (1997) suggest that stakeholders can be identified using Freeman's (1984) ''affect criterion'' based on power, legitimacy and urgency. Power, which can be gained as well as lost by a stakeholder, may be coercive, utilitarian, or normative; legitimacy is something that is ''socially accepted and expected structures or behaviours'' (Mitchell et al., 1997; p.853). Based on the presence of three attributes of power, legitimacy and urgency, on their own or in various combinations, Mitchell et al. (1997) identified seven types of stakeholders – "dormant stakeholders", "discretionary stakeholders", "demanding stakeholders", "dependent stakeholders", "dangerous stakeholders", "dominant stakeholders". By incorporating stakeholder analysis into the respective strategic development processes, the

firm can achieve increased community credibility and access to different market segments, while it provides the opportunities to interact with other businesses that broadened its capability to achieve wider environmental change (Merrilees et al., 2005).

2.8.5 Stakeholder Risk Management

Competition among the various stakeholders is obvious and such competition sometimes turns into conflicts by creating non-supportive groups of stakeholders (Lodhia, 2012). According to Rahman and Kumaraswamy (2004), construction projects are typically characterised by disjointed relationships between contracting parties, misalignment of objectives and risk-averse behaviours. Despite recent use of advanced procurement approaches such as alliancing (that incorporate contractual incentive systems), the industry faces continuing challenges related to the subtle balances required in designing risk/reward systems that motivate project stakeholders (Rose, 2008). Brown et al. (2013), developed a workshop on stakeholder management which is built on the three questions –

1. Identify risks,
2. Analyse and quantify the risk,
3. Develop a risk response,

Brown (2013) mentioned that from the risk management perspective, stakeholders can be managed that needs to be aware of, so it helps to be creative and robust in identifying stakeholders. From a risk management perspective the benefits of consulting with the stakeholders are said to be numerous and include: higher levels of trust with stakeholder groups; stakeholders being able to contribute to decisions affecting their future; higher quality information for making business decisions; a wider understanding in the community of constraints upon firms; stakeholders feeling more involved in decision-making processes and feeling their interests are being considered; stakeholders better understanding their risk and opportunity management responsibilities and; greater collective responsibility in managing risks (Loosemore, 2010). Loosemore also mentioned that stakeholder paradigm is based on the premise that people are not rational when thinking about risk but are influenced by cultural and social networks in which they are embedded. Engaging people in the risk management process in a practical and realistic way, technical communication has the potential to avoid this common problem and facilitate stakeholder consultation in an engaging and cost effective way which is stimulating, interesting, enlivening and fun (Loosemore, 2010). A systematic and structured stakeholder risk management aims to manage project

value by removing the risks and uncertainties ensuring quality, reliability, performance and the aspects to meet or exceed the customer's expectations (Ward and Chapman, 2008).

2.8.6 Stakeholder Relationship Management

Construction supply chains are highly fragmented (Mitropoulos and Tatum, 2000) and typically characterised by disjointed relationships between contracting parties (Rahman and Kumaraswamy, 2004). Therefore there is a great deal of construction research literature heralding the performance benefits of establishing collaborative inter-organizational relationships between key project stakeholders as they are susceptible to generate contributions and important resources (Mainardes et al., 2012; Kadefors, 2004). As there is often information asymmetry between stakeholders and high levels of unforeseen risks in construction projects, relational contracting is increasingly being adopted to prevent manipulation and opportunism, by developing trust through individual and inter-organisational relationships (Rahman and Kumaraswamy, 2004). Project success and failure is directly related to the nature of the stakeholders' relationship with the project team. This dissertation (Bourne, 2005) demonstrates a direct link between the successful management of the relationships between the project and its stakeholders and the stakeholder's assessment of a successful project outcome. Kadefors (2004), noted that team building processes in the early stages of a project influence project behaviour and project knowledge, so that relationships based on trust are more likely to be formed and maintained if initiated in these early stages. In construction alliances can help share risk and can also provide a competitive advantage in the market (Hughes et al., 2012).

Building strong relations with stakeholders such as employees, customers, suppliers and communities not only increases the firm's ethical standing, but may also lead to increase shareholder wealth and firm performance (O'Higgins and Morgan, 2006). Project stakeholders across all projects are placed importance on strong relationships to promote motivation towards the project goals and highlighted the initial relationship workshops had a positive impact on team motivation, as they facilitated teamwork and relationship building between the project stakeholders. Mainardes et al., (2012) emphasised on the management of stakeholder relationship and summarised the process to five steps: identify relevant stakeholders and their potential impacts on the performances of enterprise; specify the goals to be achieved in each stakeholder relationship; develop opportunities for mutual benefit; monitor inter-stakeholder relationship; and attempt to harmonise or balance them as much as

possible. The Stakeholder Circle was evaluated as a valuable tool that can support project teams in identifying the "right" stakeholders to engage; the second was an understanding of the level of capability and willingness of people in different organisations to manage project relationships (Bourne and Walker, 2008). Building team relationships through negotiating for agreement on the relative importance of each stakeholder by sharing knowledge about each of the stakeholders and these experiences will contribute to the growth of the project team members along the path to "wisdom" (Mainardes et al., 2012).

2.8.7 Stakeholder Performance Measurement

Stakeholders have the capability to influence the project, the project team and also receive both gain and loss from the success or failure of a system. Successful completion of construction projects is therefore dependent on meeting the expectation of stakeholders (Cleland, 1995). Paprika *et al*. (2008) and Cooper (2007), mentioned that stakeholders performance measurement and management practice in a project is a key supporting mechanism for project managerial decision making. Paprika *et al.* (2008), also noted that stakeholder management of information systems, performance measurement and management practice and other management tools support the maintenance and develop a good relationship among all the stakeholders. Accurate and efficient performance measurement not only forms the basis of an accurate performance review but also gives way to judging and measuring employee potential (Kaplan and Norton, 2001). In terms of maximizing the stakeholder's performance the literature has also recognized the theoretical importance of considering the interests of other stakeholders, besides the customer (Cleland, 1986; Karlsen, 2002; Mallak et al., 1991; Tuman, 1993).

Cooper (2007) mentioned two approaches to measure the stakeholder performances. Firstly quantitatively measuring the stakeholder performance but doing it in non-financial terms. It is more consistent with the concept of multi-dimensional performance measurement that moves us away from the traditional financial statement (Cooper, 2007). The second general approach to measure performance is to translate the impact of a corporation's activities on stakeholders into financial or economic terms. He also noted that it translates impacts upon stakeholders into monetary terms and then these can be incorporated into traditional financial statements. Kaplan and Norton (2001) introduced the balanced scorecard tailored around four perspectives partially oriented towards stakeholders: financial, customer, internal business and innovation and learning. The Stakeholder Performance Appraisal is a refinement of the

Stakeholder Relationship Audit (Murphy et al., 1999), an earlier stakeholder measurement system developed by Research Consultants Ltd in 1991 and administered by them till 2001. A customized application of the Balanced Scorecard in managing quality in a major infrastructure project measures the performance of all involved stakeholders to move towards a project quality culture (Basu et. al., 2009; Dorweiler and Yakhou, 2005). The Stakeholder Performance Index can be considered to be a perceptual measure of holistic stakeholder relationship marketing performance in terms of perceived business performance outcomes (Murphy et al., 2005).

Summary

In the first part of this chapter, research has defined sustainability in relation to the construction sustainability initiatives with the importance of this concept and its extensive use in the social science study and management field. Building on this, a discussion of the specific concept of "Construction Sustainability" is developed, since the idea of success is a fluid concept and can be interpreted in many different ways. It was therefore important to establish how construction sustainability would be defined to fit the purpose of this research.

The second part of the chapter has covered a broad review of literature in the construction project performance to address the principal aspects affecting the construction project performance. The importance of the key performance indicators was also indicated to measure the construction project performance.

The third part of the chapter has described elaborately the Stakeholder Engagement. A number of themes related to stakeholder engagement are identified in relation to the stakeholder engagement. The research has highlighted a number of factors of Stakeholder's Engagement to improve the sustainability principles. Implementing these themes in Stakeholder Engagement in construction organisations requires close orientation and involvement of the major stakeholders. All of the factors described in this chapter is organised as a conceptual element which is constructed in chapter 3 which represent the theoretical way of the framing the research from the outset.

Chapter Three: An Integrative Approach to Improve Construction Project Performance

3.1 Introduction

Chapter Three argues that there is a growing literature relating to construction sustainable development on the one hand and project social, economic and environmental performance, on the other. This chapter discusses a conceptual approach to creating a bridge between the construction sustainability and construction project performance, using the management tool of Stakeholder Engagement within an overall Construction Management System. Based on the relationship among the Stakeholder Engagement, Construction Sustainability and Construction Project Performance from this chapter an integrative approach is developed to support the research to find and answer the research question.

3.2 Sustainability Related Project Performance

Performance measurement research in construction has previously adopted a narrow focus, typically failing to respect the profoundly complex and interdependent nature of what is essentially a dynamic social system capable of infinite variation (Love and Skitmore, 1996; Nesan and Holt, 1999). According to Chan et al. (2002), project success criteria varied in fields, and then the indicators of time, cost, health and safety, profitability and quality, technical performance, functionality, productivity, satisfaction, environmental sustainability were categorized into “objective measures” and “subjective measures” and were stressed especially for design/build projects of the construction industry. Elkington (1994), described the importance of improved business reporting of project performance and advocates the concept of the triple bottom line (TBL) to achieve sustainability, where organizations measure their economic (profit), social (people) and environmental (planet) performance. To improve the construction project performance, as well as, in order to survive in national and international markets, requires that construction businesses properly understand how they are currently adopting sustainability target and regarding this how they need to perform in the future (Love and Holt, 2000). They also proposed an effective method of business performance measurement (BPM), in the sense that it enables a construction company to evaluate and establish its position with respect to its construction sustainability performance.

Wagner and Svensson (2010) and Svensson et al. (2010) elaborated the issue related to the sustainability practices, and contend that socially responsible managers to manage sustainable business practices because they believe that it is the right thing to do and that the organisational culture, plays a major part in enhancing the project performance of organizations. Ugwu and Haupt, (2005), envisaged to make some contributions to infrastructure sustainability which includes facilitating the development of decision models and computational framework that encapsulate the identified indicators, for use in evaluating the sustainability of different infrastructure design. They also noted that these models and framework that would enable stakeholders to take appropriate proactive measures to ensure sustainable design and construction as part of the innovative infrastructure to improve the project success.

3.3 Relativity of Companies Strategic Goal with its Stakeholder, Sustainability Target and Construction Project Performance

Regarding the improvement of construction project performance Spencer (2011), noted that to aim for the future targets for continuous improvement, engagement with the broader supply chain is compulsory. He considered it important for the UK concrete industry and enabling the stakeholders to realise the potential and understand the sustainability credentials of concrete and its constituents. Sustainable construction is about the responsibility of the construction stakeholders to design, develop, construct and manage a project in a way that minimises negative impacts on the environment and society (Abidin at el, 2013). Taking sustainability as a way of improving the construction project performance would help the stakeholders to set up a specific and cost-effective goal of improving the quality and environmental performance of buildings, in both the short and long terms (Setijono et al., 2007, Siew et al., 2013). Zhang (2013), proposed targeting to improve the Cost, Time and Quality as project performance criteria for construction projects. Researchers considered the corporate effort to promote sustainability and implement sustainability as a strategy, in which economic goals (Mysen, 2012) are a means of supporting the corporate sustainability mission and strategy. White (2009), mentioned that Procter & Gamble (P&G) launched a new sustainability strategy in 2007, together with five-year sustainability goals, that cover their target for consumer satisfaction with the company's sustainable innovations. It also improves their project performance improving their profile of products and engages all the stakeholders to build sustainability thinking and practices innovation into their everyday work (Siew et al., 2013).

Setijono et al., (2007), recommended that improvement of projects performance is not merely a way of solving problems, but also the way to improve customer satisfaction, improving efficiency and Quality Performance in a cost effective and sustainable way which is both reactive and proactive. Walley (2013), suggested that project performance is directly influenced by the project manager's ability to develop strong project commitment, partly through early stakeholder influence and stakeholder endorsement of project plans. Project commitment can be improved through active participation of stakeholders in project management which would assist to achieve the strategic objectives (Nangoli et al., 2013). The sustainability strategy of the Eden Project is divided in to the three interconnected strategies; operational practice, educational programmes and outreach initiatives that target particular stakeholder communities that form the interrelationships between different internal and external value systems to implement sustainability and improve the project performance (Mysen, 2012). Therefore from the previous research it is evident how a corporation with sustainability, stakeholder engagement as its mission, implements sustainability strategic goal and programmes to promote construction project performance.

3.4 Achieving Sustainability through Stakeholder Engagement

In one study Presley and Meade, (2010) proposed that, a company pursuing sustainability must be aware of various stakeholders who influence or are influenced by sustainability decisions including environmental agencies workers, consumers and communities, all the while ensuring a reasonable return on investment and long-term enterprise viability for their stockholders. Sobol, (2008) investigated whether, the concept of sustainable development is not just about protecting the environment, or controlling economic growth, as it is frequently depicted to be, or if it is more about the relationships between the environment and people who populate it. Through engaging stakeholders, companies can anticipate, understand and respond faster and more easily to changes in the rapidly changing business environment. In order to meet the sustainability objectives in a construction project it is really imperative to determine the stakeholder's beliefs, concerns and interests in the project (Streeter and Jongh, 2013; Adeyeye et al., 2007). According to Hill and Bowen (1997) sustainability of a firm depends on the sustainability of its stakeholder relationships. The major task under stakeholder theory is to manage and integrate the relationships and interests of various stakeholders so as to achieve sustainable development (Lodhia, 2012). Ugwu and Haupt, (2005) investigated the perceptions and prioritization of key performance indicators (KPI) for infrastructure sustainability from a cross section of construction industry stakeholders.

Considering stakeholder's importance to achieve the sustainability related target Ayuso et al., (2011), proposed that it is extremely important to manage the stakeholders in all phases of the project, as their previous experience and their involvement in the project significantly increase the chances of success, by building in a self-correcting feedback loop. Managing stakeholders from different sustainability subgroups, ecology, economy, social and culture, helps the project management team to take more correct course of action in their decision making process (Johansson, 2008; Persson and Olander, 2004). Yaziji (2004), argued that collaborative affiliations can accelerate innovation, particularly solutions that improve some aspect of society or the environment. Ugwu and Haupt, (2005) mentioned that the first requirement for project-level sustainability is to develop indicators while engaging the stakeholders. They also mentioned that such indicators would further underpin the development of methods, techniques and decision support tools to facilitate sustainable appraisal and decision-making at the various project level interfaces (i.e. from conceptualisation to design, construction, operation and decommissioning). Ayuso et al., (2011), proved quantitatively that engagement with different stakeholders is a valid mechanism for promoting sustainable innovation within firms.

Mathur et al., (2007), pointed to stakeholder mapping as a process that will develop an approach for defining and identifying stakeholders and considered it as the most appropriate for sustainability assessment. In the same way, the mapping process helps the stakeholders to contribute their views and experiences in addressing the issues that are important to them (Ayuso et al., 2011). According to Ayuso et al. (2011), selecting the internal people who have the knowledge and skills required to experiment with new ideas and incorporating sophisticated approaches to recruitment and selection, training and appraisal – bring organizational sustainability. Interaction with external stakeholders represents an untapped opportunity to bring in more voices into the innovation process and therefore, stimulate new ways of approaching problems (Mathur et al., 2007; Ayuso et al., 2011). Through cooperation with stakeholders or with a better stakeholder relationship, companies can improve their sustainability performance by adopting innovative practices (Onkila, 2009; Renukappa et al., 2012). In addition, if the stakeholder's needs and concerns on sustainability issues could be considered and recognised and also be incorporated into the design and delivery of a project, it will promote sustainable development in construction project (Onkila, 2009). Managing stakeholders in project bring confidence in product development and will greatly relieve its approval to the target groups to improve the customer satisfaction. Adopting sustainable

supply chain management helps the stakeholders to keep relationship with supply chain partners, to work together, to increase comfort and quality of the project, to decrease negative environmental impacts and increase the economic viability of the project (Mathur et al., 2007).

Stakeholders are the integral part of the project and most of the risks in construction arise from stakeholders. Different stakeholders might have different experiences, knowledge and approaches to deal with sustainability. So, the more stakeholders could be managed, the more likely it will help to manage the project risk (Loosemore, 2010). As the stakeholders are a major source of uncertainty, a generic project risk management process framework provides a structure for a review of approaches to analysing stakeholders and risk management issues (Ward and Chapman, 2008). According to Yilmaz and Flouris (2010), risk management protects, creates and enhances business value through measurement and management of sustainability threats and opportunities and also added that this can help businesses effectively respond to the growing expectations of the corporate stakeholders. This accomplished project value aids to develop the construction efficiency through examination of building design and material requirements for sustainable structure (Mathur et al., 2007).

Ayuso et al (2011) combined stakeholder engagement and knowledge management (KM) that are relevant elements of an organizational capability to deal with project innovation in the context of sustainable development. The combination of this stakeholder engagement and knowledge management (KM) enables companies to communicate their sustainability performance with stakeholders, ensures compliance, reduces risk of liability (Epstein, 2008) and enhances business reputation and competitive advantage (Ioannou and Serafeim, 2011). Doloi, (2012), attempted to combine the degree of centrality of stakeholders and perceived sustainability value is quite intriguing in the context of measuring the TBL sustainability performance of projects. Therefore, from the previous research it is evident that the engagement of stakeholders has immense impact on the construction sustainability target which is both reactive and proactive.

3.5 Developing the Conceptual Framework

The fifth objective of this research is to develop a Conceptual framework on the basis of the principle of stakeholder engagement process affecting the achievement of Construction sustainability related project performance; this will underpin the overall research process. The

Conceptual framework has been built up (Figure 3.1) which is based on a collection of inter related concepts which is derived from the findings of existing construction sustainability domain, together with the stakeholder engagement theory, the effect of the enabler's and disablers on sustainability and the concepts of project performance. This is structured using four principal dimensions which correspond to the first four research questions and objectives of the research highlighted in Chapter 1. The conceptual framework is a systematic structure that can hold or support a theory of a research work which presents the theory to explain why the problem under study exists. Thus, the conceptual framework is but a theory that serves as a basis for conducting research.

The established concept of stakeholder engagement and how the sustainability related project performance could be defined is built-in under the framework, where the use of self-reported measures of project performance are used to gauge construction project performance. Adding to the framework, overall the stakeholder engagement was regarded as the critical factor that had an impact on the improvement of construction sustainability related project performance. These stakeholder engagement process were reflected in or had resonance with, previous research findings whilst others related specially to this study. Chapter two discussed all these stakeholder engagement processes at length and Chapter three identified the link of stakeholder engagement with the construction sustainability and construction project performance. Therefore, a conceptual framework for achieving the construction sustainability related project performance is illustrated in Figure 3.1.

Based on the theoretical underpinning, this framework will conceptualize the links between the stakeholder engagement process (variables) and construction project performance (outcome variables). It will be moderated via construction sustainability (moderator variables). This framework shows the relationship between variables and research questions. It also identifies which variables are linked with which corresponding research questions. In this study, stakeholder engagement process represents the construction project performance context as variable. Two key roles assumed are independent variables and dependent variables, which help the researcher to identify both the level of importance, impact and level of implementation success when making statistical inferences. The moderating variables represent the construction sustainability that the researcher thinks explain the variation in the dependent variable, especially when differential statistics are anticipated. Figure 3.1 will show the corresponding relationship between the variables and research questions.

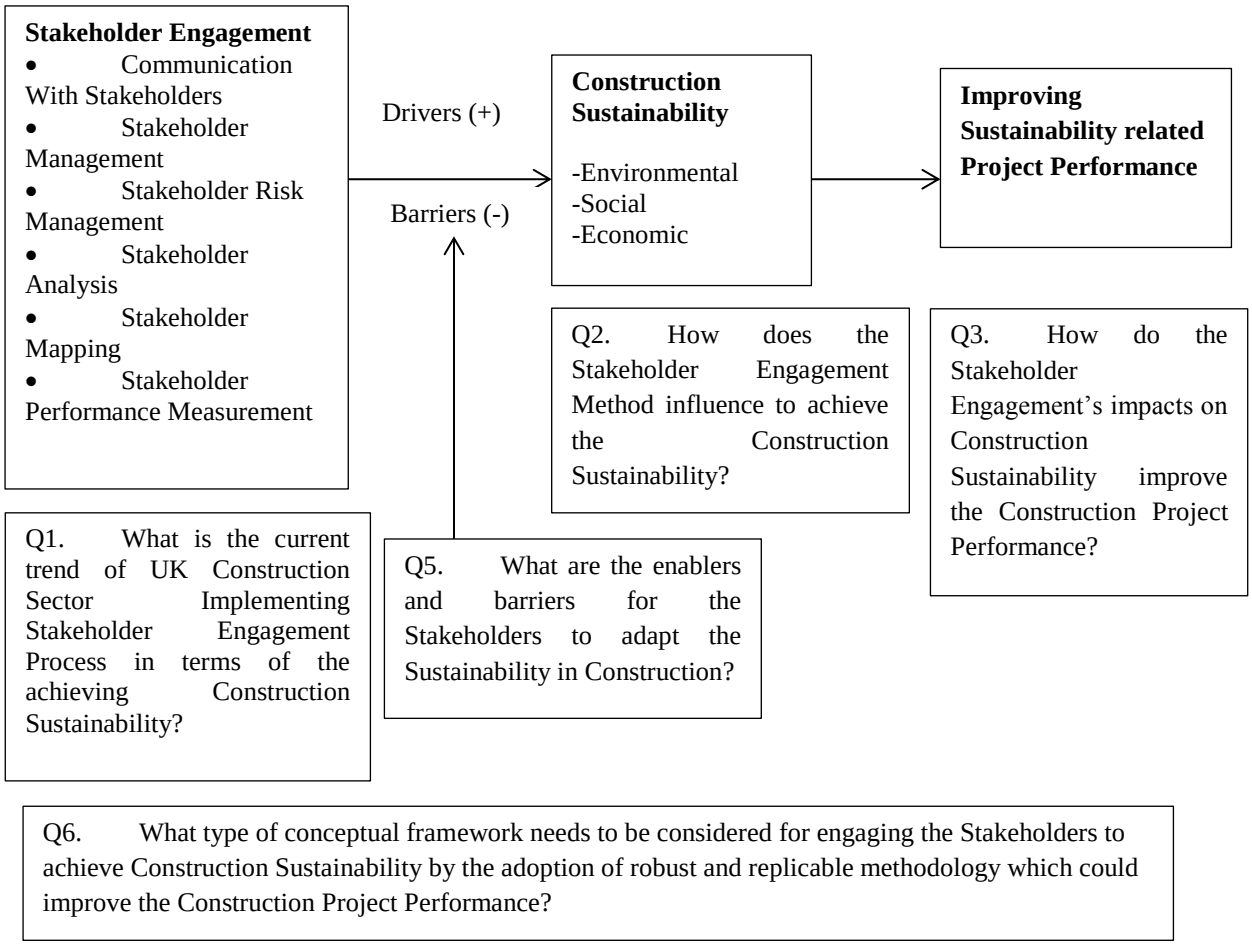


Figure 3.1: A Preliminary Conceptual Framework Identified from the Literature Review for Improving the Construction Project Performance

The project success is the outcome variable, the one that the researcher is trying to hypotheses or predict. Variation in the moderator variable or dependent variable is what the researcher will attempt to explain. Through manipulating the variables; the final conceptual framework will be developed in the light of empirical findings and statistical analysis to be presented later in Chapter 7.

Given these theoretical underpinnings, the framework provides a clear and original conceptualization of the wide variety of literature; as well as a means for organising the collection and analysis of data which will be further developed in the next stage of the research. As a result, the purpose of this framework is to make sense of the initial structure of the study and therefore help define the scope of the inquiry to be examined – i.e. to ensure sufficient validity and utility. Clarifying the potential and limitations of formal literatures in a practical sense, a conceptual framework can help focus the debates which are developing

around these broader changes (Gibb, 1994). This conceptual framework also allows the researcher to be in a better position to make appropriate limiting and delimiting choices that shrink the endeavour back down to manageable parameters and at the same time give confidence of ensuing results of the study.

Summary

The review of prior literature within the construction management domain was reiterated, based around the research questions which pertain to the five objectives of this research. As a result, this chapter has constructed the conceptual elements which represent the theoretical way of framing the research from the outset. This allows the appropriate research design and method to be considered and further developed, and this is consciously discussed in chapter 4. Further analysis to validate the different stages of the stakeholder engagement involved, and investigated the extent to which these stages have significant impact to improve the construction sustainability related project performance are presented in chapter 5, 6 and 7 of this research.

Chapter Four: Methodology

4.1 Introduction

This chapter details the research philosophy, approach and methods employed to support the research aim and objectives outlined in Chapter 1 and the arguments developed and articulated within the literature review. This chapter methodology not only reflects the preferred approach but also provides the most suitable methods to analyse people's perception of value and experience in detail (Silverman, 2005). The main issues to be described include (1) The scope of the research and its philosophy; (2) Relevant application of realism and positivist approaches and, (3) Research design and methods of analysis employed. The aim of the research is to investigate the construction sustainability which is considered to be of critical importance to the successful implementation in the UK construction sector.

4.2 Research Philosophy and Approach

4.2.1 Research Scope

The aim of this research is to develop a framework for engaging stakeholders to improve the construction project performance through achieving sustainability. It will analyse the current level of performance in construction sectors in relation to meeting the sustainability targets. It will also analyse the role of stakeholder engagement in achieving sustainability related targets with a specific focus on its improving the construction project performance and to develop a framework for stakeholder engagement in the sustainable construction sector. Poor waste management, conflicts and poor management of stakeholder interest combined with problems caused by myopic control (Bourne and Walker, 2005; Ulmer, 2001; Preble, 2005) are among the many factors that contribute to poor construction project management. The complexity in a typical construction project arises from the fact that it consists of a number of stages that represent different processes and involve different project stakeholders.

Moreover, engaging the stakeholders will not only deliver sustainability but also highlight the impact of their mutual interactions, revealing risks and uncertainties among their interactions and erasing those which have a negative impact to add value. Research has been carried out on individual topic of achieving the construction sustainability target and stakeholder engagement. Till now little research has been done that has focused on integrating the stakeholder engagement and construction sustainability target. Considering different issues and uncertainty in the construction industry and the contribution of stakeholder engagement the focus of this research project is on ways to achieve the sustainability related project

performance. This will be based on the conceptual framework developed and the proposed methodology employed.

4.2.2 Understanding the Research Philosophy

The term research philosophy relates to the development of knowledge and nature of that of knowledge. Tuli (2010) mentioned that the selection of research methodology depends on the paradigm that guides the research activity, more specifically, beliefs about the nature of reality and humanity (ontology), the theory of knowledge that informs the research (epistemology), and how that knowledge may be gained (methodology). Figure 3.1 illustrates different layers and approaches that are available and must be consistently employed when conducting a research. In accordance with the research onion, prior data collection and analysis techniques can be determined, considerations on several issues must be completed.

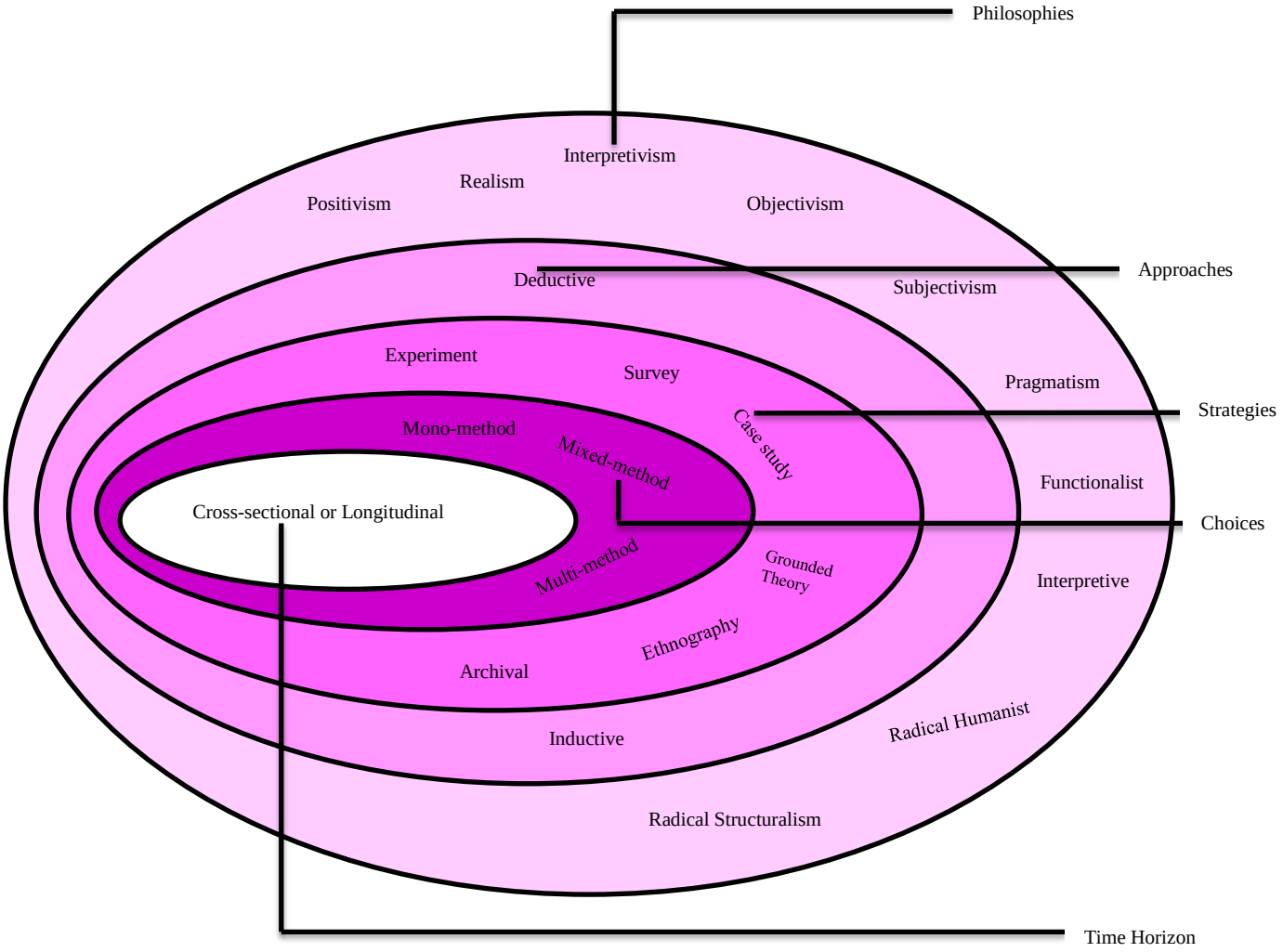


Figure 3.1: The Research 'Onion', Source: Saunders et al. (2009)

All researchers have different beliefs and ways of viewing and interacting within their surroundings. Yet, there are certain standards and rules that guide a researcher's actions and beliefs. Therefore, to clarify the researcher's structure of inquiry and methodological choices, an exploration of the paradigm adopted for this research will be discussed prior to any discussion about the specific methodologies utilized. According to Denzin and Lincoln (2005) paradigm is the net that contains the researcher's epistemological, ontological and methodological premises. The research paradigm chosen by individual researchers appears to be dependent on their perceptions of "what real world truth is" (ontology) and "how they know it to be real truth" (epistemology) (Tuli, 2010). Since the pragmatist approach is utilised, the selection of mixed methods enables the researcher to actively select methods that support and enable data triangulation. Bryman and Bell (2007) highlighted the importance of having more than one data collection method to ensure that there is overlap and confirmation that the data collected has an accurate and true reflection on the organisational perceptions. The use of quantitative and qualitative measures in this study, through interviews and questionnaire surveys, serves as a means to triangulate the data. The use of both the qualitative and quantitative methodologies was necessary to encompass the different aspects of engaging the stakeholders and achieving sustainability related project performance in the construction sector.

4.2.3 Inductive and Deductive Theory

Silverman (2005) argues that methods are techniques that take on meaning according to the methodology used. Most methods can be used in either research approach. In Deductive theory the researcher on the basis of what is known about in a particular domain, deduces a hypothesis that must then be subjected to empirical scrutiny (Bryman, 2008). He also added that theory and the hypothesis deduced come first and drive the process of gathering data.

In Inductive theory the researcher infers the implication of his or her findings for the theory that prompted the whole exercise (Bryman, 2008). With an inductive stance, theory is the outcome of research. Saunders et al., (2009) defined that inductive approach, allows building theory with the principle of enabling the researcher to gain an understanding and to formulate theories of what is going on from the data collected.

This research is combined with both inductive and deductive approach. From the literature review and structured interviews an initial inductive approach will be adopted to enable the

researcher to explore and build a theory from the information collected. In deductive method a questionnaire is formed based on the interview findings to confirm theory.

4.2.4 Ontological Consideration

Ontology is concerned with the nature of reality which raises questions of the assumptions researchers have about the way the world operates and the commitment to particular views (Saunders et al., 2012). There are four different ontologies: realism, internal realism, relativism and nominalism. This research takes the position of realism approach. A traditional position in realism emphasizes the world in concrete and external terms and that science can only progress through observations that have a direct correspondence to the phenomena being investigated. Then the internal realism assumes that there is a single reality, but asserts that it is never possible for scientists to access the reality directly, and it is only possible to gather indirect evidence of what is going on in fundamental physical processes (Puntm, 1987). The position of relativism in ontology goes a stage further in suggesting that scientific laws are not simply out there to be discovered, but they are created by people (Easterby-Smith et al., 2012). Nominalism suggests the labels and names people attach to experience and events are crucial. Postmodern authors, such as Cooper and Burrell (1988), envisage social life as paradoxical and indeterminate, and argue that social reality is no more than the creation of people through language and discourse**.** This research draws the position substantially of realism that is compatible with the key ideas of the critical realist tradition and that provides additional insights and alternative perspectives for using realism in qualitative research.

4.2.5 Epistemological Consideration

An epistemological issue concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline (Bryman, 2008). Epistemology is about different ways of inquiring into the nature of the physical and social worlds (Easterby-Smith et al., 2012). Easterby-Smith et al (2012) suggested two approaches to epistemology – Positivism, Social Constructionism. Positivism is an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond. Positivism entails elements of both a deductive approach and inductive strategy (Bryman, 2008). The positivism approach has the elements of being reductionist, logical, an emphasis on empirical data collection, cause-and-effect oriented and deterministic based on a priori theories (Creswell, 2007).

The idea of social constructionism (which is often combined with interpretivism; see Cesswell, 2007) developed by authors such as Berger and Luckman (1966), Cesswell (2007), Watzlawick (1984) and Shotter (1993), focuses on the ways that people make sense of the world especially through sharing their experiences with others via the medium of language. It shares two features with positivism: a belief that the natural and social sciences can and should apply the same kind of approach to the collection of data and to explanation and a commitment to the view that there is an external reality to which scientists direct their attention (Bryman, 2008). In Social Constructivism researchers recognized their own background shapes, their interpretation and they "position themselves" in the research to acknowledge how their interpretation flows from their own personal, cultural, and historical experiences (Creswell, 2007). The researchers then make an interpretation of what they find, an interpretation shaped by their own experiences and background. This research adopts both the positivism and social constructionism as its epistemological perspective which is seen to be consistent with the research nature and its aim and objectives. From social constructionism point of view this research conducted interviews to explore the interviewees experience regarding the subject areas and from positivism perspectives this research tested the hypothesis using the statistical method.

4.2.6 Methodological Consideration

This section outlines the methodology and presents an overview of the methods to be used in the research. According to Lehaney (1994), Methodology is used to mean:

- the ways in which hypotheses become theories – scientific methodology;
- the ways in which techniques are chosen to address a particular problem;
- the ways in which problems are chosen, which addresses the question of sponsorship; methods or techniques;
- the modelling process, which include hard and soft systems approaches, and the ways in which the relevant variables are chosen for a model, and how reality is concomitantly simplified;
- the chronological planning of events – the research programme.

The first phase of this research study (MPhil) is conducted through a review of the literature based on the research topic. In this research, phenomenological approach is used in phase one (Cresswell, 2007) and in phenomenological study semi-structured interviews are used (Rockart, 1979; Corbetta, 2003) with the experienced construction professionals. Cresswell

(2007: p. 57 and 59) described such approach as: "the meaning for several individuals of their lived experiences of a concept or a phenomenon." He clarified it further and stated: "phenomenology is not only a description, but it is also seen as an interpretive process in which the researcher makes an interpretation of the meaning of the lived experiences." In phase two, an experimental research strategy is adopted (Saunders et al, 2012; Bryman, 2008). Questionnaire survey (Oppenheim, 1992) is distributed to the constructional professionals as an experimental study.

4.2.7 Linking Ontology, Epistemology and Methodology

Ontology and epistemology are linked with each other by fitting positivism with realist ontologies and fitting constructionism with nominalism. In the strong positivist position it is assumed that there is a reality which exists independently of the observer and hence the job of the researcher is to discover the laws and theories that explain this reality. From the constructionist position, the assumption is that there may be many different realities and hence the researcher needs to gather multiple perspectives through a mixture of qualitative and quantitative methods and to gather the views and experiences of diverse individuals and observers. This is sometimes described as triangulation (Easterby-smith et al, 2012). Table 4.1 represents the Methodological implications of different epistemologies.

Crotty's (1998) classification was more helpful in justifying any researcher's decisions in selecting 'epistemology'; 'theoretical perspectives'; Positivism 'methodology' and methods since they are related to each other. Based on the Crotty's (1998) findings this research has considered 'Ontology', 'Epistemology', 'Methodology' and 'Methods' as they are linked with each other. This research adopts 'Realism' as its ontological perspective which is seen to be consistent with the research nature and its aim and objectives. This research will not just describe what is found as would be consistent with objectivism and will not create something out of nothing as would be done in subjectivism (Crotty, 1998). It will build on a critical reviews and analysis of different literatures to develop a Stakeholder Engagement model to achieve construction sustainability through investigating current construction issues and stakeholders' involvement as a way to improve the project performance. People hold different views, and their ability to gain acceptance from others may depend on their status and past reputation (Easterby-Smith et al., 2012). He also added that thus the 'truth' of a particular idea or theory is reached through discussion and agreement between the main protagonists. This assumption underpins this research, thus the main issues related to sustainability in

construction and engaging stakeholders to achieve the sustainability could be different among the construction companies. These issues which were highlighted in the literature were interpreted and investigated to develop a stakeholder engagement framework.

Ontologies	Realism	Internal Realism	Relativism	Nominalism
Epistemology / Methodology	Strong Positivism	Positivism	Constructionism	Strong Constructionism
Aims	Discovery	Exposure	Convergence	Invention
Starting Points	Hypothesis	Propositions	Questions	Critique
Designs	Experiment	Large Surveys; Multi-cases	Cases and Surveys	Engagement and Reflexivity
Data Types	Numbers and Facts	Numbers and words	Words and numbers	Discourse and Experience
Analysis/ Interpretation	Verification/ Falsification	Correlation and Regression	Triangulation and comparison	Sense-making; Understanding
Outcomes	Confirmation of Theories	Theory Testing and Generation	Theory Generation	New Insights and Actions

Table 4.1: Methodological Implications of different Epistemologies (Easterby-smith et al., 2012)

Epistemology is about different ways of inquiring into the nature of the physical and social worlds (Easterby-Smith et al., 2012). In this research Social Constructionism is considered as it focuses on the ways that people make sense of the world especially through sharing their experiences with others via the medium of language (Berger and Luckman, 1966; Watzlawick, 1984 and Shotter, 1993). Social Constructionism is one of the groups of approaches that Habermas (1970) has referred to as interpretive methods. In social constructionism the reality is determined by the people rather than by objective and external factors. It focuses on what people, individually and collectively are thinking and feeling and attention should be paid to the ways they communicate with each other, whether verbally or non-verbally (Easterby-Smith et al., 2012).

Having the instruction from the ontology and epistemology the methodology prepares a package of research design that is to be employed by the researcher (Tuli, 2010). Tuli also mentioned methodology is a research strategy that translates the ontological and

epistemological principles in the process of research activity. Methodology is a research strategy that translates ontological and epistemological principles into guidelines that show how research is to be conducted (Sarantakos, 2005), and principles, procedures and practices that govern research (Marczyk et al, 2005). In addition, special emphasis is given to address the technical challenges and barriers when outlining the approaches for each segment. In construction project management research, an insightful exploration of the project management research field is needed for a better understanding of the past, present and possible future of research paradigms (Biedenbach and Mueller, 2011). According to Aouad et al. (2010), the construction industry is hampered by an adversarial contractual nature and each stakeholder seeks to mitigate their own costs and risks by passing them on down the supply chain. Vidalakis et al. (2011) argued that the major part of problems with construction projects is associated with the management of supply chain and it creates the problem to generate new solution and to generate innovation in construction. They also highlighted that significant waste is acquired in the construction industry as a result of poor logistics. Considering the above issues this research project seeks to establish a framework to engage the stakeholders, who makes construction more sustainable through managing all risks and uncertainties and ultimately improve the project performance.

After the first phase of reviewing the literature, in next phase a modalities approach is used to collect qualitative information (data) from organisational members, which is called natural language data. This approach aims to use language data to gain insight into social and organisational realities (Easterby-Smith et al, 2012). The reason for doing qualitative research is to get more experience with the phenomenon and to formulate one's own ideas about the reason of whatever thing happens. Qualitative research can make a contribution in advancing the theoretical and methodological base of the diverse range of subject areas within the management and organizational field (Cassell and Symon, 2006). Finally, qualitative analysis helps to develop a quantitative methodology to summarize a few key positions on these issues.

This research will use the qualitative data to assess characteristics, knowledge, attitudes, behaviours, beliefs and opinions of stakeholders from the construction project. The aim of this qualitative research phase of the research is to get the background of the companies, identify the stakeholders of the construction industry and the way of managing those stakeholders and their relationships. Figure 4.1 depicts the different approaches adopted in this research.

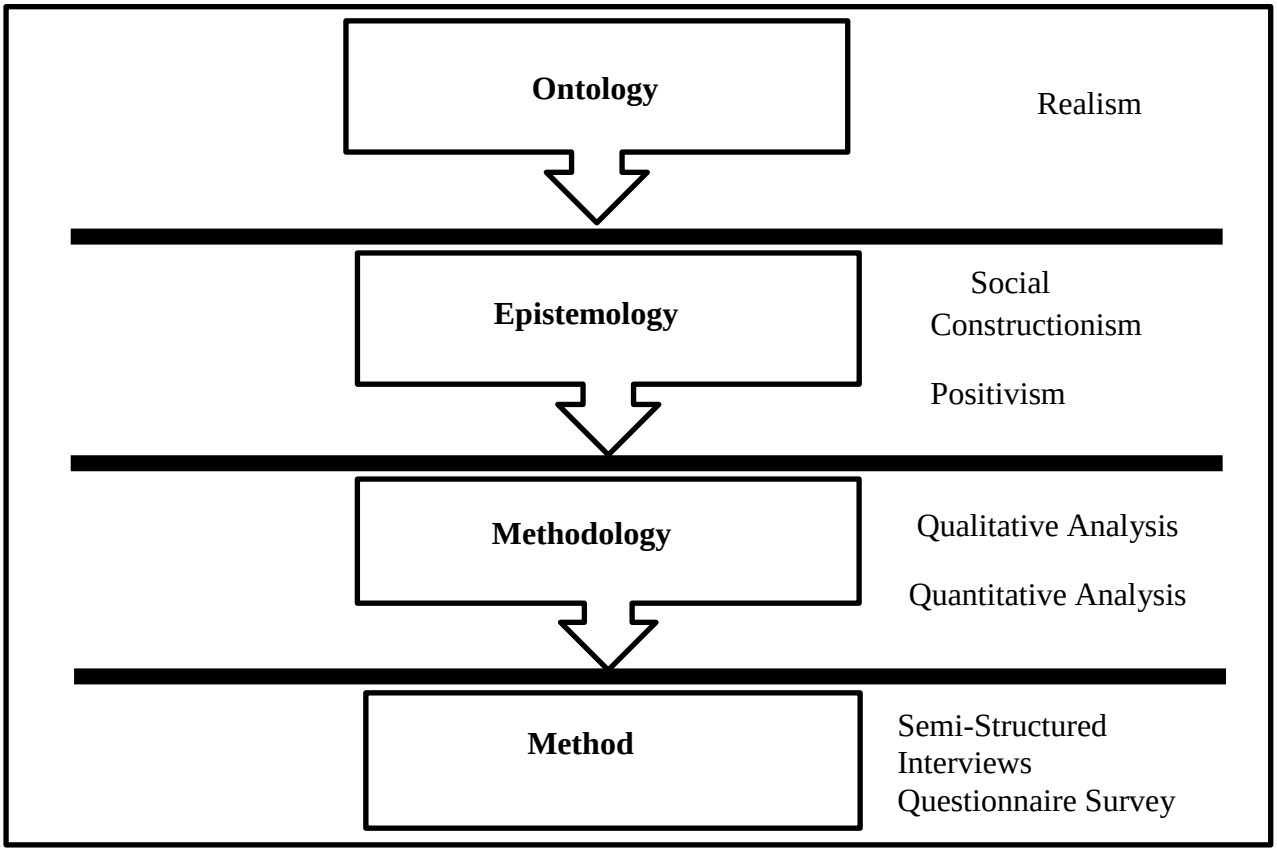


Figure 4.1: Research Main Stages, Sources: Crotty (1998)

Quantitative data will be collected to do the precise measurement and analysis in phase three. It will describe the collection of numerical data as exhibiting a view of the relationship between theory and research as deductive and a predilection for a natural science approach and as having an objectivist conception of social reality. Quantitative research will be used to test the hypothesis derived from the qualitative data. In this respect, quantitative research involves counting and measuring of events and performing the statistical analysis of a body of numerical data (Smith, 1988) and also clearly and precisely specifying both the independent and the dependent variables under investigation. The nature of this research was the reason for not using 'observation' in building the case study. The aim of this quantitative research is to find out a structured methodology to accomplish the requirements of making the construction sector more sustainable by reducing the complexities.

There are many methods of data collection in quantitative research but this research takes the approach of questionnaire survey in the broadest sense. A questionnaire has to be designed based on the findings from the interview data analysis. Typically, questionnaires will be used to produce numbers. To perform the surveys, people have to be asked their opinion in a

structured way with mostly closed questions to produce hard facts and statistics to follow. It will help the respondents select their answers from given lists of possible responses. Generally, a questionnaire will be sent to the people who are involved with construction related activities such as owner, contractor, sub-contractor, construction clients, project manager and architects etc.

At the end of this research, the findings from the interview and questionnaire survey will be done to develop a conceptual framework for delivering sustainability in the construction sector. In this regard a sequential mixed-method research method is used. This mixed method research consists of combining the qualitative semi structured interview and quantitative questionnaire method (Saunders et al, 2009). Finally, research methodology helps to provide a hypothesis that helps to explain the phenomenon of the on-going research.

Hypotheses will be tested statistically by the dependent variables on the corresponding independent variables using Equation (1). Formally:

$Y = \beta_0 + \beta_1 \times X_1 + e$……..……1

$Y = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_1 \times X_2 + e$……2

Here Y denotes dependent variables and X denotes the independent variables. A significant β_1 indicates the significant effect of the independent variable on the corresponding dependent variable.

A significant β_0 supports the hypothesis on a moderating effect (Venkatraman, 1989). Following (Cohen et al., 2003), the variables are standardized to minimize the effect of multi-linearity.

X_1 = Stakeholder Engagement

X_2 = Construction Sustainability,

Improving Construction Project Performance (Y) = β_0 + Factors Affecting the Stakeholder Engagement (β_1) × Engaging Stakeholders + Factors Affecting the Construction Sustainability (β_2) × Construction Sustainability + Factors Affecting the Stakeholder Engagement (β_3) × Stakeholder Engagement × Construction Sustainability e……..3

4.3 Research Method

At the beginning of the research, the research problem is identified related to the construction project, such as issues of performance in the construction project, the necessity of adopting

sustainability in construction, conflicts arising from having a diverse range of stakeholders, temporary organisations and temporary relationships between the stakeholders. An extensive literature is reviewed to identify the current level of performance of engaging stakeholder to achieve the construction sustainability. To meet the research objectives two research methods are used: one qualitative-based and one quantitative. To perform the qualitative research semi-structured interviews are undertaken and to perform the quantitative research a questionnaire survey is carried out. Interviews are analysed using NVIVO software and questionnaires are analysed using SPSS software. After analysing the interview and questionnaire findings a conceptual framework is developed.

4.3.1 Data Collection and Management

Sampling is "observing a part in order to glean information about the whole is an almost instinctive human act" (Corbetta, 2003, p. 210). According to Saunders et al. (2009), sampling can be divided into two types –

- Probability or representative sampling - In probability samples the chance, or probability, of each case being selected from the population is known and is usually equal for all cases.
- Non-probability sampling- For non-probability samples, the probability of each case being selected from the total population is not known and it is impossible to answer research questions or to address objectives that require making statistical inferences about the characteristics of the population.

To produce a list of aspects for collaboration it was important to target the right audience. Therefore, in this research probability sampling was carried out for questionnaire survey and nonprobability sampling was used to conduct an interview. Contractor, project manager, sustainability consultant, Civil Engineer, Developer, Design Engineer Environmentalist were targeted for interviewing with a lot of experience to make judgments on aspects of collaboration.

The persons interviewed all worked in large organisation across the UK within the construction industry from a cross section of project types including major construction projects with associated infrastructure works, civil works to small building projects. Interviews were continued for one month. In choosing a sample population, some factors like

role (both client/contractor and relevance of the role), their experience, and type of project they were involved in were taken into account.

It was decided to send the questionnaire to people working in both civil and building projects and from various sizes to get a broad cross section of the UK construction industry. In this research the questionnaire was distributed via the internet to people selected based on their knowledge of construction sustainability and stakeholder engagement. Given that response rates to operations management-related postal surveys can typically be in the region of 10-20 per cent (Larson and Poist, 2004; Bryde and Robinson, 2007), the questionnaire was mailed to 500 UK construction companies. It was anticipated that this sample size would yield approximately 100 returned questionnaires, which would be an adequate number in terms of undertaking some useful exploratory data analysis. To achieve the balance of different clients, contractor, subcontractor, project managers, directors and engineers perspectives and degrees of project-focus 500 construction companies are randomly selected from the Fame database, with the construction SIC code 45 – which covers construction-related activities (UK SIC, 2003).

The questionnaire was then mailed with an accompanying letter explaining the purpose of the survey. In total, 233 (46 per cent) responses were received from the 500 questionnaires posted (which was more than the expectations). Surveys were continued for two and half months. The number of returned questionnaires was regarded as acceptable for exploratory data analysis, with adequate representation of the samples. Therefore no further mailing was undertaken.

4.3.1.1 Interview

It refers to a context in which the interviewer has a series of questions that are in the general form of an interview schedule but is able to vary the sequence of questions (Rockart, 1979; Bryman, 2008). Semi structured interviews were used as the participants were key informants who were targeted to investigate the current issues and practices related to stakeholder engagement, construction sustainability and construction project performance. Grounded theory research was used to increase the validity and reliability of the research results – through triangulation (Cresswell, 2007) - and to enrich the discussion with them during the interview. Company analysis was done before each interview. The persons interviewed all worked in large construction companies across the UK. The interviewees had a minimum of

three years of working experience within a collaborative environment with four of them having worked for over 15 years on collaborative projects. The list of questions is included in Appendix 3.

Before approaching the interviewees an interview question schedule was produced. Prior literatures were used to design the interview question about different issues related to stakeholder engagement, construction sustainability and construction project performance. A literature review was undertaken to identify the extensive potential information on construction sustainability, stakeholder engagement and construction project performance. It provides information on the different perspectives, current issues, understandings, gaps of subject areas. Based on the literature review questions were derived to identify and address the current level of practice of engaging stakeholder, construction sustainability and construction project performance. Interview questions will also added to identify how organisations are implementing stakeholder engagement to achieve sustainability related project performance. The other reason was to encourage interviewees to talk and to discuss these existent literature and practical examples with the interviewer. Four sections formed the semi-structured interview question set. These sections were: demographic and personal information; practising of sustainability in construction; practice and effectiveness of engaging stakeholders in the construction and final section is perception of improving the construction project performance. Interviewees' valuable comments are included in chapter five. After the interview, another check was made against what each stakeholder said during the interview, if certain information could be verified through further literature review.

The first section of the interview question is "Construction Sustainability". Prior literatures were reviewed to identify the basic information and explanations of sustainability practice in construction, different issues and relationships with stakeholder engagement. Moreover, literatures are reviewed to explore the different viewpoints regarding sustainability. Based on the interview findings questions of this section are produced to aim for identifying the understanding and knowledge of sustainability and its implication for the construction professionals. It assesses how the construction professionals currently regulate sustainability in construction, particularly whether and how these regulations are enforced on a day to day basis. It also identified the implications of transforming sustainability into the subject of strategic analysis with a focus to improve the environmental, economic and social phenomena. These enquiries will also recognize the current sustainability related issues and

identify the possible solutions to consolidate the sustainability at the initial level into the regulatory project framework. A list of all the questions of the first section is mentioned below –

a) What do you mean by sustainability?

b) Do you think that you need sustainability in your organisation? And why?

c) Do you (your company) take any action to be more sustainable? And what is that?

d) What influence does your stakeholder have with the concepts of sustainable construction?

e) To what extent do you deliver against sustainability-related targets in your construction-related projects in respect of the TBL?

f) How much influence do your stakeholders have over sustainable design and specification decisions?

g) Do you face any obstacles in implementing the sustainability and what are those? If yes, how do you overcome these obstacles?

h) How do you measure your performance in relation to achieving sustainability related targets? Do you use any KPI to measure the performance? And how?

i) Do you think that adapting Lean Techniques in construction is a way of achieving sustainability in construction? Why?

j) Does your company follow the Lean Techniques? If yes, how?

The second section of the question list deals with "Stakeholder Engagement". Literatures are reviewed from different perspectives of stakeholder engagement like managing stakeholders, communicating with the stakeholders, stakeholder's analysis, stakeholder risk management and stakeholder performance management. This second section of questions is developed to cover all these perspectives of engaging stakeholders. The questions are formed to aim for identifying the variation of the project stakeholders' and organisation understanding of the importance of engaging the project stakeholders. Different term and issues were discussed with the participants about the stakeholder engagement if there was something which contradicted his/her words or if there were certain issues which it might be useful for the stakeholders to know about the terms and issues. It will identify assisting the relationships inside the project team. This section also intended to identify the organisation stakeholder's contribution to achieve the construction sustainability. A list of all the questions of this section is mentioned below –

a) Could you please explain what do you mean by stakeholders?

b) Who are your main stakeholders?

c) How do you engage and communicate with your stakeholders?

d) In your opinion what is the most important thing to your stakeholders?

e) Why do you think that you need to engage your stakeholders for better project outcome? And why?

f) What influence do your stakeholders have on your approach to sustainable construction?

g) How do you manage your relationships with the stakeholders? Do you have a formal process for stakeholder identification, analysis and management? If yes, could you please describe? If not, do you undertake any of these processes on an informal basis? If so, how?

h) Do you use any criteria to prioritize your stakeholders such as according to their interests, attitude, power, impact and/or influence to the project?

i) Do you use any KPI to measure the performance of your stakeholders? If yes, how?

j) Have you faced any risk related with your stakeholders? What types of stakeholders risk usually do you face in your company?

k) What type of risks do you face to manage your stakeholders in your company?

l) Do you follow any risk management strategy in your company? What type of risk management strategy has been implemented?

The last section of the question deals with "Construction Project Performance". Literatures are reviewed on the elementary justification of construction project performance, its relationship with the sustainability outcome and stakeholders impact on improving the project performance. The questions are formed based on the literatures and to identify the understanding of project performance and organisations stakeholder' activities to monitor measure and adjust the different aspects project performance through management controls. The purpose of the questions is to identify if achieving sustainability in construction is linked with improving the construction project performance. As a whole the questions are selected to identify and analyse their future expectations and recommendations for successful stakeholder engagement on sustainability practice and project performance. A list of all the questions of this section is mentioned below –

a) What do you mean by Project Performance?

b) What approach do you have to improve the project performance?

c) Do you think that achieving sustainability could improve the Construction Project Performance? If so, How?

d) What influence do your stakeholders have on your approach to improve the Project Performance?

4.3.1.2 Survey

Saunders et al (2000) considered the word "questionnaire" to be a general term to include all data collection techniques that require participants to respond to the same order. Sekaran (2003, pp. 55) defines a questionnaire as "a reformulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives". If the questionnaire was administered personally the respondent could have tried to please the researcher by giving responses they thought that the researcher was looking for due to his position of power in the organisation (Cameron and Price, 2009; Creswell and Plano- Clark, 2007; Ghauri and Gronburg, 2005). According to Collis and Hussey (2003), a benefit of the mailed questionnaire is that it enables the participant to think and reflect and thus provide greater consideration of the question than if they were expected to give an immediate response in person. Saunders et al. (2009) suggest the following guidelines for wording questionnaires which is followed in the questionnaire survey:

- The questions are clear, straightforward and use simple language, vocabulary, terminology and common concepts to ensure the participant's comprehension of what question the researcher is actually asking of them,
- To clearly show the possible responses to each question, a straightforward scale should be provided from which the respondent can choose an answer,
- Biased questions that influence the participant towards a response must be avoided,
- Short and directed questions are utilised to stop confusion in participants,
- Ambiguous wording is avoided, so that all respondents understand the questions in the same manner and context.

In this research a questionnaire is used as it allowed the respondents to provide their opinion on the relative importance of the aspects of collaboration in a way that was easily analysed and also was a suitable method to collect the volume of results required for this research. Therefore, selective sampling was carried out. To produce a useful set of data, it was considered that the sample have experience of stakeholder engagement, construction

sustainability and construction project performance. All the participants had a minimum of three years involvement within construction projects. The list of all questions of survey is included in Appendix 4. As selections were made participants were approached by email to be invited to participate in the questionnaire survey and it was mentioned in the questionnaire that it will take 15 minutes to fill it up. However, having completed the research, one of the reflections from the author is that it would take, for the participants, longer than 15 minutes to fill up the questionnaire. Therefore, in future the author will consider this issue and change the guidance accordingly for conducting survey. The author acknowledge that it is important not to of not neglect ethical issues when undertaking any type of data collection involving people.

The questionnaire is divided into six sections to help in the organisation of study variables. Part One of the questionnaire will find out the organisation's current practice and understanding of Stakeholder Engagement. Part Two will contain the adoption of Sustainability in organisation's project activities. Part Three will explore the Stakeholder's Impact on Sustainability. After that, part four will contain the Items to Measure the Construction Project Performance. Chapter five will look for organisation's main strategic focus that deals with improving the project performance. Finally part six will ask some of the questions to find out general information about the participants.

A five point Likert-type scale is used in the questionnaire to rate the possible answers (Table 4.2). The Likert-scale enables attitude of the participants to be established by a series of statements which declare the specific emotion and to which respondent is required to indicate the degree of agreement or disagreement (Sekaran, 2003). There is a neutral middle option so that participants who did not have an emotional response to the research could select this option and thus help remove research bias (Saunders et al. 2009).

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Table: 4.2: Example of five point Likert-type scale used in the questionnaire

4.3.2 Data Analysis

4.3.2.1 Qualitative Data Analysis

The term qualitative management research is a conceptual device that people regularly use to make sense of their worlds by signifying particular forms of management research: an abstraction that enables us to give order to our impressions by enabling the categorization of

certain aspects of lived experience. According to Easterby-Smith et al (2012), there are two strategies analysing qualitative data – analytic induction and grounded theory. Analytic induction is an approach to the Cresswell (2007), explored five qualitative approaches which are Narrative Research, Phenomenological Research, Grounded Theory Research, Ethnographic Research and case study research. He also mentioned that all five approaches have in common the general process of research that begins with a research problem and proceeds to the questions, the data, the data analysis and the research report.

An inductive approach is used to analyse the qualitative data. In this inductive approach initially data needs to be collected and then explored to see which themes or issues to follow up and concentrate on (Schatzman and Strauss 1973; Corbin and Strauss, 2008, Yin, 2009). A generic approach is used to analyse the qualitative data that follows the following points (Saunders et al., 2009):

- Identifying categories or codes that allow the researcher to comprehend your data;
- Attaching data from disparate sources to appropriate categories or codes to integrate these data;
- Developing analytical categories further to identify relationships and patterns;
- Developing testable propositions;
- Drawing and verifying conclusions.

Generally, qualitative research is especially important in the behavioural sciences where the aim is to explore, discover, understand or describe the underlying motives of human behaviour (Kothari, 2008). Indeed, the apparently diverse nature of conducting interviews in practice may be exacerbated by the multi-disciplinary and inter-disciplinary (Watson, 1997) nature of management research: a situation which is likely to encourage a further proliferation of research questions and perspectives. Philosophers and social theorists have critiqued interviews as a research methodology focusing their criticisms on the problems of representation, the nature of language, the inseparability of researcher and knowledge, and the problems of writing (Qu and Dumay, 2011).

The interview method is employed often as a pilot study to gather preliminary data before a survey is designed. Data is analysed through using NVivo software. NVivo combines the features of the popular software program NVivo 2.0. It helps to analyse, manage, shape and analyse qualitative data. It provides security by storing the database and enables the

researcher to easily manipulate the data and conduct researches. The following framework is followed in analysing the qualitative data –

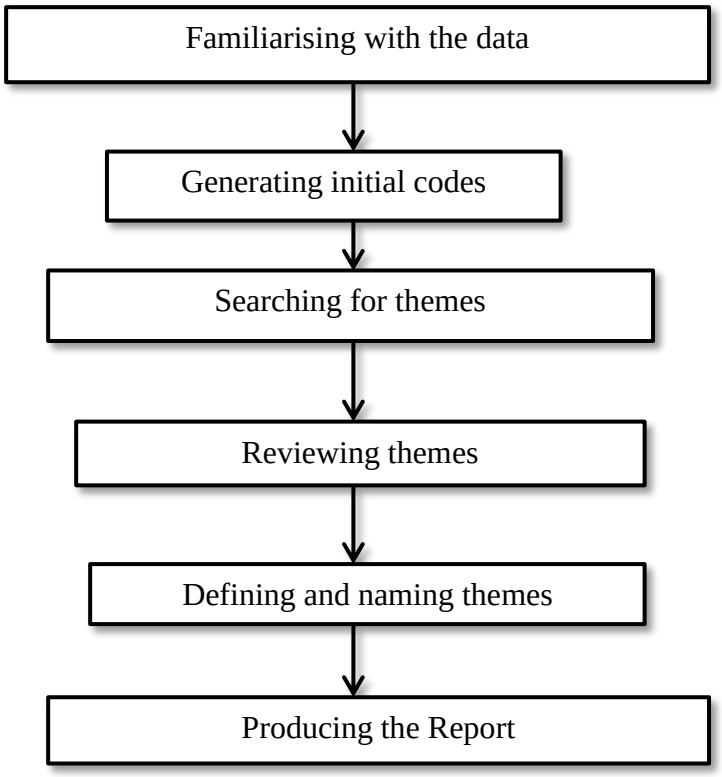


Figure 4.2: Thematic Analysis of Qualitative Data

Figure 4.2 illustrates that the common approach to analysing qualitative data through using thematic analysis. It involves the researcher identifying, analysing and reporting themes within data (Braun & Clarke, 2006). Thematic analysis is 'a process of data reduction' – reducing the data into meaningful groupings (Grbich, 2007, pp. 25). Thematic analysis can be broken down into three phases Boyatzis (1998): seeing, encoding and interpreting. Before thematic analysis it needs to read over the transcripts as much as possible to become familiar with the data. After reading, coding needs to be done which is a process of identifying features of the data that appear interesting to the analyst (Braun & Clarke, 2006). The idea at this stage is to develop smaller units of codes (1st level codes) that will then develop into broader themes (2nd and 3rd level codes).

Once the data is coded, the analysis can move to a broader level by restructuring the initial codes into broader themes (or 2nd level codes). After reading through the list of codes some commonalities will be identified that make sense, or not. These initial codes need to be arranged into some sort of logical thematic structure. Then each theme needs to be reviewed

to ensure that they form an overall structure – maybe implementing further 3rd level codes. At this point the structure of thematic analysis is practically complete, however it is important to revisit what each theme means, and what is stands for. A contents page is made up of a series of chapters, which each contain sections and further sub-sections structure. The thematic analysis in the same way to assume the overall themes are the main chapters, which can then be broken down into sections (mid-level themes) and possibly further sub-sections (lower level themes).

4.3.2.2 Quantitative Data Analysis

To ensure that the questionnaire was providing a true picture of the perceptions and a response and held by the population, additional statistical testing is needed to ensure that the questionnaire provides a statistically probable response. The common software application called Statistical Package for Social Science [SPSS] is selected and used to analyse the questionnaire responses. Field (2009) identifies that there are two main methods used when undertaking statistical data analysis, parametric and non-parametric.

4.3.2.2.1 Parametric Data

Assumes that for data to be parametric it should satisfy a number of assumptions. The data should be interval and it should also be normal distributed. Also the participants who volunteered in the study should be randomly selected (Pallant, 2007).

4.3.2.2.2 Non-Parametric Data

If the data is either ordinal or categorical, and it is not normally distributed and when the sample is not randomly selected than the data is considered non-parametric (Field, 2009).

4.4 Type of Statistical Tests

Although the data was not found to be normally distributed it will still be examined using parametric tests rather that non-parametric ones. Usually data sets can be explained using either Descriptive or Inferential Statistics (Pallant, 2007; Field, 2009). This section will explain a number of tests that will be essential and suitable or the data.

4.4.1 Descriptive Statistics

These statistics are suitable for finding basic descriptive statistics such as the Mean (average), Standard Deviation or SD (how much the scores deviate from the mean, the Minimum and

Maximum Scores (the lowest and highest scores). These statistics are suitable for an initial description of the data.

4.4.2 Inferential Statistics

Inferential Statistics are very important or making sense of data and determining the significance of the outcomes, these statistics helps in making generalizable results on which reliable conclusions could be made, it should be noted that both parametric and non-parametric could be considered inferential (Field, 2009).

4.4.3 Pearson's Correlation Procedures

This is a method for testing whether two variables are correlated with each other or not. This is suitable for finding the relationship between variables. The relationship (or correlation coefficient) could be either positive or negative. Positive correlation between two variables explains that if a score in one variable increases the other variable will also increase (linear increase); and negative correlation explains that if the scores in one variable increase the score on the other variable will decrease. The correlation coefficient must be significant in order to make conclusions. The strength of the correlation coefficient must be significant in order to make conclusions. The strength of the correlation coefficient is determined based on the following explanation: The value of the coefficients must all between -1 and +1, therefore any value between 0→0.35 will be considered small, and anything between 0.35→0.65 will be considered medium and any value of the correlation coefficient above that will be considered strong. The size of the coefficient will be treated similarly regardless to it being positive or negative.

The final step in the relationship analysis procedures was to use the data to examine if there is any significant correlation between the stakeholder engagement, construction sustainability and construction project performance. Pearson correlation is deemed the most appropriate method to achieve this aim as correlation analysis tests whether a relationship exists between two variables (Field, 2009). To establish the relationship between three variables, stakeholder engagement, and construction sustainability and construction project performance were correlated using the Pearson product-moment correlation analysis technique. This involves initially setting up compound variables in SPSS in order to enable the testing of the association between two variables. This data was extracted from the questionnaire survey. The resulting correlation coefficient (r values) indicates the strength of association for each

individual construct between the perception of construction sustainability and construction project performance.

4.4.4 Analysis of Variance (ANOVA)

The questionnaire will be analysed using ANOVA and regression analysis. ANOVA is used to test the effect of respondent variation with respect to reported fixed item. The techniques is used because one way ANOVA allows one to test if the mean values being compared are different (varied) from each other. ANOVA is particularly useful in this work because it can compare means irrespective of whether the dependant variable is an interval or ordinals scaled data. Results having a significance of 95% downward are assumed to be conclusive. That is, a particular result that has a 95% probability or less or has occurred by chance will cause the null hypothesis to be rejected. The ANOVA test can be within subject, between subjects, mixed within and between subjects or factorial between subjects (Fields, 2009). One way ANOVA is the method of choice when testing for difference between multiple groups. It is assumed that mean is a valid estimate of centre and that the distribution of the test variable is reasonably normal and similar in all groups. Essentially this techniques was used because this set of analytic procedures allows one to test if the means being compare are vary from one another (Tabachnick and Fidell, 2001; Field, 2009). In this procedure, one estimate comes from the differences among scores within each group. This estimates considered a random or error variance. The second estimate of variance comes from differences in group means. This is considered a reflection of group differences. Where these two estimates do not vary significantly, a conclusion is made that all of the group means come from the same sampling distribution of means and that the slight differences between them are due to random error (Tabachnick and Fidell, 2001). Where, however, the group means differ significantly, a conclusion is made that they were drawn from different sampling distribution of means, and the null hypothesis that the means are the same is rejected.

4.4.5 Alpha Level or Probability Test (p)

This probability test is essential for all tests mentioned above. It is the value of (p) that determines the significance of any relationships or differences between groups. Researchers generally agree on an alpha level = 0.05 to be the limit for determining the significance of the result, this refers to 5% chance of the results being down to chance. Therefore any bigger result will indicated that the results are down to chance and any lower result will determine

that the result is significant. At times, researchers might use p = 0.01 or p = 0.001 for further strength of the results.

4.5 Research Credibility

4.5.1 Reliability

Reliability refers to the consistency or stability of a measure. It is commonly used in relation to the question of whether the measures that are devised for concepts in the social sciences are consistent. Qualitative research findings can be strengthened in this way by combining participant observation with interviews and documentary sources (Hammersley and Atkinson, 1983) in a single case. Saunders et al (2009) also identified participant's error/bias. To reduce this bias the researcher conducted interviews in a neutral environment with a purposive sample of project stakeholders, who had experience of many change programmes. This research also explained the purpose of the research to gain knowledge and opinion of their current thinking of benefits of stakeholders engagement in the project, its implication and feasibility to improve the project performance and the practice of achieving sustainability projects and secondly, to increase the understanding and feasibility of the contribution of stakeholders engagement to achieve the construction sustainability.

4.5.2 Validity

Validation of the interview phase of this research depends on the presentation of solid descriptive data, meaning that the researcher must lead the reader to an understanding of the meaning of the experience under study (Stake, 1995). Validity is concerned with the integrity of the conclusions that are generated from a piece of research. For the qualitative interview research method, data triangulation is particularly important in order to fortify validation in the absence of cross case comparison. Remenyi et al (1998), suggest using multiple data sources, establishing an identifiable chain of evidence and having a draft reviewed by the key informants to strengthen construct validity in this regard. For these reasons, interview questions were pre-tested by the key informants both from the academic and industrial point of view to ensure the right context and terminologies were used in the instrument.

For the interview method applied, the research goal is to offer interview description (including data collection procedures) that would allow the reader to repeat the research process in another case (Kidder & Judd, 1986; Vaughan, 1992). Although it was argued that a single case (Interview) may not provide sufficient evidence to make robust generalisations,

it can establish the existence of a phenomenon (Van Maanen, 1988) which is adequate for the purposes of exploratory research (Remenyi et al., 1998). Thus a single case can be generalizable to theoretical propositions (Yin, 1984), creating a distinction between analytical and statistical generalizability (Yin, 2003).

In the case of this research, findings from the interview phase have been used primarily as a method to validate the findings from the literature review carried out during the initial phase of this research. It has been earlier been pointed out that published studies in the recycling domain which could provide an ideal basis for comparison of this nature are very limited. Although there is a lack of precedent studies relevant to the UK construction sector in particular, discussion and results from the other chapters of this thesis have demonstrated that findings from this research are mostly supported by published literature from relevant stakeholders related with construction sustainability, rather than construction sector specifically.

4.5.3 Bias

Bias is defined as any tendency which prevents unprejudiced consideration of a question (Godlee, 2007). In research, bias occurs when "systematic error [is] introduced into sampling or testing by selecting or encouraging one outcome or answer over others" (Gerhard, 2008). Pannucci and Wilkins, (2010), noted that bias can occur in the planning, data collection, analysis, and publication phases of research. They also mentioned that understanding research bias allows readers to critically and independently review the scientific literature and avoid treatments which are suboptimal or potentially harmful. Results possibly can be biased due to the over- or under-representation of particular groups in the dataset, as well as because of question wording that has a tendency to encourage or discourage particular responses (Godlee, 2007). Bias can cause estimates of association to be either larger or smaller than the true association and in extreme cases, bias can cause a perceived association which is directly opposite of the true association (Pannucci and Wilkins, 2010). The timing of collecting data can also scientifically bias the results.

Summary

This chapter has provided details of the methodology adopted in order to achieve the objectives of the study. A three phased research mixed methods approach has been adopted employing qualitative and quantitative strategies. Comprehensive explanations of the

literature, interview procedures and the explorative pilot study of the questionnaire have also been offered. Through the use of these methods it is envisaged that the researcher will be able to understand the perceptions of construction professionals to achieve the construction sustainability. The output of best practice recommendations will be presented with a set of strategies designed to achieve the aims and objectives of the present research in accordance with the existing conceptual framework for achieving sustainability in the construction sector.

Chapter Five: Exploring the Interviews with the Industrial Participants

5.1 Introduction

As indicated in chapter four which details the methodology adapted for the study, the question set was formulated in order to gather the opinions of the staff within the UK construction sector. First and foremost, this chapter gives the details of the participants in the initial qualitative study and subsequently presents the findings which indicate the perception of stakeholder engagement in the construction sectors and its importance to improve the sustainability related project performance. A detailed interpretation and discussion of the improvement of construction project performance, construction sustainability, stakeholder engagement and obstacles for project performance are outlined with specific hypotheses development is carried out during the confirmatory phase of the interview findings.

5.2 Objectives of Interviews

The major purpose of conducting qualitative interviews is to understand and gain insight into a particular phenomenon being investigated (Collis and Hussey, 2003; Sekaran, 2003; Saunders et. al, 2009). Thus, in this research interviews were conducted in order to gain opinions on issues that could not be properly elicited purely through a quantitative strategy. Hence, interviews were held with a small population of personnel representing sixteen different construction professionals on the belief that a range of opinions would be forthcoming and would encompass the feeling towards stakeholder engagement and construction sustainability throughout the whole organisation to improve the project performance. Hence, the overall objective of this initial qualitative exercise is to acquire data that would offer guidance regarding the construction of the questionnaire, a method which as noted by Saunders et al (2009), thereby allows for more fruitful interpretation of the eventual quantitative study, and an extension of the research findings.

5.3 Summary of the Semi-Structured Interview Employed

The research methodologies used, including the interview sample and data collection process, were detailed earlier in section 4.3 of Chapter 4. As intended, the interview process used was a semi-structured face-to-face interview technique. This allowed the interviewer to modify the questions, if necessary and all interviews were carried out in face-to-face meetings. All of the interview participants undertake construction activities, so purposive sampling was used to identify the interview participants. To select the respondents for interviews the focus was on

key informants who have particularly rich sources of information regarding the subject of the questions. Following a purposive sampling strategy, maximum variation and also the snowball technique have been used (Lisa, 2008). In maximum variation diverse characteristics of the population are identified; in this case organisations working in different parts of the industry from the supply-side perspective and individuals who were undertaking various project-related roles. Based on the characteristics a sample has been done. A target figure of sixteen interviews was regarded as adequate to achieve saturation, which was the case.

	Organization (UK)	***Role of Interviewee***	***Experience in Construction***	***Classification***
#1	*Construction Company*	*Contractor A*	*40 years*	*DC*
#2	*Water and Waste Water Services*	*Project Manager*	*30 years*	*PM*
#3	*Social Housing Company*	*Client Project Manager*	*30 years*	*PM*
#4	*House Builder*	*Contractor B*	*38 years*	*DC*
#5	*Engineering, Construction And Technical Services Organization*	*Sustainability Consultant*	*7 years 6 months*	*EC*
#6	*Water and Waste Water Services*	*Environmental Engineer*	*8 years*	*EC*
#7	*Water and Waste Water Services*	*Contractor C*	*3 years*	*DC*
#8	*Construction Company*	*Civil Engineer*	*8 years*	*EC*
#9	*House Builders*	*Developer*	*15 years*	*DC*
#10	*Engineering, Construction And Technical Services Organization*	*Design Engineer*	*37 years*	*EC*
#11	*Gas Networks Company*	*Project Team Leader*	*3.5 years*	*PM*
#12	*Engineering, Construction And Technical Services Organization*	*Senior Engineer*	*3 years*	*EC*
#13	*Construction Consultancy Company*	*Project Director*	*26 years*	*PM*
#14	*Construction Company*	*Senior Project Services Manager*	*32 years*	*PM*
#15	*Construction Company*	*Supplier Project Manager*	*14 years*	*PM*
#16	*Construction Company*	*Project Director*	*35 years*	*PM*

Table 5.1: Profile of Interviewees

The interview questions focused on gathering background information about the rationale and organisation aims behind the initiatives and information about the stakeholder engagement, construction project performance and construction sustainability. Specific details about the

key informants (table 5.1) contacted for interview, including the interviewee, are kept anonymous and remain confidential to the researcher. Participants are classified into three groups as DC, PM and EC. All Contractors and Developers are put together into the group DC; all Project Managers, Project Directors and Project Team Leaders are allocated in to the group PM and finally group EC is formed with Consultants and Engineers. In this research saturation is used as a guiding principle during their data collection. In interview studies, sample size is often justified by interviewing participants until reaching 'data saturation' (Francis et al, 2010). After conducting 16 interviews researcher stopped conducting further interviews because of data saturation. Data saturation occurred through repetition of answers of the previous interviews.

5.4 Thematic Analysis

The following sections outline the main themes and sub-themes emerging from analysis of the interview transcripts. Notes were taken during each interview. Before beginning the coding process, the audio-recorded interviews were transcribed literally. A specialised audio-typist was not used for the transcription to allow the researcher to work the data and to ensure that data confidentiality was maintained. The transcribed interviews were then entered into NVivo – a qualitative research software package for latent thematic analysis. Thematic analyses, as in grounded theory and development of cultural models, requires more involvement and interpretation from the researcher. Thematic analyses move beyond counting explicit words or phrases and focus on identifying and describing both implicit and explicit ideas within the data, that is, themes (Guest et al, 2012). Each theme was then quantified by producing a thematic profile analysing the number of passages that were attributed to each particular theme and cross-referenced against the three sets of interviewees. Codes are then typically developed to represent the identified themes and applied or linked to raw data as summary markers for later analysis (Guest et al, 2012). In this research, the researchers developed the nodes using Tree Nodes. Two high level themes were finally developed from the interview findings. Figure 5.1 provide a thematic diagram of the high level theme Improving Project Performance and associated mid-level themes that were then identified. The high-level themes divided into some mid-level themes and in some cases the mid-level themes divided into sub-level themes.

5.5 High Level Theme – Improving Construction Project Performance

A total of 1106 related passages were established for the high level theme Improving Project Performance, in which the responses provided for each theme were fairly evenly distributed,

however within each theme there were distinctive differences in the number of responses from each interviewee set. The high level theme is coded into 4 sub-level themes. This is illustrated in Table 5.1. The high level theme is divided into four sub-level themes which are "*Managing the Sustainability Performance", "Promoting the Construction Sustainability", "Meeting the Project Performance"* and *"Measuring the Project Performance".*

Firstly, the high level theme is coded in to sub-theme "*Managing the Sustainability Performance"* as the participants considered how to manage the sustainability performance to improve the project performance through incorporating the sustainability with project planning, system and processes. Secondly the high level theme is coded into sub-themes *"Promoting the Construction Sustainability"* as the participants considered that the most effective way of delivering sustainable objectives would be for Management and the Government to set them out as binding requirements to motivate the stakeholders. Thirdly regarding the sub theme *"Meeting the Project Performance"* the participants stressed on achieving the project performance through accomplishing all the project requirements and objectives. Finally, the high level theme is coded in to sub-themes *"Measuring the Project Performance"* which combined the organisational social, economic, environmental and sustainability performance. Among these four sub-themes participants mostly mentioned about "*Promoting the Construction Sustainability"* which produced 921 passages of DC (272 passages), PM (329 passages), EC (320 passages). The second mostly mentioned sub-theme is "*Measuring the Project Performance"* (96 passages), third sub-theme is *"Managing the Sustainability Performance"* (58 passages) and the fourth one is *"Meeting the Project Performance"* (31 passages). All these sub-themes are explained in the next sections.

Improving Construction Project Performance	**DC**	**PM**	**EC**	**Total**
Managing the Sustainability Performance	9	19	30	58
Promoting the Construction Sustainability	272	329	320	921
Meeting the Project Performance	7	10	14	31
Measuring the Project Performance	31	38	27	96
Overall	314	393	389	1106

Table 5.2: Thematic Profile of high level theme Improving Project Performance

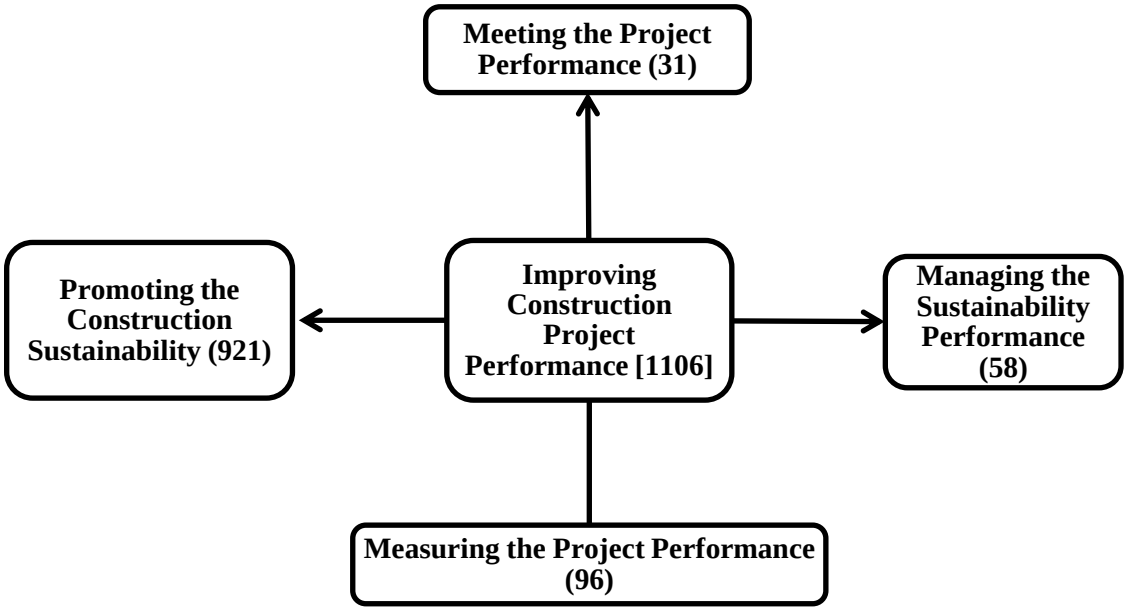


Figure 5.1: Thematic Diagram of Improving Project Performance

5.5.1 Managing the Sustainability Performance

The sub-theme managing the sustainability performance produced 58 related passages. This was predominantly mentioned by EC (30 passages), PM (19 passages) and DC (9 passages). This was then further broken down into four associated mid-level themes.

Managing the Sustainability Performance	DC	PM	EC	Total
Monitoring Sustainability related Performance	1	10	19	30
Research and Development to bring Innovation	1	2	2	5
Improving the strategic targets to achieve the project objectives	3	2	5	10
Set up strategic target to achieve project performance	4	5	4	13
Overall	9	19	30	58

Table 5.3: Thematic Profile of Managing the Sustainability Performance

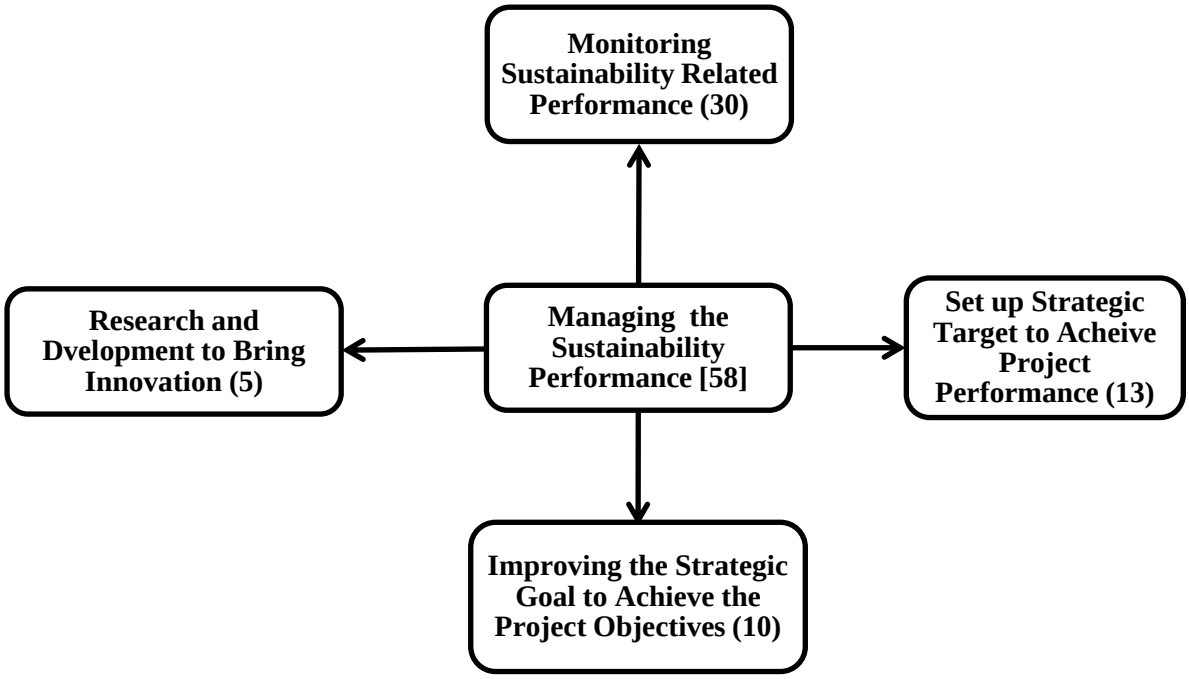


Figure 5.2: Thematic Diagram of Managing the Sustainability Performance

The most prominent was the frequent mention of "Monitoring Sustainability Related Performance" (30 passages), followed by "Improving the Strategic Targets to Achieve the Project Objectives" (10 passages), "Set up Strategic Target to Achieve Project Performance" (13 passages) and finally discussion around "Research and Development to Bring Innovation" (5 passages).

Improvement in performance can only be persuasively achieved if the stakeholders are properly informed about current performance that needs to be measured. Participants mentioned that they manage their project successfully by monitoring the project performance in order to produce records. These records evaluate the success or otherwise of detailed project sustainability strategies. Regarding the sub-theme "Monitoring Sustainability Related Performance" (30 passages) participant #5 mentioned that, *"From an energy point of view we have engineers to check out the project how best we can improve the process or how we can lessen the usage of energy to save money to improve our energy performance and to make it more cost effective and efficient."*

Participants considered that to achieve the project objective they need to emphasize the improvement of the strategic focus or strategic goal through following certain specific steps. In relation to sub-theme "Improving the Strategic Goal to Achieve the Project Objectives", participant #11 mentioned that the main target of their project is to improve the environmental performance and customer happiness. To achieve this target they monitor the environmental impact and emphasise market research to find out what the customers want.

With regard to the next most mentioned sub theme, "Set up Strategic Target to Achieve Project Performance", participants mentioned that they have their strategic targets that more appropriately reflect with their project performance. They work hard to achieve these strategic targets to improve the efficiency of their product, their service. They consider that it could effectively reduce the project risk and improve the project performance.

5.5.2 Measuring the Project Performance

The second sub-theme "Measuring the Project Performance" produced 96 related passages. This was predominantly mentioned by DC (31 passages), PM (38 passages) and EC (27 passages). This was then further broken down into four associated mid-level themes.

Measuring the Project Performance	**DC**	**PM**	**EC**	**Total**
Measuring Sustainability Performance	19	16	9	44
Measuring Economic Performance	4	7	2	13
Measuring Social Performance	2	7	6	15
Measuring Environmental Performance	6	8	10	24
Overall	31	38	27	96

Table 5.4: Thematic Profile of Measuring the Project Performance

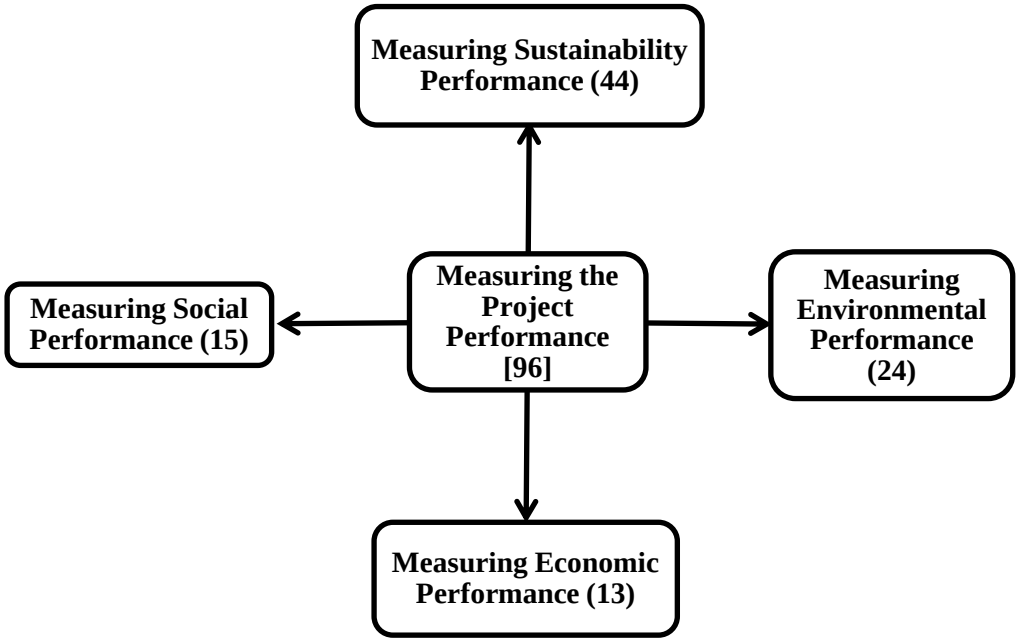


Figure 5.3: Thematic Diagram of Measuring the Project Performance

The most prominent was the frequent mention of "Measuring Sustainability Performance" (44 passages), followed by "Measuring Environmental Performance" (24 passages), "Measuring Social Performance" (15 passages) and finally discussion around "Measuring Economic Performance" (13 passages). A number of participants mentioned that to measure the project performance it's essential to improve the overall sustainability performance. Participants focused on measuring economic, social and environmental performance individually to improve the project performance. All these mid-level themes are divided into sub-level themes.

5.5.2.1 Measuring Social Performance

The sub-theme "Measuring Social Performance" produced 15 related passages. This was predominantly mentioned by DC (2 passages), PM (7 passages) and EC (6 passages). This was then further broken down into three associated mid-level themes.

Few of the participants consequently support the "Measuring Social Impact" (7 passages) on sustainability achievement in order to monitor the effect on individual internal and external stakeholders is within the limited financial support. Participants considered that in a sustainable society, everyone must actively contribute to reduce the harmful impact of human

activities on the environment. With regard to measuring the social impact participant #8 stated that *"We try to measure how much our project activity is impacting on the people's life or on the society, is there any change? How significant is that change? Does it impact badly?"*

Measuring Social Performance	DC	PM	EC	Total
Safety Performance		3		3
Measuring Social Progress		2	3	5
Measuring Social Impact	2	2	3	7
Overall	2	7	6	15

Table 5.5: Thematic Profile of Measuring Social Performance

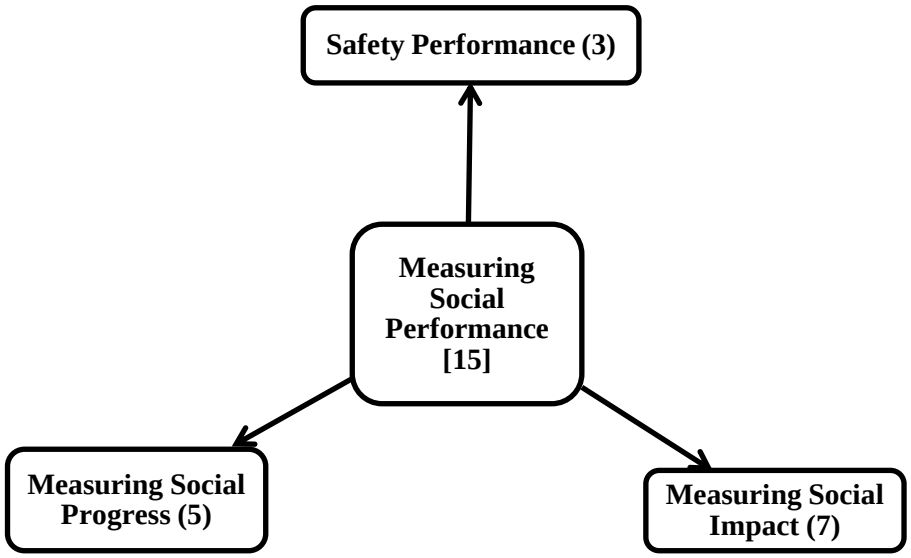


Figure 5.4: Thematic Diagram of Measuring Social Performance

Few of the participants stressed on their organisation's safety performance to control the risks and safety issues to measure the social performance. Participants noted that to have a more sustainable impact and to improve the social performance their organisation tries to increase the scale, quality, duration and continuity of their support to ensure safety in preconstruction and post construction.

5.5.2.2 Measuring Economic Performance

The sub-theme "Measuring Economic Performance" produced 13 related passages. This was predominantly mentioned by PM (7 passages), DC (4 passages) and EC (2 passages). This mid-level theme is split into two sub-level themes.

Measuring Economic Performance	DC	PM	EC	Total
New Economic Framework	3	3	2	8
Commercial Performance	1	4		5
Overall	4	7	2	13

Table 5.6: Thematic Profile of Measuring Economic Performance

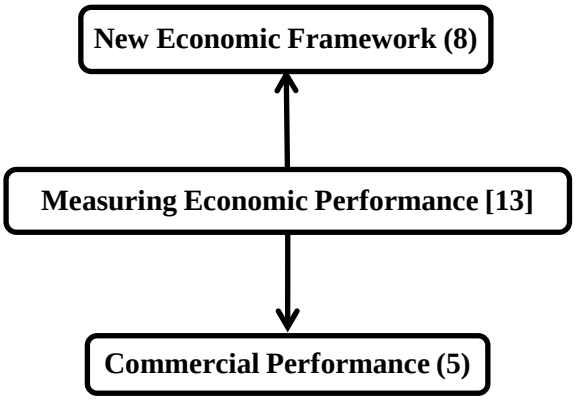


Figure 5.5: Thematic Diagram of Measuring Economic Performance

Participants frequently mentioned about following an established economic framework or economic sustainable model will be cost effective to Measure Economic Performance. They talked about a framework to discuss the economic growth impact of sustainable development and regarding this participant #9 mentioned, *"…..to understand our commercial performance we respond to follow our new economic framework where our business competitive advantage is determined by the social and environmental dividends of operation".*

5.5.2.3 Measuring Environmental Performance

The sub-theme "Measuring Environmental Performance" produced 24 related passages. This was predominantly mentioned by EC (10 passages), PM (8 passages) and DC (6 passages). This was then further broken down into five associated mid-level themes.

The most prominent was the frequent mention of "Measuring Carbon Footprint" (7 passages). Carbon reduction is a critical challenge for all organisations. Any energy efficiency improvements in building occupancy mean that measuring the carbon footprint indirectly through the project team could form an even larger proportion of control over the building's lifetime footprint. With regard to measuring the carbon footprint participant #13 mentioned that, *"Well, we do have some key performance indicators, which we set and measure against*

the target. It might give us an idea that how we can reduce the carbon footprint from energy usage in our head office." Some of the companies use Dow Jones Sustainability Indexes to evaluate and assess issues of the environmental sustainability performance. With regard to using the *"Dow Jones Sustainability Index"* participant #6 stated that, *"And we have across the business sustainability plans to improve the environmental factor; we investigate how sustainable we are to make our score higher in Dow-zones index".* Few of the participants mentioned that they use environmental scorecard to measure and reduce the environmental impact.

Measuring Environmental Performance	**DC**	**PM**	**EC**	**Total**
Using Environmental Scorecard			3	3
Environmental Inspection	2	2	1	5
Measuring Amount of Waste	3	1	1	5
Measuring Carbon Footprint	1	5	1	7
Dow Jones sustainability index			4	4
Overall	6	8	10	24

Table 5.7: Thematic Profile of Measuring Environmental Performance

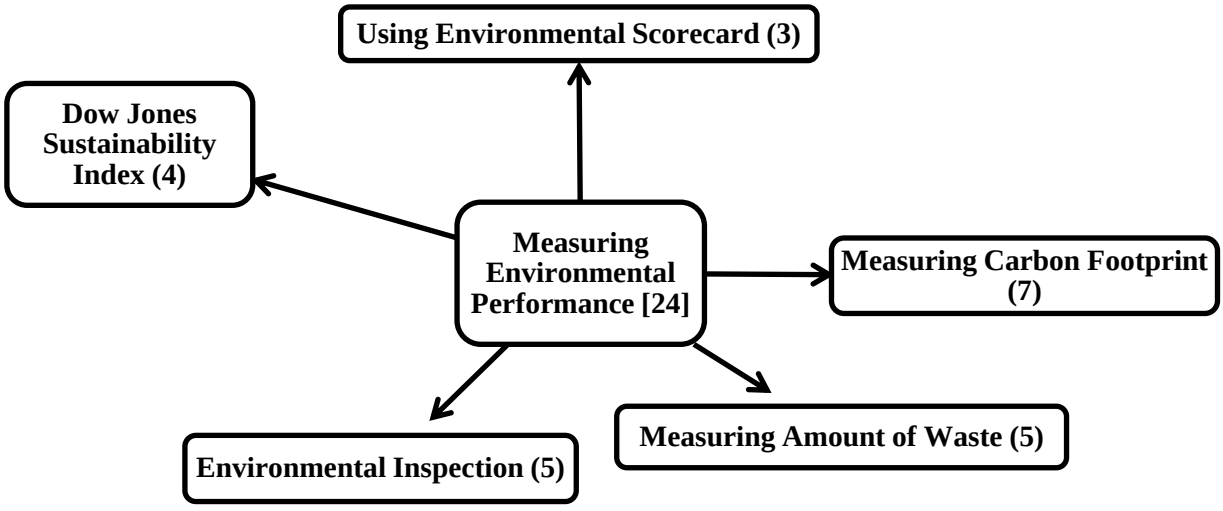


Figure 5.6: Thematic Diagram of Measuring Environmental Performance

5.5.2.4 Measuring Sustainability Performance

The sub-theme "Measuring Sustainability Performance" produced 44 related passages. This was predominantly mentioned by PM (29 passages), DC (6 passages) and EC (9 passages). This was then further broken down into four associated mid-level themes.

The most prominent was the frequent mention of "Using Indicator" (24 passages). Participants mentioned they use some KPIs to measure how successful the project is in terms of achieving project goals. They also mentioned that its outcomes also need to be shared to show how the goals are related and contribute to the overall organizational sustainability objectives. With regard to measuring the sustainability performance participant #11 mentioned that *"yes we have some kpi's. We use these kpi's to measure our target. We have measurement numbers; we set a total number of 5 to achieve our final objectives, out of 5 how much we have achieved. Every year from the 3rd party we are asked how the management is performing, how much we are capable to achieve the project objectives….."*.

Measuring Sustainability Performance	**DC**	**PM**	**EC**	**Total**
Using Score	2	3	3	8
Using Indicator	3	16	5	24
Sustainability Appraisal	1	3	1	5
Using Performance Drivers		7		7
Overall	6	29	9	44

Table 5.8: Thematic Profile of Measuring Sustainability Performance

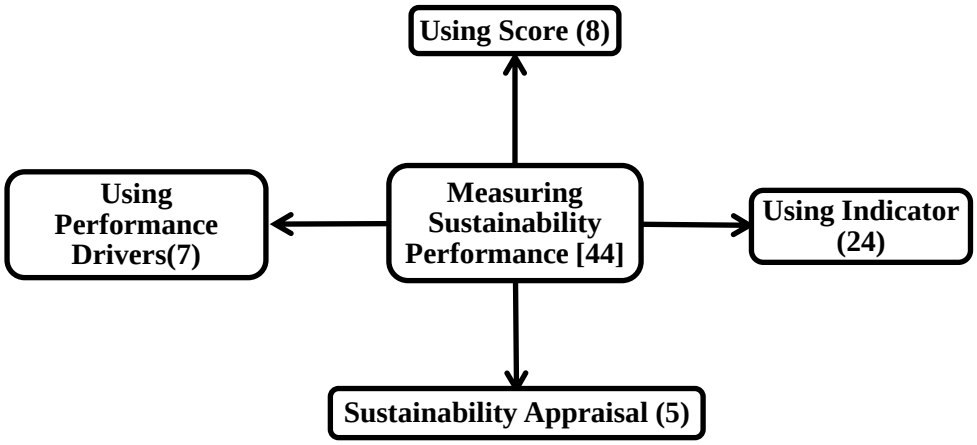


Figure 5.7: Thematic Diagram of Measuring Sustainability Performance

Participants mentioned that they use score (8 passages) of their buildings between certain numbers and ranked them against the sustainability target. With regarding to using the Score participant #5 stated that, *"we use assessment methodologies to evaluate the performance of*

buildings and rate them eventually with a particular score at the end of the whole process". Some of the participants (7 passages) mentioned that they use sustainability appraisal as a policy to measure the on-going social, economic and environmental impact which needs to be taken into account.

5.5.3 Meeting Project Performance

The sub-theme "Meeting Project Performance" produced 31 related passages. This was predominantly mentioned by EC (14 passages), PM (10 passages) and DC (7 passages). This was then further broken down into four associated mid-level themes.

Meeting Project Performance	DC	PM	EC	Total
Time Management	1	3	1	5
Integrated management system	2	2	1	5
Cheap but Quality decision	1	2	5	8
Being Competitive	3	3	7	13
Overall	7	10	14	31

Table 5.9: Thematic Profile of Meeting Project Performance

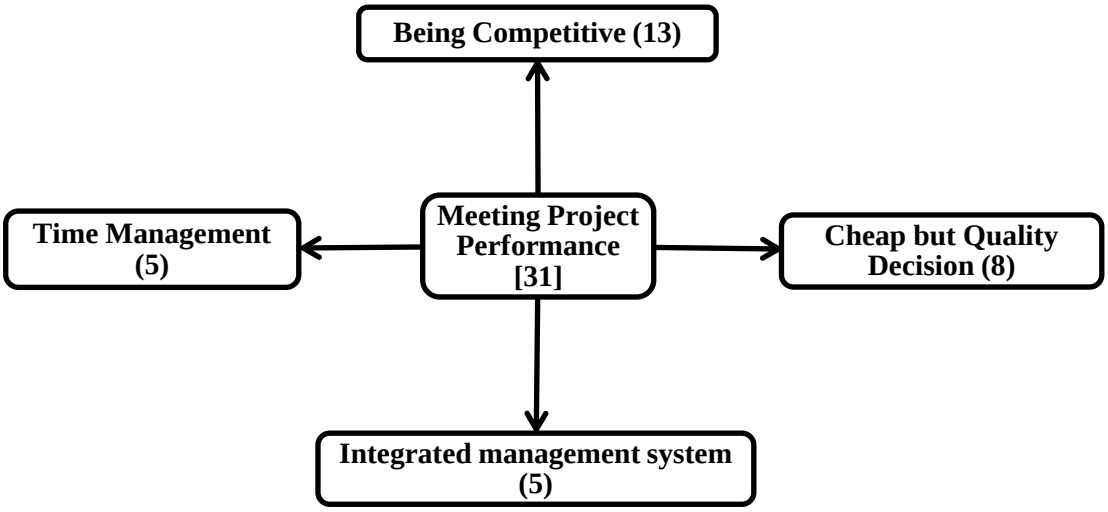


Figure 5.8: Thematic Diagram of Meeting Project Performance

The most prominent was the frequent mention of "Being Competitive" (13 passages). Participants focused on trying to be competitive through analysing the market data. It helps the project team to compare themselves with other companies and to meet the project key performance objectives. Considering sustainability as their mission participant #11 mentioned that *"Yes definitely we want to push forward the company because it has to now be*

competitive in the market. If we don't have sustainability as our mission, then we will be left behind. That's the way the market is going, so we have to go."

Concerning the theme "Cheap but Quality decision", participants (8 passages) especially the operational staff attempt to integrate the quality of the final product and reducing the total cost of designing and building of the final product. Regarding this participant #5 stated that *"If we can find out a local reuse for the waste materials without sending them into landfill we use it. Because finally it works out cheaper and it's a more sustainable solution".* The key of this theme is using in the best way or a good method that can be managed by low cost without compromising the quality.

Few of the participants (5 passages) mentioned that they use an integrated management system to integrate all of an organization's systems and processes in to one complete framework, enabling the project to work as a single unit with unified objectives. And finally a small number of the participants (5 Participants) mentioned that they follow the time management approach to control over the time through project planning and project scheduling. This time management approach improves the productivity and reduces the lead time.

5.5.4 Promoting the Construction Sustainability

The sub-theme "Promoting the Construction Sustainability" produced 911 related passages. This was predominantly mentioned by DC (267 passages), PM (326 passages) and EC (318 passages). This was then further broken down into three associated mid-level themes. The most prominent is the frequent mention of "Sustainable Development in Construction Sector" (486 passages). The second most prominent is the "Stakeholder Engagement for Construction Sustainability" (345 passages) and the third most mentioned theme is "Drivers for Construction Sustainability" (80 passages). All these sub-themes are divided into mid-level themes which are discussed in the next sections.

Promoting the Construction Sustainability	DC	PM	EC	Total
Sustainable Development in Construction Sector	159	192	135	486
Stakeholder Engagement for Construction Sustainability (4)	101	114	140	355
Drivers for Construction Sustainability	12	23	45	80
Overall	272	329	320	921

Table 5.10: Thematic Profile of Promoting the Construction Sustainability

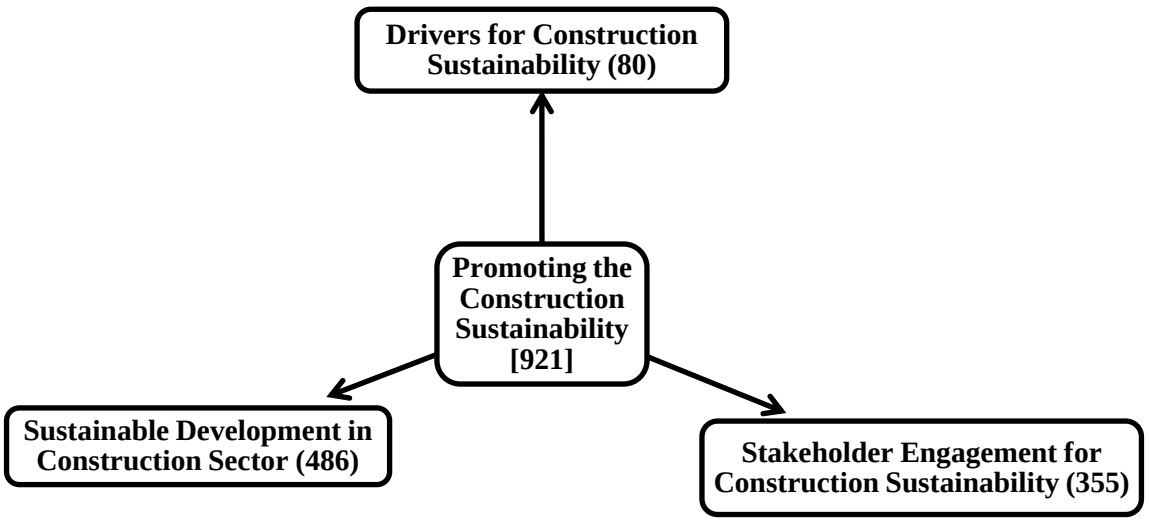


Figure 5.9: Thematic Diagram of Promoting the Construction Sustainability

5.5.4.1 Drivers for Construction Sustainability

The mid-level theme "Drivers for Construction Sustainability" produced 80 related passages. This was predominantly mentioned by EC (45 passages), PM (23 passages) and DC (12 passages). This was then further broken down into nine associated mid-level themes.

The most prominent was the frequent mention of "Competitors' Pressure for Sustainable Development" (22 passages). Participants mentioned the effect of their competitors' pressures, on their organizational decision-making to improve different sustainability issues. To support this theme participant #15 mentioned that *"Definitely the competitors are a big push. Competitors are the big rival. We analyse the competitor's service against the client's requirements. So if they are more motivated towards sustainability and motivated more than us then they will occupy the whole market, so it's really a big push for us."*

Participants considered "Customer Satisfaction" (18 passages) as another big driver for sustainability. They considered it is important for them to make sure that their customers are

much more than simply satisfied because then the satisfied customers are most likely to be loyal and will place more orders and will also use a wider range of services. Participants believed that the more customers' expectations are managed the more their project will be sustainably performed.

Drivers for Construction Sustainability	DC	PM	EC	Total
Competitors' pressure for Sustainable Development	5	4	13	22
To consume less energy	3			3
Developing innovative structures	1	2	8	11
Saving Cost	1	3	3	7
Climate Change			6	6
Market Demand for Long Lasting Structure		6	1	7
To reduce waste		3		3
Industrial Revolution Driving Sustainable Development		2	1	3
Customer Satisfaction	2	3	13	18
Overall	12	23	45	80

Table 5.11: Thematic Profile of Drivers for Construction Sustainability

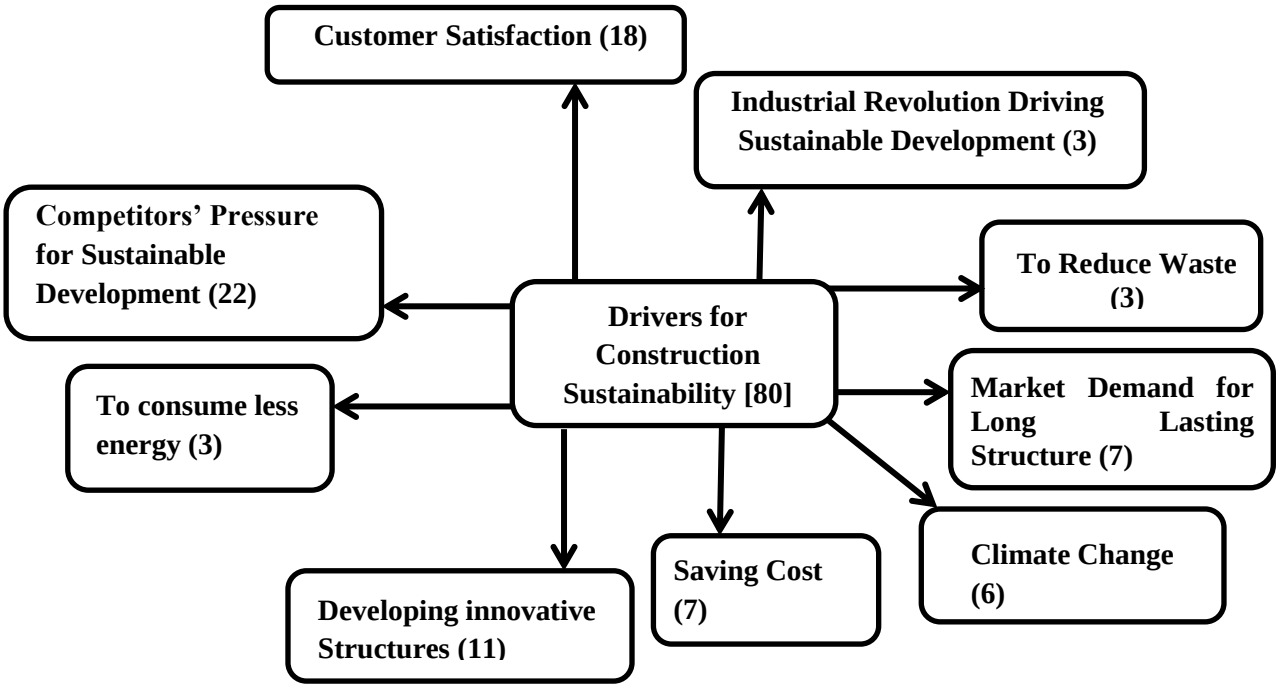


Figure 5.10: Thematic Diagram of Drivers for Construction Sustainability

Participants considered that the adoption of sustainability practices will have a greater impact on technical development of the construction industries rather than only improving the cost

and quality because the motivation to adopt these practices is more oriented toward technological development. The third frequently mentioned sub-theme is "Developing Innovative Structures" participant #8 considered that "*As the economy is growing, usually people will look to leapfrog ahead by adopting new sustainable innovation; whilst in the developed economies, people are trying to make the existing structure work more efficiently and in a more innovative way".*

The fourth repeatedly mentioned sub-theme is "Market Demand for Long Lasting Structure". Durability is a significant sustainable attribute of a building or structure because it will not deteriorate and will require less energy and resources over time to repair or replace. Considering the durability of the sustainable development participants stated that their company's policies and regulations, together with their stakeholder's pressure and market demand are putting increasing pressure on both public and private sector clients to deliver more efficient and sustainable structures. Likewise, participant #4 stated that *"And sometimes we face big pressure from our clients, as there is a huge demand for long-lasting and durable structures and people said they want solar heating, want ground source heat pump, want this, want that".*

Reducing the environmental impacts of the construction site through minimising the energy consumption and reducing the waste are also considered as drivers for construction sustainability. Regarding this participant #8 mentioned that, *"More and more clients are now requesting the evidence of our own systems and improvements in reducing carbon emissions, energy consumption, and waste, unnecessary journeys etc".*

5.5.4.2 Stakeholder Engagement for Construction Sustainability

The mid-level theme "Stakeholder Engagement for Construction Sustainability" produced 345 related passages. This was predominantly mentioned by EC (138 passages), PM (111 passages) and DC (96 passages). This was then further broken down into eight associated mid-level themes in following sections.

Stakeholder Engagement for Construction Sustainability (4)	DC (4)	PM	EC	Total (4)
Stakeholder Analysis	8	16	19	43
Stakeholder Management (4)	69	69	89	227
Communication with Stakeholders	8	8	13	29
Measuring Stakeholder Performance	3	2	7	12
Creating Sustainability Awareness	6	15	11	32
Continuous Improvement	7	4	1	12
Overall	101	114	140	355

Table 5.12: Thematic Profile of Stakeholder Engagement for Construction Sustainability

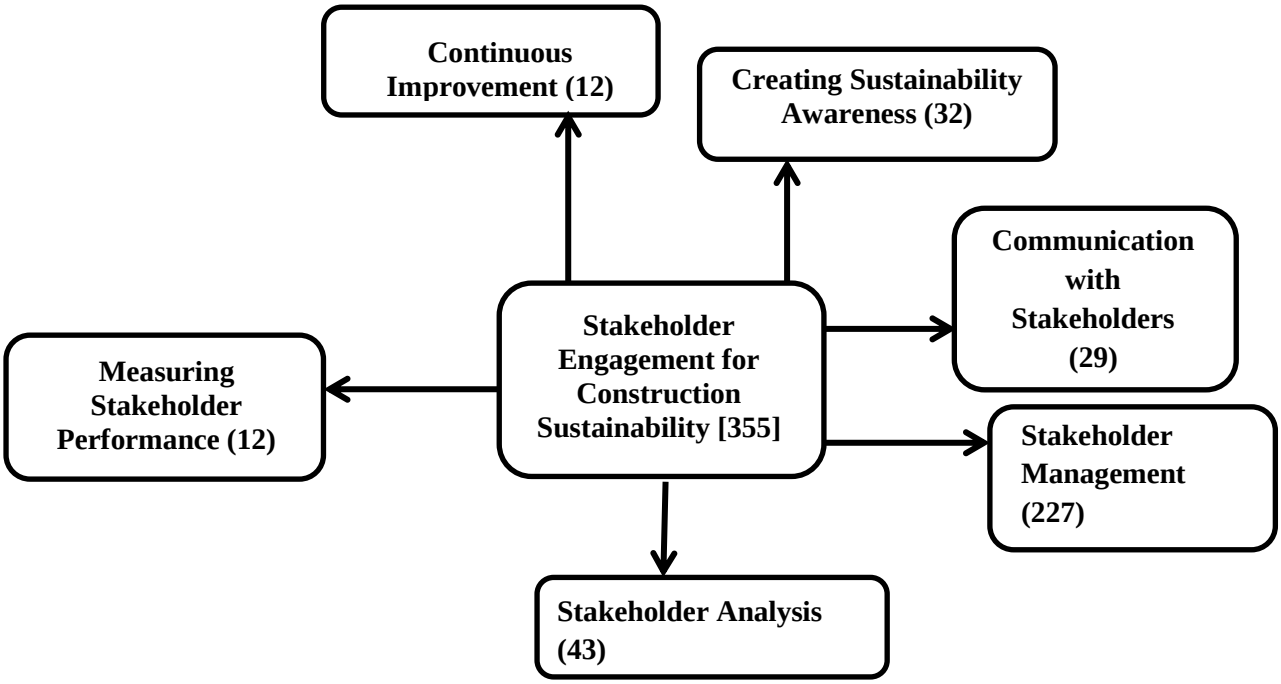


Figure 5.11: Thematic Diagram of Stakeholder Engagement for Construction Sustainability

5.5.4.2.1 Communication with Stakeholders

The sub-theme "Communication with Stakeholders" produced 29 related passages. This was predominantly mentioned by EC (13 passages), PM (8 passages) and DC (8 passages). This was then further broken down into four associated mid-level themes.

The most prominent is the frequent mention of "Information Sharing" (15 passages). Participants considered that sharing information is a key way to communicate with other

stakeholders all through the project process. They also recommend considering it at every stage of the process. According to the participant #5 *"to manage communication we try to provide more accurate or real time information to our stakeholders to inform them and to take the right decisions. It gives them a complete view of our proposed plan so that they can evaluate its suitability and decide whether to approve the project".*

Communication with Stakeholders	DC	PM	EC	Total
Sharing Knowledge	3		5	8
Information Sharing	1	7	7	15
Updating Website	2	1	1	4
Discussion with the Stakeholders	2			2
Overall	8	8	13	29

Table 5.13: Thematic Profile of Communication with Stakeholders

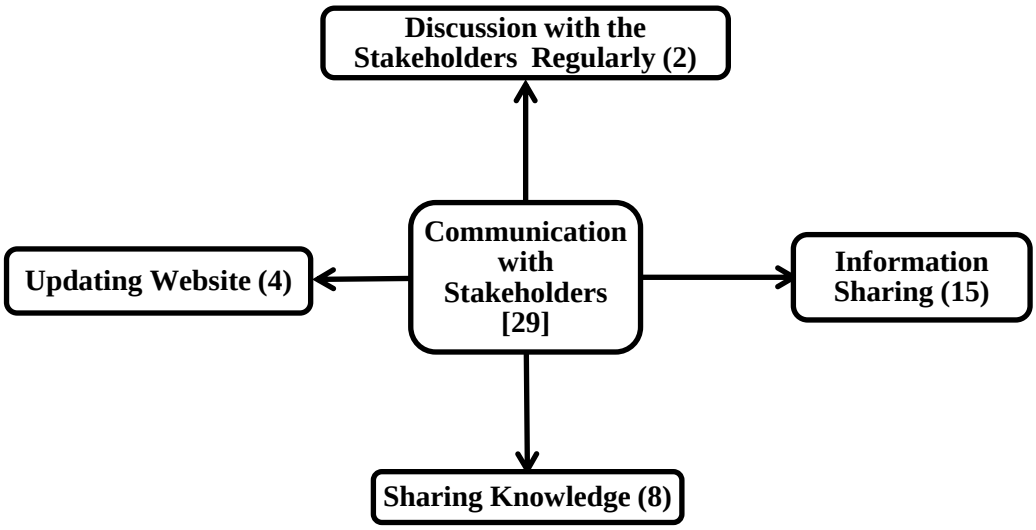


Figure 5.12: Thematic Diagram of Communication with Stakeholders

The second most mentioned theme is "Sharing Knowledge" (8 passages). Participants also indicated that sharing knowledge is an effective communication process that provides strategic as well as operational inputs to different project activities. With regard to "Sharing Knowledge" participants mentioned that they share knowledge and skills with their external stakeholders and value chain stakeholders which is relevant to make sure that this knowledge and skills represent what the current market is demanding and it will help to increase their productivity.

Regarding "Discussion with Stakeholders" participants mentioned that they discuss different issues with their stakeholders and also the performance of their internal stakeholders; also take their feedback to improve the situation. Participant #9 mentioned that "*We discuss with our stakeholders about different ongoing issues and take feedback from them; also let them know our decision. It also works as a strategy to get trust from our stakeholders and strengthen our relationships".*

5.5.4.2.2 Creating Sustainability Awareness

The sub-theme "Creating Sustainability Awareness" produced 32 related passages. This was predominantly mentioned by PM (15 passages), EC (11 passages) and DC (6 passages). This was then further broken down into two associated mid-level themes.

Creating Sustainability Awareness	DC	PM	EC	Total
Educating Stakeholders	1	8	4	13
Make the Stakeholders Understand about Sustainability	5	7	7	19
Overall	6	15	11	32

Table 5.14: Thematic Profile of Creating Sustainability Awareness

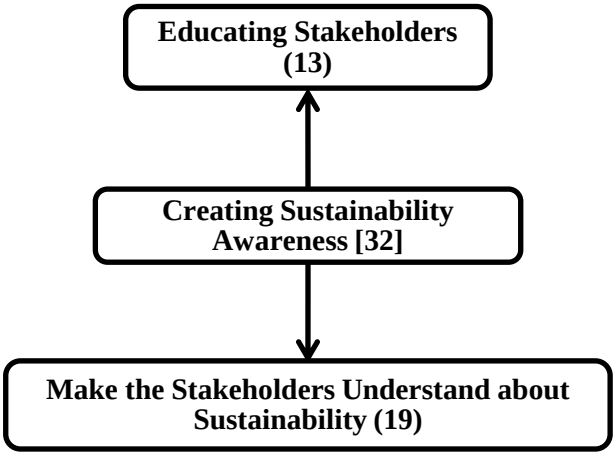


Figure 5.13: Thematic Diagram of Creating Sustainability Awareness

The most prominent is the frequent mention of "Make the Stakeholders Understand about Sustainability" (19 passages). Participants mentioned that to create sustainability awareness among all personnel in the organization, the management is trying to motivate their stakeholders to increase their interests for more sustainable or green structure participant #15

mentioned that they analyse the project risk and project value than integrate both the risk and value to manage risk and value. Then they hold meetings with all stakeholders and try to make them understand about the risk, discuss the value management, then try to influence them with some sustainable reliable solutions and agree the outcome of the meeting.

Participants considered that "Educating Stakeholders" (13 passages) is a good promoter to create the sustainability awareness among the stakeholders. Participants believed that proper education about Construction Sustainable Development gives the stakeholders knowledge, information and tools that will help them to take smart decisions to create a sustainable future for all. Some of the participants mentioned that they support a number of educational initiatives to promote knowledge, engage and educate their internal and external stakeholders to increase their interest in sustainable construction and to keep their demands reasonable.

5.5.4.2.3 Measuring Stakeholder Performance

The sub-theme "Measuring Stakeholder Performance" produced 12 related passages. This was predominantly mentioned by DC (3 passages), PM (2 passages) and EC (7 passages). This was then further broken down into three associated mid-level themes.

Measuring Stakeholder Performance	DC	PM	EC	Total
Measuring Contractor Performance	2			2
Stakeholder performance Survey			3	3
Benchmarking	1	2	4	7
Overall	3	2	7	12

Table 5.15: Thematic Profile of Measuring Stakeholder Performance

Participants mentioned that they do Benchmark (7 passages) to measure stakeholder performance through comparing the project outcome. Participants attempt to benchmark the quality of deliverables by measuring and comparing the project performance, and customer satisfaction delivered by their project team. Interviewee #13 mentioned that *"…….It (Benchmarking) works as performance measurement solutions concepts and a tool to build strong capabilities, ensuring an inward flow of ideas and establishing true competitive gaps among the project teams*". Similarly participant #6 considered that different strategic issues and customer requirements have been the focus of the benchmarking processes. He also added that benchmarking the stakeholder performance could be a way to rethink performance

improvement and to compare their different needs during benchmarking is the best performance measurement method.

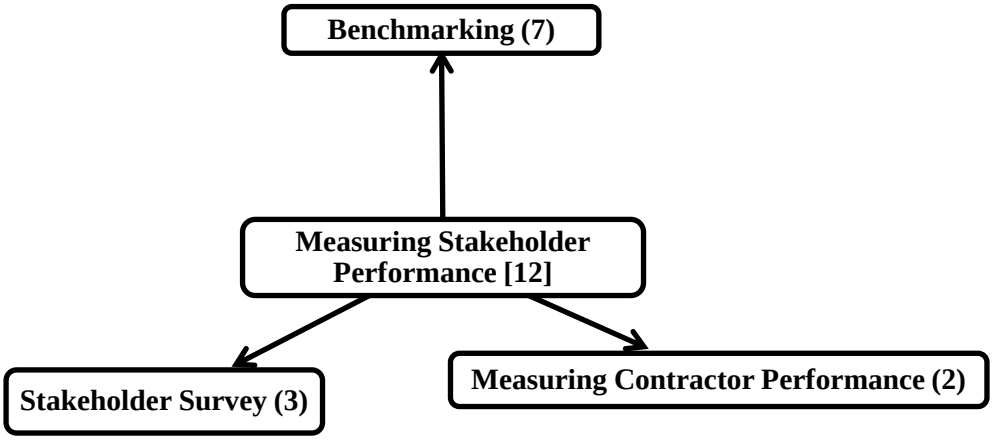


Figure 5.14: Thematic Diagram of Measuring Stakeholder Performance

5.5.4.2.4 Stakeholder Analysis

The sub-theme "Stakeholder Analysis" produced 43 related passages. This was predominantly mentioned by EC (19 passages), PM (16 passages) and DC (8 passages). This was then further broken down into four associated mid-level themes. To explain the stakeholder analysis participants mostly mentioned about Identifying the Right Stakeholders, Stakeholder Mapping, Prioritizing Stakeholders.

Stakeholder Analysis	DC	PM	EC	Total
Identifying the Key Stakeholders	1	3	3	7
Identifying the All Stakeholders	3	5	7	15
Stakeholder Mapping	2	5	2	9
Prioritizing Stakeholders	2	3	7	12
Overall	8	16	19	43

Table 5.16: Thematic Profile of Stakeholder Analysis

The most prominent is the frequent mention of "Prioritizing Stakeholders" (12 passages) to support the stakeholder analysis. After identifying the stakeholders, participants mentioned that the next most important stage is to prioritize the stakeholders based on their influence on the project success. According to participant #8, *"Yes we prioritize our stakeholders by how influential they are to the project. Are they impacting positively or negatively? Then we have*

to keep them happy and have to manage them. So we prioritize them first and then we manage them accordingly". Participants also mentioned that sometimes situations arise when they need to prioritize only the key people rather than all. Participant #5 mentioned *".....and I can think of a few situations when we want to go through the motions of stakeholder engagement without necessarily engaging everybody in the process. Because there is the potential for a very long process of engagement it's better to prioritize those who are more important"?*

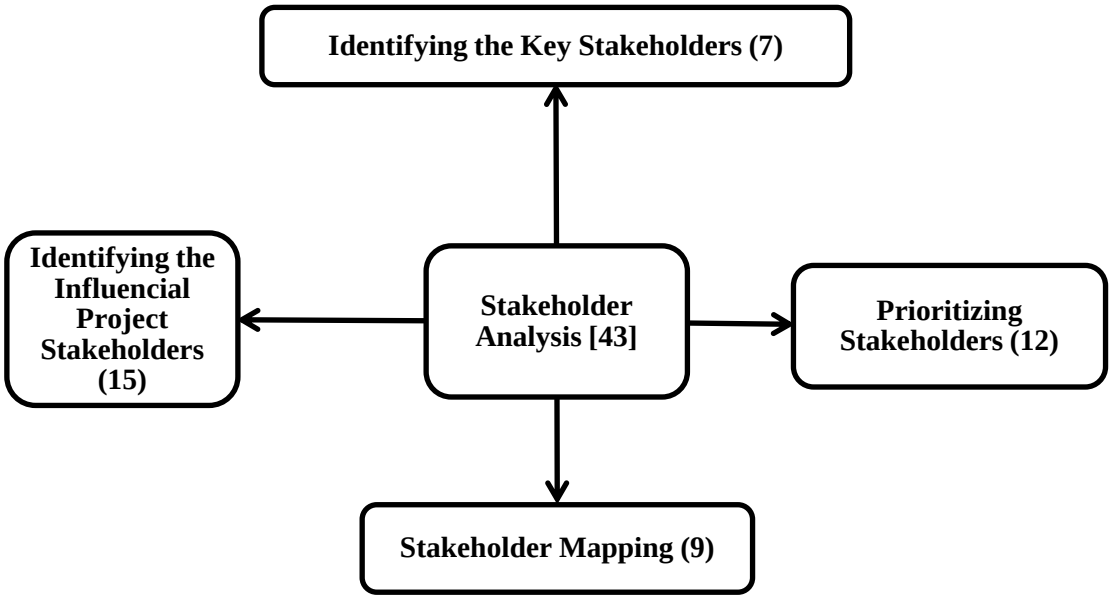


Figure 5.15: Thematic Diagram of Stakeholder Analysis

Participants considered Stakeholder Mapping as an important step to analyse and understand the key stakeholders and their demands. They mentioned that stakeholder mapping visualizes stakeholders' demands in relation to the business and in relation to their power and influence. They also stated that visualizing the demand with the stakeholders in the mapping process makes it easier to consider the demand's manageability based on their allocated project cost, time and risk. Regarding the Stakeholder Mapping participant #3 mentioned that*, "We always do stakeholder mapping because it shows the interest and who has the ability to influence the project outcome or who can influence to make the whole thing improve".* On the other hand participants also expressed their concern that in some cases stakeholders leave the project in the middle, which makes the stakeholder mapping process indeterminate. Regarding this, participant #5 pointed out that, *"…….sometimes the situation happens that stakeholders leave or change in the middle of the project due to the change in their demands or getting good proposals from other companies……it makes mapping the stakeholders more critical at the beginning".*

The third mostly mentioned theme is “Identifying the Key Stakeholders” (7 passages). To analyse the stakeholder’s participants focused on identifying the right and specific stakeholder who will affect or who will be affected by the changing project process or activities. Participant #2 described that stakeholders can be classed as all persons, organizations or communities involved in a project, the targeted group and the project executing society. He also mentioned that they need to anticipate their different responses, gain and maintain their support, and the need to challenge them if their demands are controversial. Because of their diverse attitudes participants considered that it is important to find the right stakeholders who can positively influence the changing or improving process of the organisation.

On the other hand with regard to “Identifying the Influencial Project Stakeholders” some of the participants mentioned that they try to identify the most influencial and the responsible stakeholder one who can impact on other stakeholders to motivate them to adopt the sustainability. Identifying theinfluencial stakeholder helps to to find out the responsible stekaholder who has the power to take decision or sustainability .

5.5.4.2.5 Stakeholder Management

The sub-theme “Stakeholder Management” produced 127 related passages. This was predominantly mentioned by DC (37 passages), PM (40 passages) and EC (50 passages). This was then further broken down into three associated mid-level themes. The most prominent is the frequent mention of “Managing Different Project Stakeholders” (81 passages); Managing Stakeholders Involvement in the Project itself mentioned in 4 passages. The mid-level themes “Managing Different Project Stakeholders” and “Managing Stakeholder's Impact” are divided into three sub-level themes which are discussed below.

Stakeholder Management (4)	**DC (1)**	**PM (2)**	**EC (1)**	**Total (4)**
Managing Different Project Stakeholders	31	24	26	81
Managing Stakeholder's Impact	1	10	21	32
Stakeholder Risk Management	8	5	3	16
Motivating Stakeholders	6	6	7	19
Managing Relationship with Stakeholders	22	22	31	75
Overall	69	69	89	227

Table 5.17: Thematic Profile of Stakeholder Management

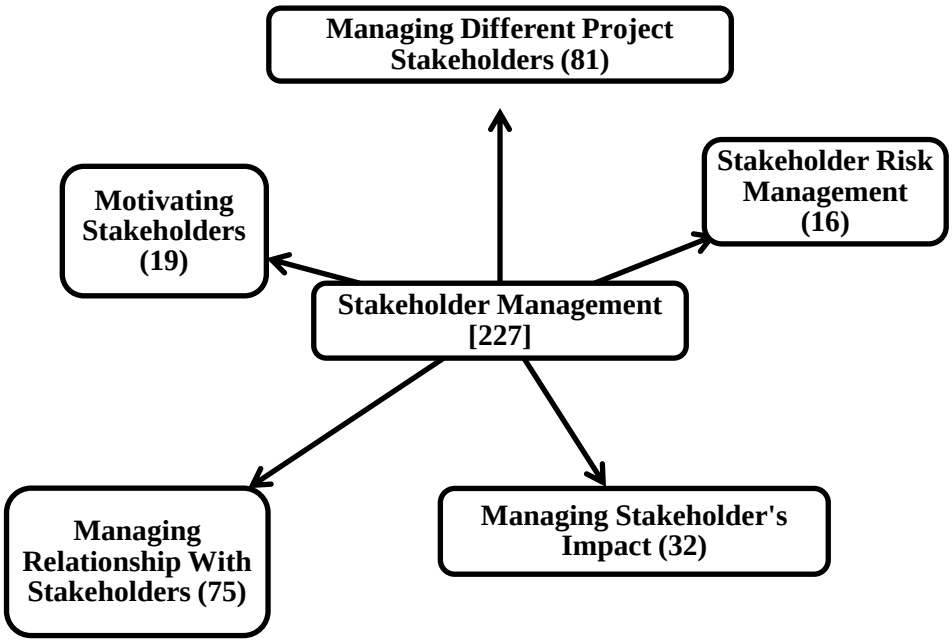


Figure 5.16: Thematic Diagram of Stakeholder Management

5.5.4.2.5.1 Managing Different Project Stakeholders

The sub-theme "Managing Different Project Stakeholders" produced 81 related passages. This was predominantly mentioned by DC (31 passages), EC (26 passages) and PM (24 passages). Stakeholder Management itself is mentioned in 6 passages. This was then further broken down into four associated mid-level themes.

Managing Different Project Stakeholders (6)	DC (4)	PM (1)	EC (1)	Total
Training Internal Stakeholders	9	5	3	17
Managing Stakeholders Demand	8	11	15	34
Involving all Stakeholders Early	6		3	9
Managing Supply Chain	4	7	4	15
Overall	31	24	26	81

Table 5.18: Thematic Profile of Managing Different Project Stakeholders

The most prominent is the frequent mention of "Managing Stakeholders Demand" (34 passages) to get the best result. Participants noted that assessing and addressing stakeholder demands must be a proactive process that helps to ensure project efforts and objectives are aligned to meet those needs. They also referenced that it needs to balance the stakeholder's demands considering scope, time, cost, quality, resources and risk to produce a quality product. They also stressed on balancing the competing the stakeholders demands based on its

scope, time, cost, quality, resources, and risk to produce a quality product that will ensure continuous improvement.

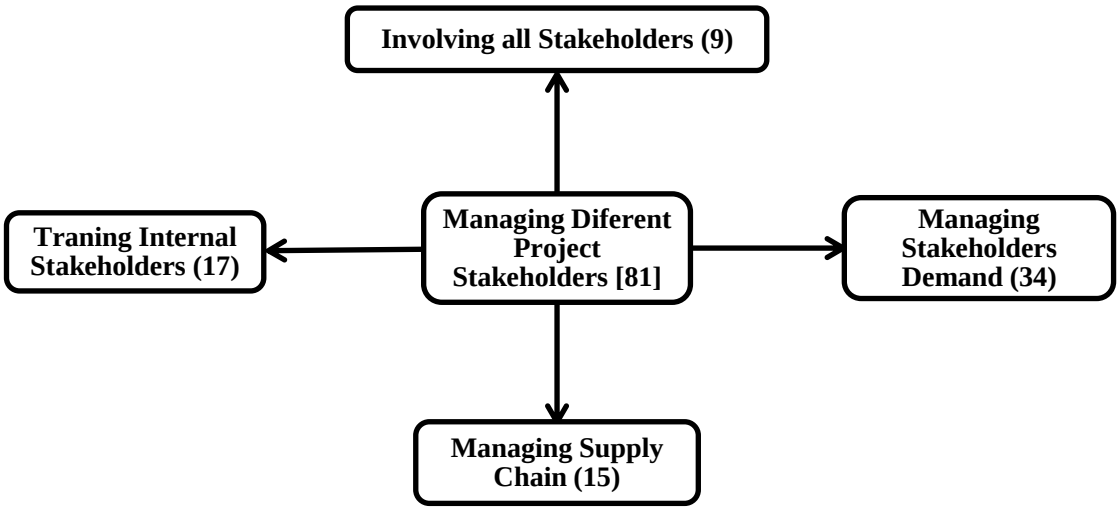


Figure 5.17: Thematic Diagram of Managing Different Project Stakeholders

The second most mentioned theme is "Training the Internal Stakeholders" (17 passages). Interviewees mentioned that they arrange different types of training program to change stakeholder's mentality and to educate them. They also added that it will make sure that they know all the different options for improving energy efficiency and waste management as a whole improve to their innovative behaviour.

The third most frequently mention is "Managing Supply Chain" (15 passages). Interviewee #13 mentioned that *"our management team manage the supply chain which aims to minimise risks and create the business opportunities".* Participants also indicated that managing the supply chain will help to build better and more sustainable long-term relationships with their partners, in turn will make sure to achieve the competitive advantage.

Considering the individual needs and interests of potential stakeholder's and generating the innovative ideas participants considered that it is important to engage all the project stakeholders from the initial stage.

5.5.4.2.5.2 Managing Stakeholder's Impact

The sub-theme "Managing Stakeholder's Impact" produced 32 related passages. This was predominantly mentioned by EC (21 passages), PM (10 passages) and DC (1 passages). This was then further broken down into three associated mid-level themes.

The most prominent is the frequent mention of "Stakeholder's Influence to Bring Innovation" (18 passages). In order to bring innovation through stakeholders' influence, it needs to leverage the organisation's internal resources and needs to build relationships with them. Participant #13 concerned about the fact that that most of the innovative solutions come from their external stakeholders rather than the internal stakeholders. He also added that most of the time clients demand innovative products and new technology. Then they arrange different training programs for their internal and external stakeholders called innovation days where they talk about new approaches to work. Few of the participants mentioned that they arrange school and university lunch time sessions where they bring the manufacturers and producers to talk about their staff competencies, new techniques, environmentally friendly approaches etc. Participant #15 also mentioned that sometimes their contractors, engineers come up with innovative ideas and innovative products that last for long period and comparatively cheaper than other.

Managing Stakeholder's Impact	**DC**	**PM**	**EC**	**Total**
Considering Stakeholders Suggestion			9	9
Stakeholder's Influence to Bring Innovation		10	8	18
Stakeholder as Decision Maker	1		4	5
Overall	1	10	21	32

Table 5.19: Thematic Profile of Managing Stakeholder's Impact

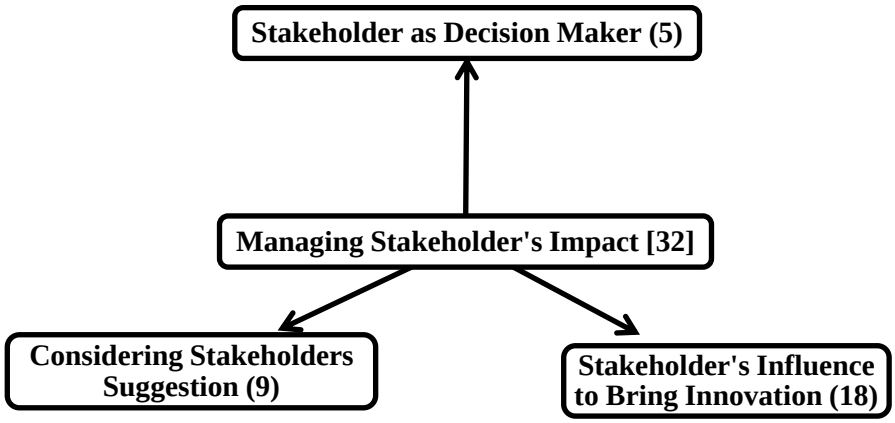


Figure 5.18: Thematic Diagram of Managing Stakeholder's Impact

5.5.4.2.5.3 Stakeholder Risk Management

The sub-theme "Stakeholder Risk Management" produced 16 related passages. This was predominantly mentioned by DC (8 passages), PM (5 passages) and EC (3 passages). This was then further broken down into one associated mid-level themes.

Stakeholder Risk Management	DC	PM	EC	Total
Stakeholder Risk Management	8	5	3	16
Overall	8	5	3	16

Table 5.20: Thematic Profile of Stakeholder Risk Management

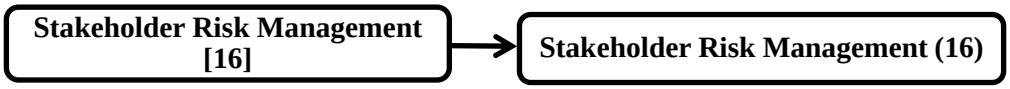


Figure 5.19: Thematic Diagram of Stakeholder Risk Management

Participants mentioned that till now, stakeholder risk has typically been disaggregated across the organisation, which is creating a big gap that is exploited. However, few of the participants agreed that pulling together all in a project's objectives and anticipating all the risks related to the employees, contractors, clients and other external project teams, helps the management to monitor and also allows them to take appropriate action for timelier identification of potentially counter-productive behaviour. The risk can be then more quickly explored and resolved. Regarding managing stakeholder risk, participant #8 mentioned that, *"Definitely, it's the stakeholder risk in the project team, you need to manage their risk otherwise it hampers your business growth. If you don't anticipate and manage their risk then you will be stuck. You can't manage your project correctly; you can't be the market leader. So if you don't manage risk it will affect you".* Participants mentioned they follow some risk management strategies to manage their risk related to the internal and external stakeholders.

5.5.4.2.5.4 Managing Relationship with Stakeholders

The sub-theme "Managing Relationship with Stakeholders" produced 75 related passages. This was predominantly mentioned by EC (30 passages), PM (23 passages) and DC (22 passages). This was then further broken down into five associated mid-level themes.

The most prominent is the frequent mention of "Meeting with Stakeholders" (28 passages). Participants mentioned that to manage relationships with stakeholders it is important to meet with the important stakeholders regularly and consult with them so that their concerns and interests can be identified. Participants also believed that meeting regularly with the stakeholders supports the positive relationships with the stakeholder community and can also

be utilised to influence attitudes and behaviours within the organisation. Few of the participants were also concerned about the fact that sometimes too much communication is time consuming and also create conflict among the stakeholders. Regarding this issue participant #8 mentioned that, *"……..on occasion during a meeting, looking through an agenda, to find out a particular agenda item is time consuming and annoying; it also creates disputes among the people".*

Managing Relationship With Stakeholders	DC	PM	EC	Total
Meeting with Stakeholders	5	9	14	28
Supply Chain Partnership	3	2	5	10
Working in a Team	4	6		10
Building Relationship	4	4	9	17
Collaboration	6	2	2	10
Overall	22	23	30	75

Table 5.21: Thematic Profile of Managing Relationship with Stakeholders

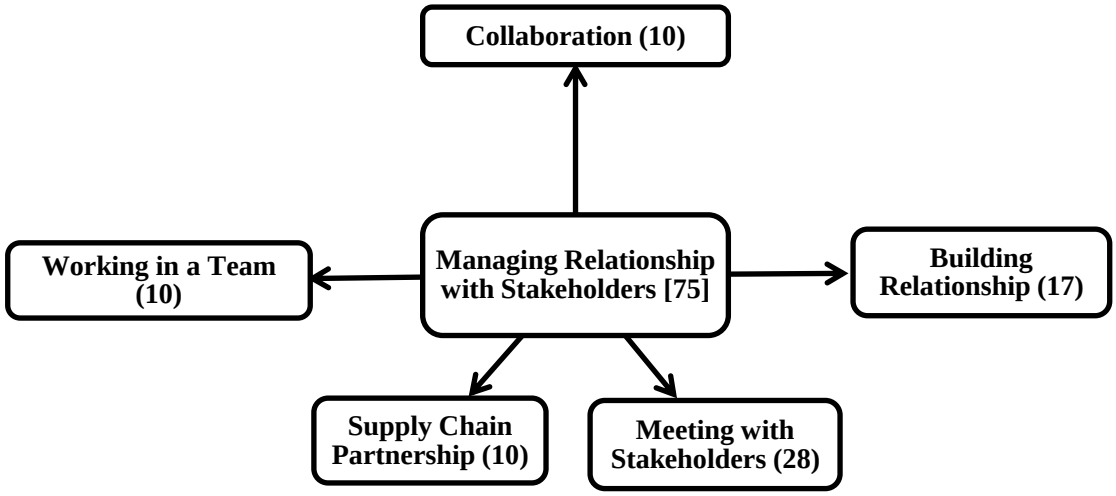


Figure 5.20: Thematic Diagram of Managing Relationship with Stakeholders

The second most mentioned theme is "Building Relationship" (17 passages). Participants mentioned that their organisation wants to engage stakeholders to build effective relationships with them and also wants to maintain these relationships for the long term to manage them. With regard to building relationships participant #11 mentioned that *"It's essential, we have our area manager, who is very close with the senior people, and similarly they try to be very close to us on the ground to deliver the scheme. So we are effectively trying to engage with*

our people on working to build relationships with the different levels in housing associations or the council and try to maintain them."

Participants believed that the power of "Collaboration" (17 passages) with the stakeholders creates an environment to work together. It also helps to share individual knowledge, skills and resources that can help to win and implement project objectives, reduce costs and manage risks and create additional project value. Emphasizing on the collaboration with stakeholders participant #9 considered that creating a synergy between the project team helps to build a cost effective clean design, add value, exceed the customer's expectations and also ensure to deliver the project on time and budget. He also added that, *"We let others know what we are doing actually. We engage our clients through the SMART criteria. So collaboration is a key tool to engage the stakeholder and monitor them. So it's the formal basis of workshop and meetings"*

5.5.4.2.5.5 Motivating Stakeholders

The sub-theme "Motivating Stakeholders" produced 19 related passages. This was predominantly mentioned by EC (7 passages), PM (6 passages) and DC (6 passages). This was then further broken down into three associated mid-level themes.

The most prominent is the frequent mention of "Identifying Stakeholders Skill" (7 passages). Interviewees believed that specific thinking and improving behavioural and technical skills would help to increase their motivation. Participants mentioned that they do measure stakeholder's performance because it helps them to identify their individual strength and identify the gap in their skills. As a whole identifying stakeholder's skills increases their motivation and willpower to perform better in the future.

The second most mentioned theme is "Rewarding the Successful Stakeholders" (6 passages). Participants, especially the clients mentioned that providing incentives or rewarding the project team members for any of their successful attempts to make them more motivated to improve the situation and it also motivates the other project team members to develop themselves. With regard to rewarding the stakeholder participant #7 refers to that *"when we get any innovative ideas and sustainable solutions from our internal stakeholders, clients, contractors we always welcome their suggestions. At times we reward them to encourage them; so we motivate them".*

Motivating Stakeholders	DC	PM	EC	Total
Rewarding the Successful Stakeholders	2	1	3	6
Knowledge Management	1	3	2	6
Identifying Stakeholders Skill	3	2	2	7
Overall	6	6	7	19

Table 5.22: Thematic Profile of Motivating Stakeholders

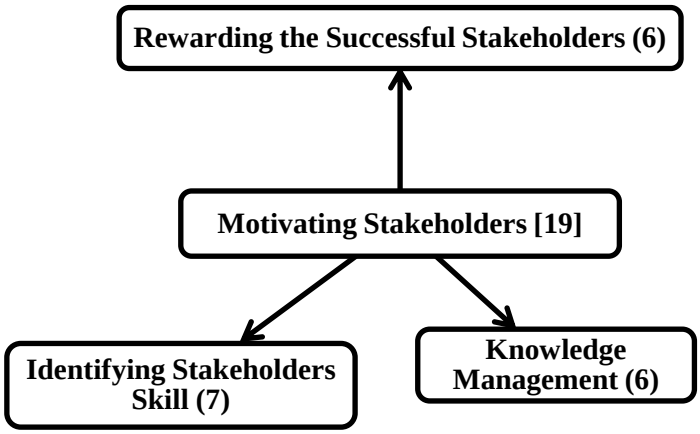


Figure 5.21: Thematic Diagram of Motivating Stakeholders

5.5.4.2.6 Continuous Improvement

The sub-theme "Continuous Improvement" produced 12 related passages. This was predominantly mentioned by DC (7 passages), PM (4 passages) and EC (1 passages). Some of the participants emphasized the importance of continuous improvement to engage the stakeholders as it ensures the systematic improvement of the project process will make the company more competitive and reap more financial and operational benefits. They also stressed that when the stakeholders are engaged than they could continuously improve the project, product and services by eliminating waste, increasing efficiency and reducing costs. However, very few of the participants expressed their negative attitudes on adopting continuous improvement. Participant #6 was concerned about the fact that sometimes continuous improvement is time consuming and difficult to achieve. He mentioned that *"……..though the continuous improvement is solely important to improve the project success sometimes there is so much focus on continuous improvement process and on gaining efficiencies, that they don't challenge the basic assumptions of what's being done. In most*

cases one size of continuous improvement doesn't fit in all parts of the project activities, it needs change which is time consuming".

Continuous Improvement	DC	PM	EC	Total
Continuous Improvement	7	4	1	12
Overall	7	4	1	12

Table 5.23: Thematic Profile of Continuous Improvement

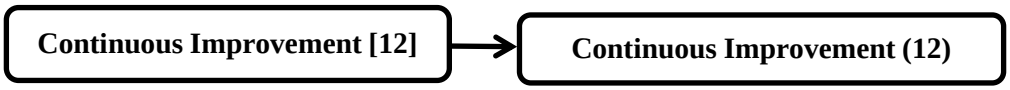


Figure 5.22: Thematic Diagram of Continuous Improvement

5.5.4.3 Sustainable Development in Construction Sector

The sub-theme "Sustainable Development in Construction Sector" produced 486 related passages. This was predominantly mentioned by DC (159 passages), PM (192 passages) and EC (135 passages). This was then further broken down into six associated mid-level themes. All these mid-level themes are divided into some sub-level themes which are discussed below.

Sustainable Development in Construction Sector	DC	PM	EC	Total
Lean Construction	3	12	5	20
Environmental Sustainability	61	58	26	145
Economic Sustainability	20	23	22	65
Practising Sustainable Methodology	30	40	49	119
Social Sustainability	16		39	71
Project Risk Management	29	20	17	66
Overall	159	192	135	486

Table 5.24: Thematic Profile of Sustainable Development in Construction Sector

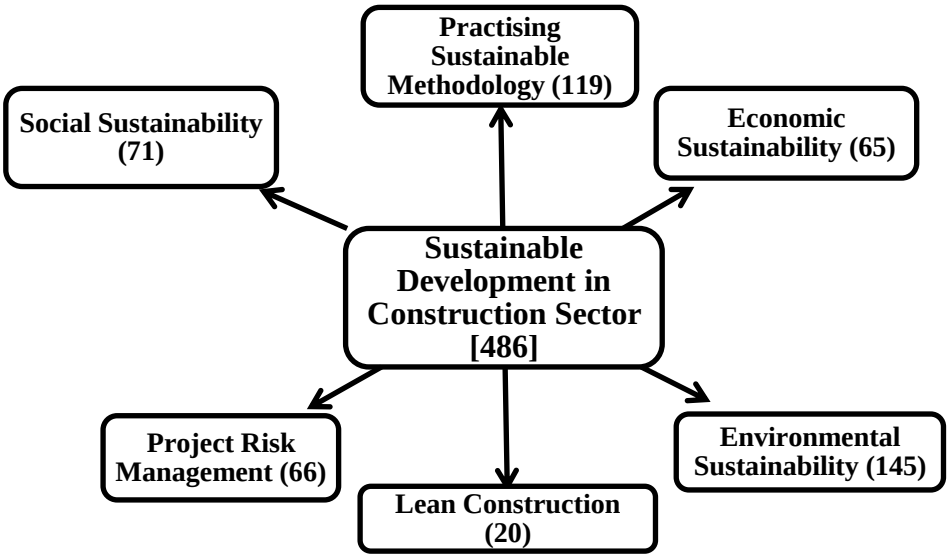


Figure 5.23: Thematic Diagram of Sustainable Development in Construction Sector

5.5.4.3.1 Practising Sustainable Methodology

The sub-theme "Practising Sustainable Methodology" produced 119 related passages. This was predominantly mentioned by DC (30 passages), PM (40 passages) and EC (49 passages). This was then further broken down into four associated mid-level themes. These mid-level themes are divided into sub level themes.

Practising Sustainable Methodology	DC	PM	EC	Total
Using Sustainable Design and Technology	2	7	3	12
Meeting Sustainability Standard	10	7	15	32
Managing Product Standard	7	12	24	43
Value Management	11	14	7	32
Overall	30	40	49	119

Table 5.25: Thematic Profile of Practising Sustainable Methodology

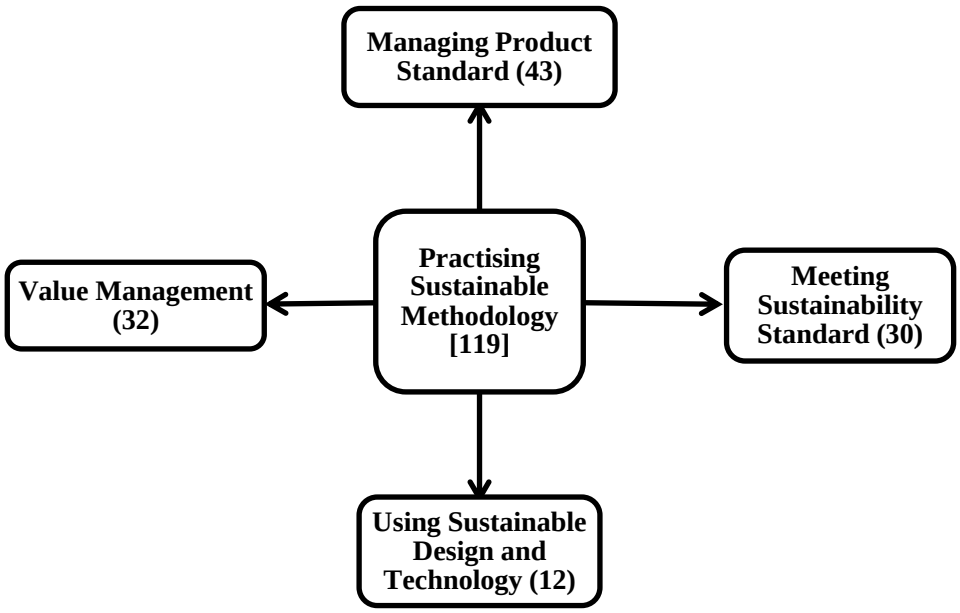


Figure 5.24: Thematic Diagram of Practising Sustainable Methodology

5.5.4.3.1.1 Managing Product Standard

The sub-theme "Managing Product Standard" produced 43 related passages. This was predominantly mentioned by the EC (24 passages), PM (12 passages) and DC (7 passages). This was then further broken down into four associated mid-level themes.

Managing Product Standard	DC	PM	EC	Total
Meeting Product Standard	2	1		3
Providing Good Quality	2	5	3	10
Meeting Product Design and Standard	3	3	21	27
DFMA		3		3
Overall	7	12	24	43

Table 5.26: Thematic Profile of Managing Product Standard

The most prominent is the frequent mention of "Meeting Product Design and Standard" (27 passages). Participants mentioned that they try to use the product that meets the product design standard, design specification and target to make sure that they are using the more efficient product. According to participant #10, *"So we are seeking to produce standard design and standard specification. You can't put a number on it. The best we can do is following a specific Design Standard and attaching some numbers with the standards we got to put some qualitative, subjective value and measure it against the Design Standard."*

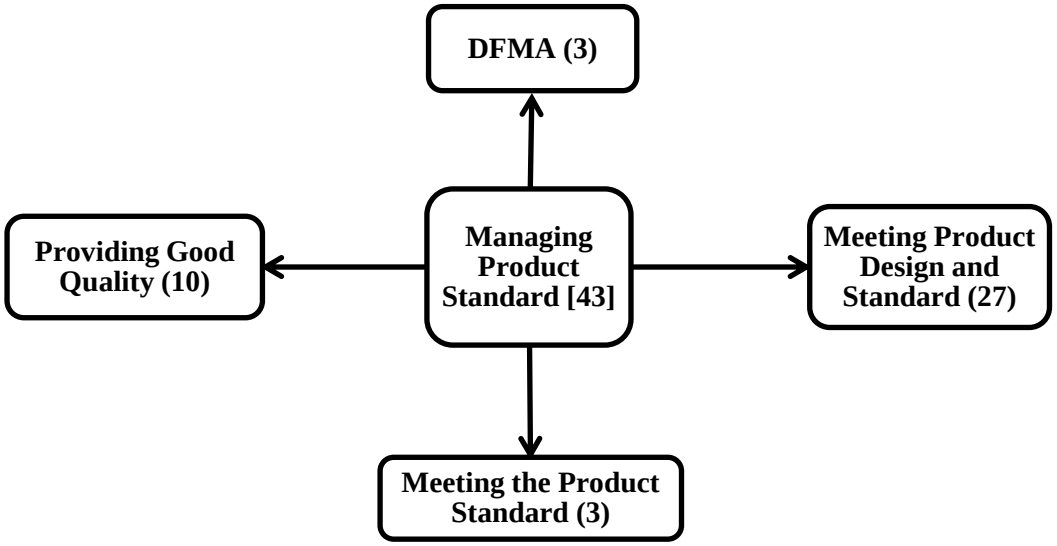


Figure 5.25: Thematic Diagram of Managing Product Standard

To manage the product standard the second most mentioned theme is "Providing Good Quality" (10 passages). Some of the participants feel that if they provide decent quality and exact product which is fit for purpose to the clients, then customers will support them to create a distinctive and competitive position in relation to the competitors.

Few of the participants mentioned that to manage product standard they use the DFMA (Design for Manufacture and Assembly) (3 Passages). They use it to reduce the complexity and cost through product design and process. Regarding this #15 mentioned that they use the automated processes like DFMA to manufacture the construction components. They use DFMA to allow them to follow guidelines to calculate the actual materials requirements with an absolute precision and ultimately to reduce the cost, effort and time.

5.5.4.3.1.2 Meeting Sustainability Standard

The sub-theme "Meeting Sustainability Standard" produced 32 related passages. This was predominantly mentioned by EC (15 passages), PM (7 passages) and DC (10 passages). This was then further broken down into four associated mid-level themes.

To meet the sustainability and innovative standard participants mostly mentioned that they want to be the "BREEAM Excellent" (18 passages). They try to follow the BREEAM's set standard for sustainable building design, construction and operation and do the BREEAM

assessment to rate their achievement. They do the BREEAM assessment to get the market recognition to attract their stakeholders. According to the participant #10, *"We score 87.5% of BREEAM, which is in today's rating perception would be really "outstanding" so clients get the highest BREEAM rating from us, because they wanted the evidence to show the green capabilities".* He also added that *"So we have a target, we have percentage to achieve; we are within in a band to meet our product standard."*

Meeting Sustainability Standard	DC	PM	EC	Total
Sustainability Code	2	2	4	8
Sustainability Guidelines	1	1	1	3
Egan Agenda	2	1		3
BREEAM Excellent	5	3	10	18
Overall	10	7	15	32

Table 5.27: Thematic Profile of Meeting Sustainability Standard

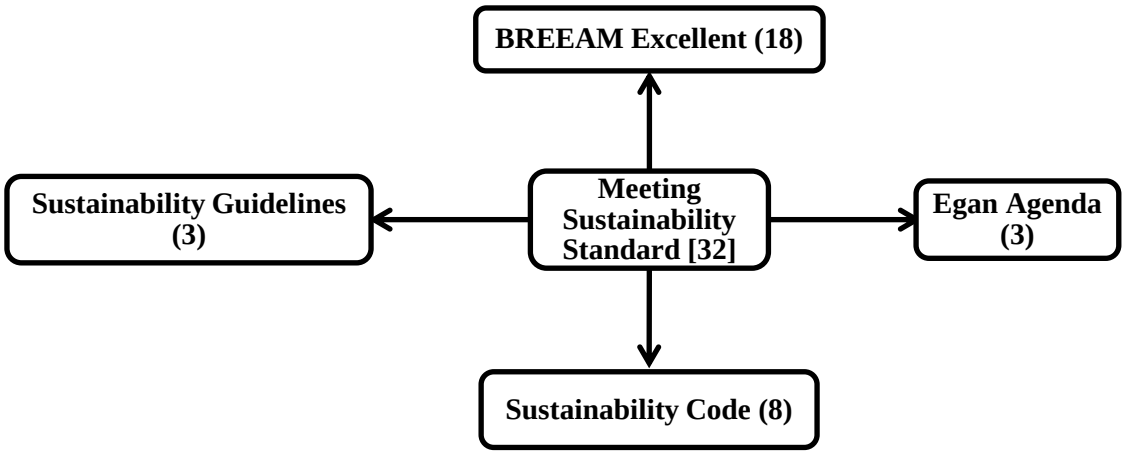


Figure 5.26: Thematic Diagram of Meeting Sustainability Standard

The second most mentioned theme is "Sustainability Code" (8 passages). The Code for Sustainable Homes (CSH) is an environmental assessment method for rating and certifying the performance of new homes based on BRE's Global Eco Homes scheme. Some of the companies use the code of sustainability as a measurement method to quantify the sustainability of their home against the categories of sustainability design and standard. The higher the code the more it will be sustainable and renewable. They use it to encourage the stakeholders to strive for the continuous improvement of sustainable home building.

Regarding using the sustainability code participant #3 mentioned that, *"we really recommend to look at the code of sustainable homes which was previously known as the eco homes considered by HCA; we are currently working in core level 3 and we are trying to achieve the core level 4 even though the minimum requirement is 3, so it exceeds our minimum demand".*

5.5.4.3.1.3 Using Sustainable Design and Technology

The sub-theme "Using Sustainable Design and Technology" produced 12 related passages. This was predominantly mentioned by PM (7 passages), EC (3 passages) and DC (2 passages). This was then further broken down into two associated mid-level themes.

Using Sustainable Design and Technology	DC	PM	EC	Total
Using Sustainable Technology	2	6	1	9
Standard Design and Specification		1	2	3
Overall	2	7	3	12

Table 5.28: Thematic Profile of Using Sustainable Design and Technology

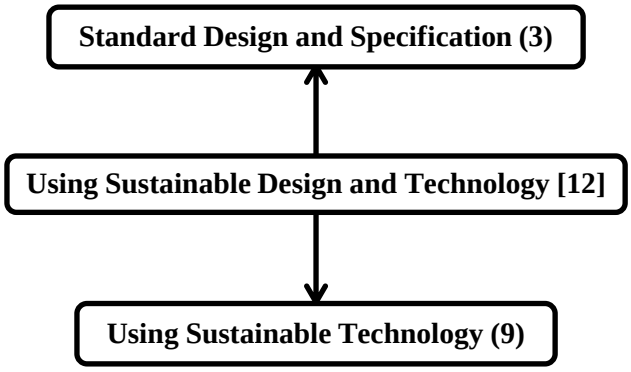


Figure 5.27: Thematic Diagram of Using Sustainable Design and Technology

Participants mentioned that they use Sustainable Technology (9 passages) to adopt more innovative solutions and to reduce the adverse environmental impact on the building. According to participant #7, *"we provide a comprehensive building and civil engineering service offering construction excellence in private and public sector within a reasonable price. This is complemented by a range of construction specialists offering engineering design, interiors and refurbishments, mining, standard mechanical and electrical design and installation, BIM and 3D modelling."*

Participants also mentioned that they use "Standard Design and Specification" as a sustainability requirement in their product selection which is innovative and cost effective, and especially offers best value for money. Regarding this participant #3 mentioned that, "*Also we have an economic sustainable model which is more cost effective. Within this model we always follow the key drivers of the lean which is standardisation and so we are seeking to produce standard design and standard specification in our product selection."*

5.5.4.3.1.4 Providing the Product Value

The sub-theme "Providing the Product Value" produced 32 related passages. This was predominantly mentioned by DC (11 passages), PM (14 passages) and EC (7 passages). This was then further broken down into four associated mid-level themes.

Providing the Product Value	DC	PM	EC	Total
Value Engineering		1	4	5
Delivering Value	8	11	1	20
Managing Product Value	3	2	1	6
Measuring Value			1	1
Overall	11	14	7	32

Table 5.29: Thematic Profile of Providing the Product Value

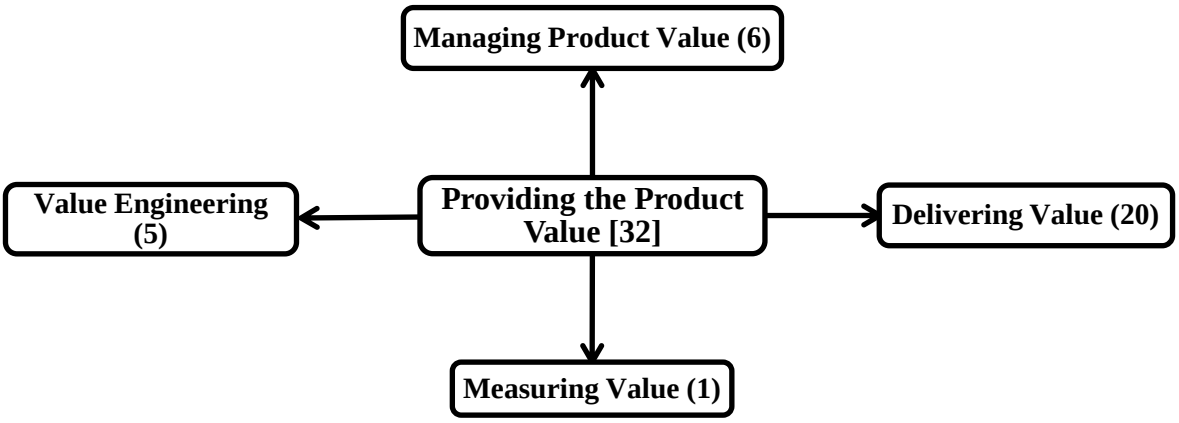


Figure 5.28: Thematic Diagram of Value Management

The most prominent is the frequent mention of "Delivering Value" (20 passages). Participants especially the project management staff mentioned that they try to deliver value to their customers to remove unnecessary costs while ensuring that quality, reliability, performance and other critical factors will be met or customer's expectations will be exceeded. Participants

noted that following principles of value management provided the stakeholders the idea of taking an excellent trade decision, increased effectiveness, better services and quality, better competitiveness, better communication and collaboration inside the organisation.

Participants also mentioned that they try to Manage Product Value (6 passages) to incorporate it with the sustainability issues and targets so that it would deliver better quality project outcomes at a lower price . Participant #3 mentioned that *"We are looking at achieving best value of our product. I think the best value is another push forward at this moment in the construction industry. We prefer value rather than cost, quality giving best value, and you will be a good contractor when you will give a best value to your client."*

5.5.4.3.2 Economic Sustainability

The sub-theme "Economic Sustainability" produced 65 related passages. This was predominantly mentioned by PM (23 passages), DC (20 passages) and EC (22 passages). This was then further broken down into one associated mid-level theme Cost Management which is subdivided into some mid- level themes in following section.

Economic Sustainability	DC	PM	EC	Total
Cost Management	20	23	22	65
Overall	20	23	22	65

Table 5.30: Thematic Profile of Economic Sustainability

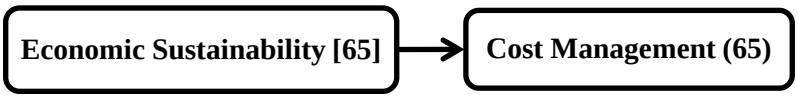


Figure 5.29: Thematic Diagram of Economic Sustainability

5.5.4.3.2.1 Cost Management

The sub-theme "Cost Management" produced 65 related passages. This was predominantly mentioned by PM (23 passages), EC (22 passages) and DC (20 passages). This was then further broken down into eight associated mid-level themes.

Cost Management	DC	PM	EC	Total
Lower the Running Cost	1	1		2
Cost Saving	1	4	6	11
Cost Reduction	7	2		9
Cost Effective Design	3	2	10	20
Cheap Sustainable Material	1	3		4
Whole Life Costing		4	3	7
Managing Competitive Price	3	2	2	7
Lowering the Price	1	3	1	5
Overall	20	23	22	65

Table 5.31: Thematic Profile of Cost Management

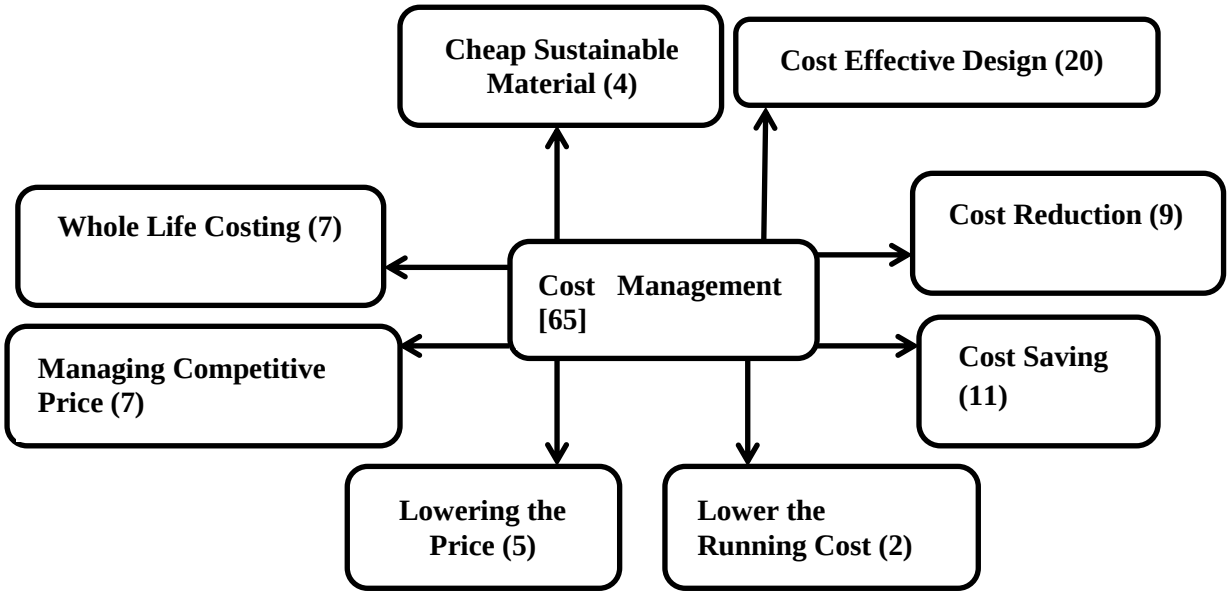


Figure 5.30: Thematic Diagram of Cost Management

The most prominent is the frequent mention of "Cost Effective Design" (20 passages). To achieve the economic sustainability participants mentioned that they try to design cost-effectively to reduce the building operating and maintenance cost. According to participant #8, *"Yes we do have a formal process of stakeholder management and I have written down important factors in engaging a design team, creating a synergy between the team and building a cost effective clean design, adding value, trying to exceed the customer's expectation and ensure it is on time and budget and forming an appropriate group we use project management process with appropriate governance and delivery service."* Regarding this participant #3 mentioned that, *"We do Value Engineering to find out how to reduce the*

cost. We have a green route biomass boiler and affordable green timber roof. Everything is very sustainable; we try to provide affordable plastic windows and doors".

To manage the construction cost participants also mentioned that they are trying to adopt different approaches to save the cost (11 passages) of pre-construction and post construction by cost planning and cost control services to make sure that whole construction project is delivered within a pre-agreed cost framework; and also to reduce the whole life cost. Participants mentioned they are trying to implement lean construction by adopting different lean techniques, by managing waste and saving energy to reduce the cost.

As a cost saving approach participants also use the value engineering. They use this approach of value engineering to measure the value of their product in terms of the quality, performance and reliability at a reasonable price. They also use value engineering to eliminate the non-value-added characteristics where value is defined in terms of its worth or cost.

5.5.4.3.3 Environmental Sustainability

The sub-theme "Environmental Sustainability" produced 145 related passages. This was predominantly mentioned by DC (61 passages), PM (58 passages) and EC (26 passages). This was then further broken down into five associated mid-level themes. These mid-level themes are divided into five sub-level themes which are discussed in following sections.

Environmental Sustainability	**DC**	**PM**	**EC**	**Total**
Improving Environmental Efficiency	21	15	11	47
Preserving Nature	14	9	2	25
Reducing Energy Consumption	7	18	4	29
Using Sustainable Material	2	5	1	8
Waste Management	17	11	8	36
Overall	61	58	26	145

Table 5.32: Thematic Profile of Environmental Sustainability

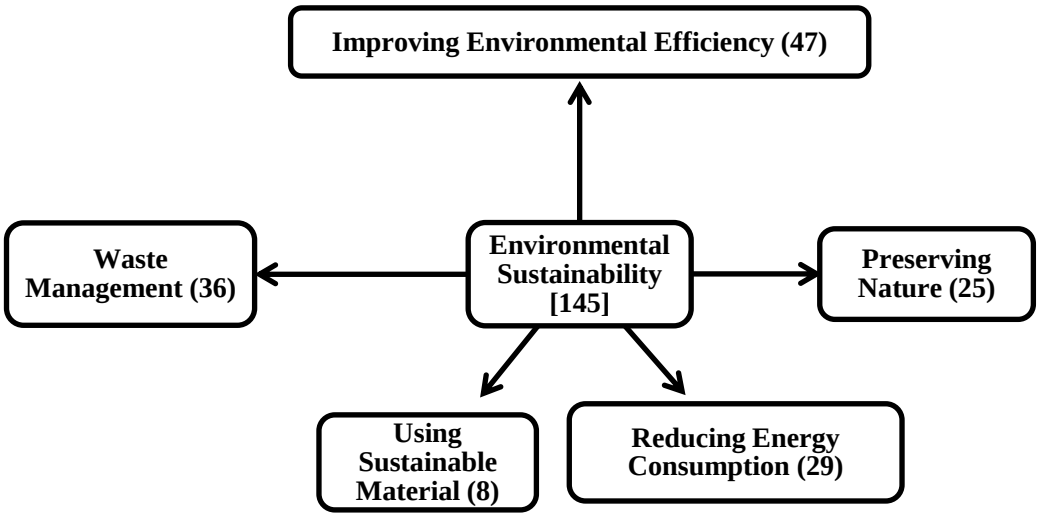


Figure 5.31: Thematic Diagram of Environmental Sustainability

5.5.4.3.3.1 Improving Environmental Efficiency

The sub-theme "Improving Environmental Efficiency" produced 47 related passages. This was predominantly mentioned by DC (21 passages), PM (15 passages) and EC (11 passages). This was then further broken down into four associated mid-level themes.

Improving Environmental Efficiency	DC	PM	EC	Total
Managing Pollution	2	4		6
ISO Standard for Environmental Sustainability	1	1	5	7
Environmentally Friendly	7	1	2	10
Reducing Carbon Emission	11	9	4	24
Overall	21	15	11	47

Table 5.33: Thematic Profile of Improving Environmental Efficiency

Participants emphasized reducing carbon emission (24 passages) to take action to reduce the emissions by setting emission reduction goals and achieving the targets of environmental sustainability in a credible and measurable way. Participant #10 noted that they are very keen on energy management, as part of sustainability. Participants also pointed out that they have their commitment to their external stakeholders to reduce energy emissions by utilizing renewable energy to improve the environmental efficiency through carbon reduction.

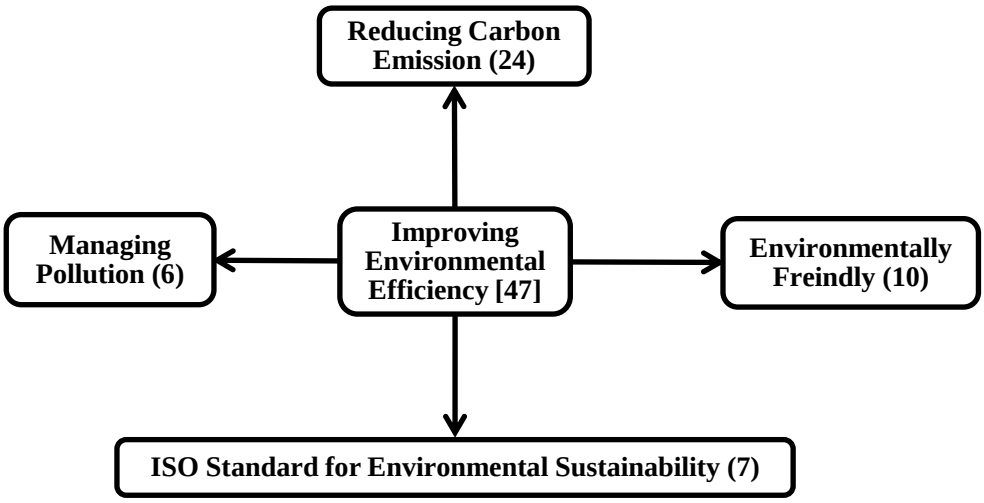


Figure 5.32: Thematic Diagram of Improving Environmental Efficiency

Participants also stressed that they try to be "Environmentally Friendly" (10 Passages) to reduce or minimise the harmful impact on the environment during the preconstruction and the post construction phases. Participants mentioned that they try to use eco-friendly construction methods as the old building materials and methods have been linked to a wide range of health problems. With regard to being "Environmentally Friendly" participant #7 mentioned that *"Obviously we check with our environment agency drinking water inspector. So all the time we check our systems and working with our environmental legislation setup to ensure that we are providing clean and pure water to our customers. And we also do it to be environmentally friendly."*

Participants also mentioned that they follow ISO Standard to manage their environmental obligations and to lessen the effect of their construction operations on the environment to improve their environmental efficiency. Participant #8 mentioned that, *"We help our businesses to develop environmental management systems in accordance with ISO 14000 for whole organisations and for just local operations".*

5.5.4.3.3.2 Preserving Nature

The sub-theme "Preserving Nature" produced 25 related passages. This was predominantly mentioned by DC (14 passages), PM (9 passages) and EC (2 passages). This was then further broken down into two associated mid-level themes.

Preserving Nature	DC	PM	EC	Total
Environmental Protection	12	9	2	23
Protect Biodiversity	2			2
Overall	14	9	2	25

Table 5.34: Thematic Profile of Preserving Nature

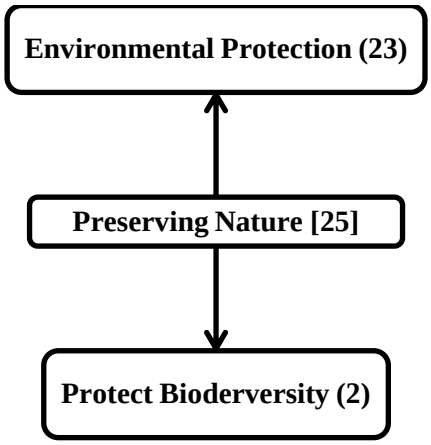


Figure 5.33: Thematic Diagram of Preserving Nature

Participants incorporated the "Environmental Protection" (23 passages) with sustainable development to secure the environment from degradation and from adverse effects like excessive use of technology, overpopulation during the preconstruction and post construction. According to participant #7, *"Sometimes our environment agency don't know what they are supposed to do regarding protecting species. So we have to protect fencing, provide newts protection, newt's exclusion fencing to stop any newts getting into the construction sites to protect them."*

To preserve local ecosystems and promote sustainable development two of the participants emphasized protecting the biodiversity (2 passages). Participant #2 mentioned they try to make their contractors, local community and customers understand about the different biodiversity issues and take actions. Participant #9 mentioned, *"So our sustainability plans include targets to improve the ecosystem and to divert 85% waste on projects from landfill, and to purchase 50% of the aggregates that we use from our recycled source so that we don't have any loss of biodiversity in design and construction."*

5.5.4.3.3.3 Reducing Energy Consumption

The sub-theme "Reducing Energy Consumption" produced 29 related passages. This was predominantly mentioned by PM (18 passages), DC (7 passages) and EC (4 passages). This was then further broken down into three associated mid-level themes.

Reducing Energy Consumption	DC	PM	EC	Total
Renewable Source of Energy	1			1
Reducing Gas Emission	3			3
Energy Saving	3	18	4	25
Overall	7	18	4	29

Table 5.35: Thematic Profile of Reducing Energy Consumption

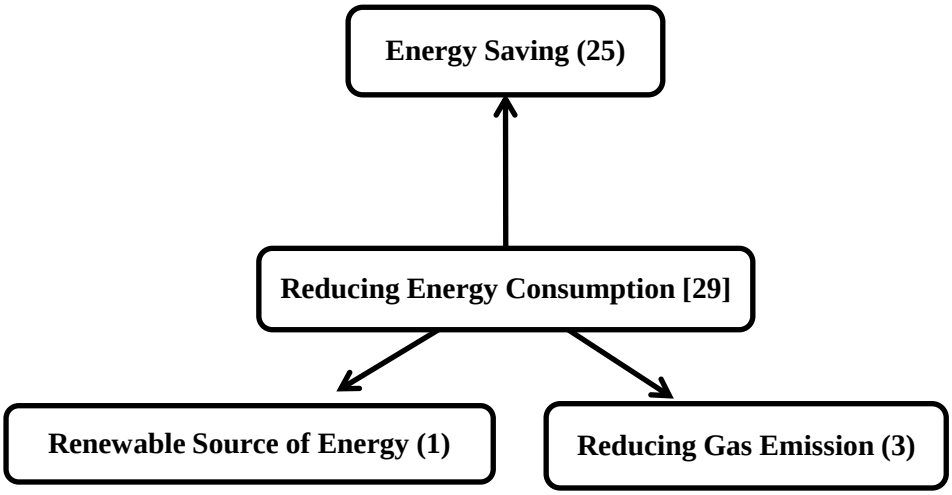


Figure 5.34: Thematic Diagram of Reducing Energy Consumption

Participants emphasized that they are looking for solutions and tips to save energy (25 passages) as it could reduce the energy bills, reduce the amount of energy and cut energy related greenhouse pollution. They also mentioned that they save energy by using environment friendly materials and try to confirm that windows, doors, floors and roof, meet the new Building Regulations and are designed to save energy. Participant #10 mentioned that to improve the energy efficiency they have their engineers and technical people who look at the project to monitor how best they can improve the process or how they can lessen the energy consumption to save money for the company.

Only few of the participants mentioned about reducing the gas emissions (3 Passages) produced from the construction activities to improve the environmental quality and performance. Regarding reducing the gas emission participant #1 mentioned that, *"we reduce natural gas emissions from our activities and assets by converting some existing 'non-green' energy supplies to green supplies and developing a programme for reducing energy and resource usage at operational storage sites."*

5.5.4.3.3.4 Using Sustainable Material

The sub-theme "Using Sustainable Material" produced 8 related passages. This was predominantly mentioned by PM (5 passages), DC (2 passages) and EC (1 passages). This was then further broken down into two associated mid-level themes.

Using Sustainable Material	DC	PM	EC	Total
Using Local Material	1	1		2
Consuming Natural Energy Resources	1	4	1	6
Overall	2	5	1	8

Table 5.36: Thematic Profile of Using Sustainable Material

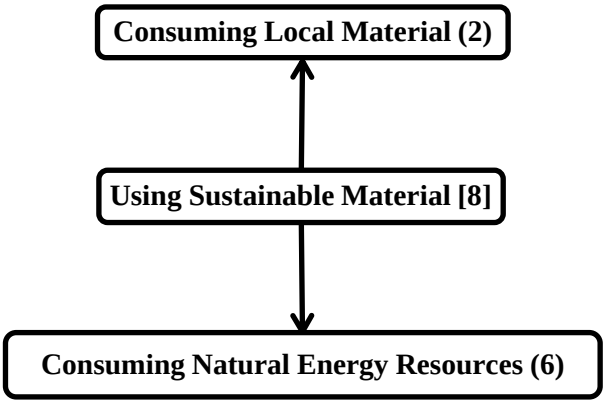


Figure 5.35: Thematic Diagram of Using Sustainable Material

To foster the environmental sustainability and for cost effectiveness purpose participants mentioned that they attempt to consume more natural energy resources (6 passages) as it has the impact to improve the product life cycle and to reduce pollution. Participants #11 mentioned that using natural energy resources will ensure that air pollution is reduced. They said there are times when people assume that using natural energy resources will lead to high costs. Even though the initial costs appear high, they will soon turn into much higher savings

for the future. Participant #4 mentioned that *"…….solar panels installation is a costly exercise; the amount saved in energy bills will soon make up for the installation cost. In the long run, it will lead to cost savings in a big way and improve the product life cycle."*

Regarding "Consuming Local Material" participants mentioned about using locally available materials as much as possible to reduce the material cost, transportation cost and also use low-impact production methods that reduce the environmental impact (2 Passages).

5.5.4.3.3.5 Waste Management

The sub-theme "Waste Management" generated from the theme "Environmental Sustainability" produced 8 related passages. This was predominantly mentioned by DC (17 passages), PM (11 passages) and EC (8 passages). This was then further broken down into six associated mid-level themes.

Waste Management	DC	PM	EC	Total
Recycling	4	5	4	13
Reduce Waste	2	2	1	5
Sewage Treatment	2	1		3
Waste Legislation	1		1	2
Reducing Sending Waste into Landfill	6	2	2	10
Waste Water Treatment	2	1		3
Overall	17	11	8	36

Table 5.37: Thematic Profile of Waste Management

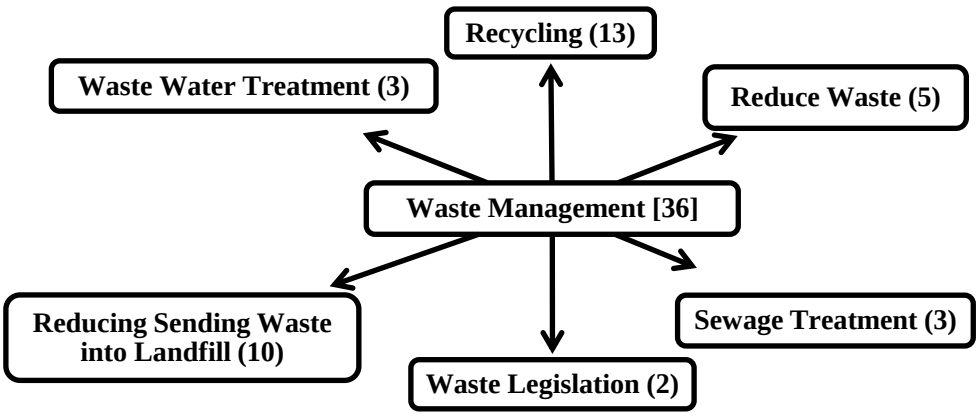


Figure 5.36: Thematic Diagram of Waste Management

To manage waste the most prominent is the frequent mention of "Recycling" (13 passages). Participants mentioned that they recycle the waste materials which are produced during the construction process and recycle those materials which do not need to send into landfill. According to participant #6, *"Normally we use plywood, but now we are using Eco sheet which is made of recycled plastic. It lasts longer than plywood and you can use it more than once and it can be recycled at the end of its life as well. So it's better than the previous material".*

To manage waste participants also mentioned that they try to reduce sending waste into the landfill (10 Passages) because of excessive loading the waste into the landfill and lack of spaces for landfill. Rather than sending the waste to landfill participants prefer to recycle the waste. With regard to this #7 mentioned that *"I think we are encouraging the contractors, to reduce any waste on site as much as possible, to reduce the amount that goes to landfill. We try to keep all waste on site limited and managed".*

5.5.4.3.4 Lean Construction

The sub-theme "Lean Construction" produced 20 related passages. This was predominantly mentioned by PM (12 passages), EC (5 passages) and DC (3 passages). This was then further broken down into two associated mid-level themes. When discussing lean construction participants mostly mentioned about adapting Lean Techniques for Sustainability and Lean Maturity.

Lean Construction	**DC**	**PM**	**EC**	**Total**
Lean Techniques for Sustainability	1	10	4	15
Lean Maturity	2	2	1	5
Overall	3	12	5	20

Table 5.38: Thematic Profile of Lean Construction

The most prominent is the frequent mention of "Lean Techniques for Sustainability" (15 passages). Participants considered the importance of using lean tools and techniques to achieve the sustainable development. Participants mentioned that they follow the guideline of the lean philosophy to reduce the waste, to identify the value added and non-value added activities and reduce the cost. According to participant #12, *"Yes they do that, we do lean construction. So obviously our company is pushing at this moment the lean construction, adapting lean process, tools and techniques to make the construction more sustainable".*

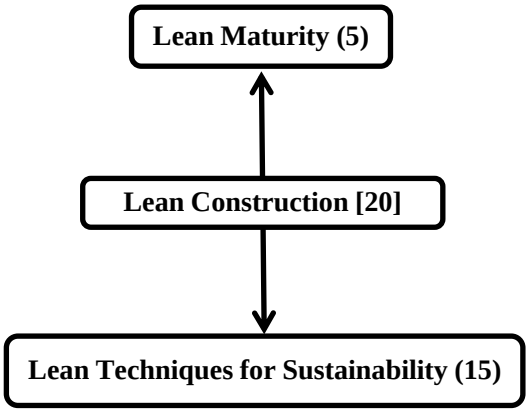


Figure 5.37: Thematic Diagram of Lean Construction

5.5.4.3.5 Project Risk Management

The sub-theme "Project Risk Management" produced 66 related passages. This was predominantly mentioned by DC (29 passages), PM (20 passages) and EC (17 passages). This was then further broken down into ten associated mid-level themes.

Project Risk Management	DC	PM	EC	Total
Risk Assessment	7	2	2	11
Risk Mitigation	2			2
Risk Rating	1	1		2
Risk Register	4	8	8	20
Reducing Risk	2	2	1	5
Quantifying Risk	3	2	1	6
Prioritizing Risk	2	3	1	6
Measuring Risk Impact	3	1	1	5
Identifying Risk	4			4
Risk analysis	1	1	3	5
Overall	29	20	17	66

Table 5.39: Thematic Profile of Project Risk Management

The most prominent is the frequent mention of "Risk Register" (20 passages) to manage the risk. Most of the participants mentioned they use Risk Register and some mentioned Risk Log to identify possible risks and to assess the impact of risk. They use this log to assess the risk,

to identify its impact and probability so that they can take appropriate action. Participant #2 noted that, *"Risk is one of the big areas that affect our company on projects; it can make and break a project. For each project we will have a risk log. We actually look at risk register every month and we update our project from risk point of view, then we can reduce the risk".*

To manage risk, participants mentioned that they do risk assessment (11 Passages) as it helps to focus on the risks that are really important and have the potential to cause harm; so that effective measures could be taken to control them. Regarding the second mentioned sub-theme "Risk Assessment", participant #9 mentioned that they do the risk assessment to carefully examine what situations could cause harm to their employees, so that they can examine whether they have used enough protection or need to take precautions to prevent harmful effects.

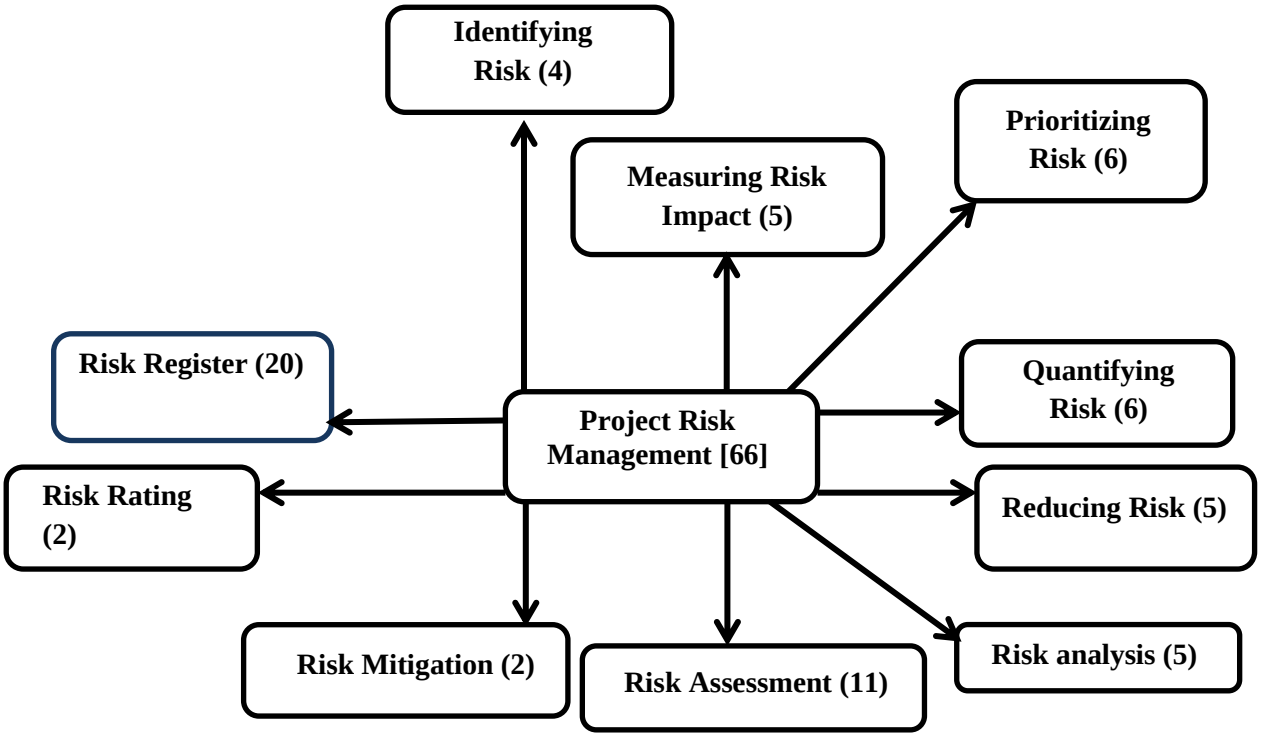


Figure 5.38: Thematic Diagram of Project Risk Management

After the risk is identified participants mentioned that they prioritize the risks (6) according to their effect and significance to impact on the project. Participant #8 mentioned that, *"If there is a biggest threat in our global company, then all possible risks are prioritized further down to project level and we then set different risk management strategies in different levels of the hierarchy. Then all work on site to manage the risk of cost, health and safety".*

5.5.4.3.6 Social Sustainability

The sub-theme "Social Sustainability" produced 71 related passages. This was predominantly mentioned by PM (39 passages), DC (16 passages) and EC (16 passages). This was then further broken down into four associated mid-level themes. All these mid-level themes are divided into sub-level themes.

Social Sustainability	DC	PM	EC	Total
Ensuring Safety	6	15	7	28
Social Development	2	5	1	8
Employability	2	6	5	13
Community Improvement	6	10	6	22
Overall	16	39	16	71

Table 5.40: Thematic Profile of Social Sustainability

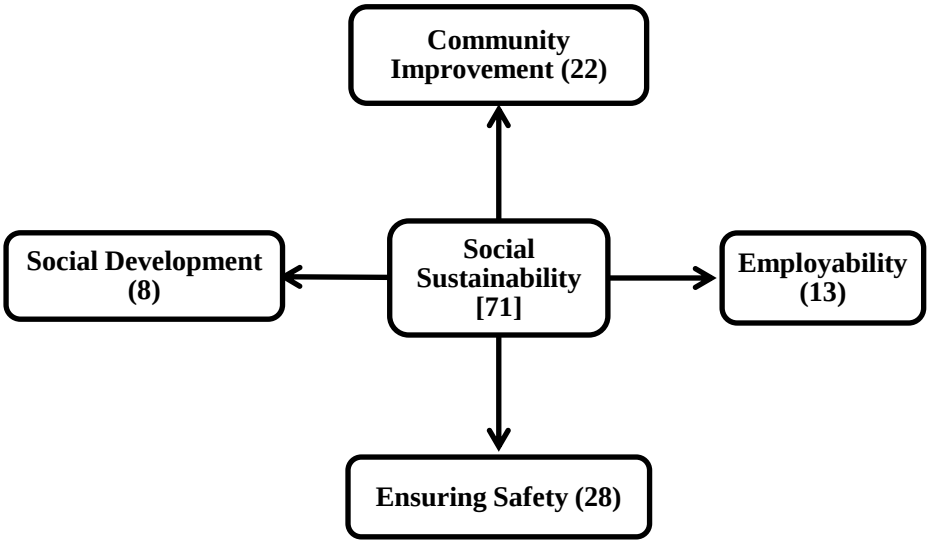


Figure 5.39: Thematic Diagram of Social Sustainability

5.5.4.3.6.1 Community Development

The sub-theme "Community Development" produced 22 related passages. This was predominantly mentioned by PM (10 passages), DC (6 passages) and EC (6 passages). This was then further broken down into five associated mid-level themes.

Community Development	DC	PM	EC	Total
Local Youth Club	1	1	1	3
Landscape Picture	1			1
Improving Local Community	2	8	2	12
Raising Charity	1	1	1	3
Children Park	1		2	3
Overall	6	10	6	22

Table 5.41: Thematic Profile of Community Development

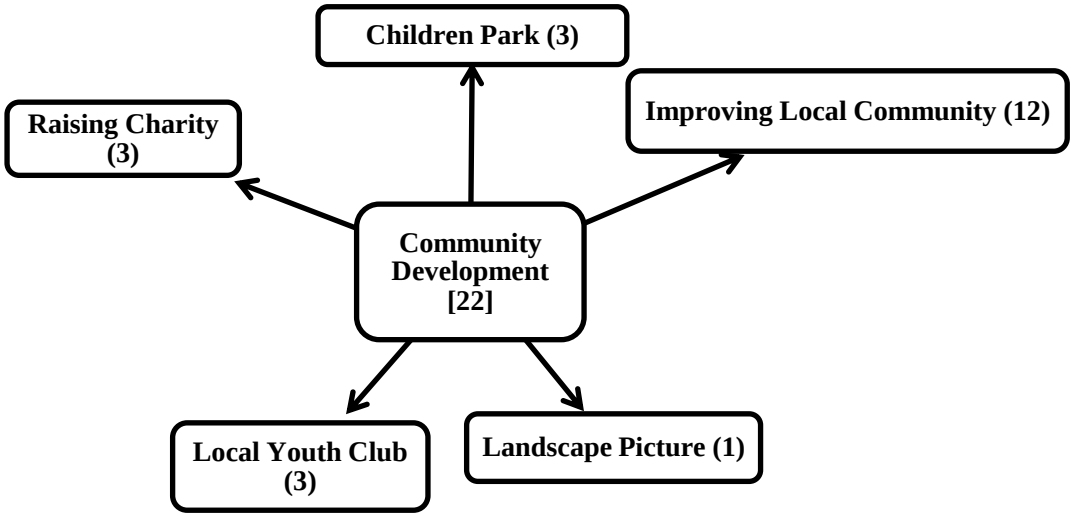


Figure 5.40: Thematic Diagram of Community Development

Regarding achieving social sustainability participants have their plans to improve the local community (12 passages), to improve the quality of local people's life. Participants mentioned that they help the community through engaging actively in youth and group participation activities to enable the community to flourish, to shape the facilities that affect them and the places where they live. Participants also mentioned that to increase the natural beauty of the local area they shape the local area with nice contours and hills which looks like a landscape picture.

To improve the quality of life of the community, participants mentioned that they attempt to facilitate such places for the young generation where they can get together for play activities. It will also keep them away from any trouble and negative activities and improve the quality of the community. Interviewees also mentioned that they raise money for charitable projects

to improve the quality of life for the community. Participant #11 mentioned that *"Our 'Into Action' scheme is a matched-funding charity giving programme where we offer our people the opportunity to match funds they are raising for charity or community projects outside of work".*

5.5.4.3.6.2 Employability

The sub-theme "Employability" produced 13 related passages. This was predominantly mentioned by PM (6 passages), EC (5 passages) and DC (2 passages). This was then further broken down into two associated mid-level themes.

Employability	DC	PM	EC	Total
Permanent Employment		2		2
Creating Local Employment	2	4	5	11
Overall	2	6	5	13

Table 5.42: Thematic Profile of Employability

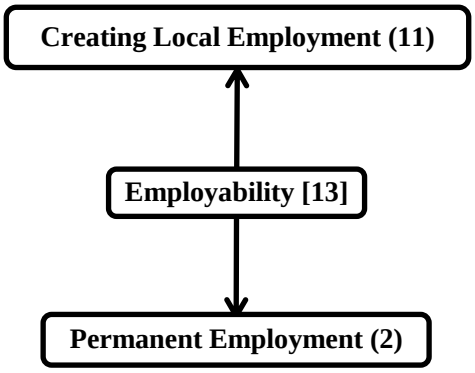


Figure 5.41: Thematic Diagram of Employability

Participants noted that to increase the employability they create employment (11) opportunities and business prospects for the local people to improve the local community socially. The most prominent is the frequent mention of "Creating Local Employment" (11 passages). According to participant #6, *"We provide Local Employment as well we try to work with those people who are locally based and stays where we are based on".*

5.5.4.3.6.3 Ensuring Safety

To provide a safe environment, social care and wellbeing to the community "Ensuring Safety" produced 28 related passages. This was predominantly mentioned by PM (15 passages), EC (7 passages) and DC (6 passages).

Participants mentioned that they try to ensure that they provide good health and safety (16 passages) to the people in the workplace. Participant #5 mentioned that they provide safe working places for those who are involved in or affected by their operations and have a plan to eliminate all accidents on their projects by 2020. According to #16 *"we try to reduce the cost inefficiency and risk by better management, making use of innovative solutions, sharing ideas and learnings, developing the best value solutions, promoting sustainability and ensuring a safe working environment for our employees."*

Ensuring Safety	DC	PM	EC	Total
Ensuring Safety	6	15	7	28
Overall	6	15	7	28

Table 5.43: Thematic Profile of Ensuring Safety

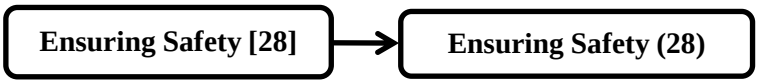


Figure 5.42: Thematic Diagram of Ensuring Safety

5.6 Barrier to Construction Sustainability

Participants mentioned some of the issues that are affecting the achievement of the sustainability target. All of these issues are put under the theme "Barrier to Construction Sustainability" which produced in total 157 passages. This was predominantly mentioned by DC (91 passages), PM (39 passages) and EC (27 passages). This was then further broken down into five associated mid-level themes. These mid-level themes are divided into some sub-level themes which are discussed in next section.

Barrier to Construction Sustainability	DC	PM	EC	Total
Economic Problem	29	14	10	53
Unfamiliarity with Sustainability	14	4	1	19
Project Difficulties	18	11	3	32
Gov. Initiatives	1		8	9
Barrier for Stakeholder Engagement	29	10	5	44
Overall	91	39	27	157

Table 5.44: Thematic Profile of Barrier to Construction Sustainability

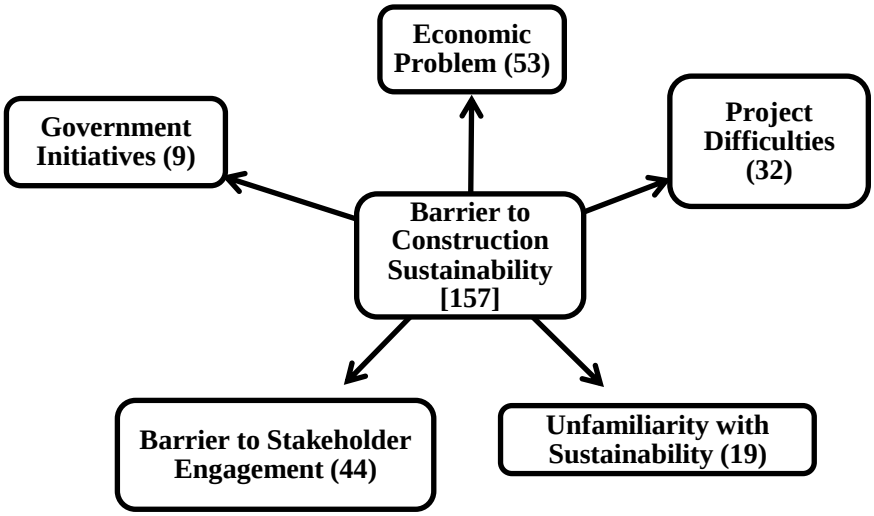


Figure 5.43: Thematic Diagram of Barrier to Construction Sustainability

5.6.1 Economic Problem

The sub-theme "Economic Problem" produced 53 related passages. This was predominantly mentioned by DC (29 passages), PM (14 passages) and EC (10 passages). This was then further broken down into two associated mid-level themes.

Economic Problem	DC	PM	EC	Total
Increasing Cost	25	11	7	43
unfavourable government rules/regulations	4	3	3	10
Overall	29	14	10	53

Table 5.45: Thematic Profile of Economic Problem

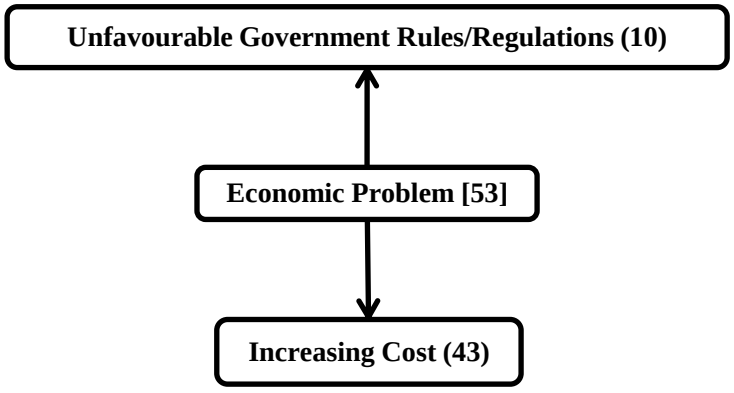


Figure 5.44: Thematic Diagram of Economic Problem

Most of the participants considered that the high cost (43 passages) especially the initial cost of sustainable construction is the big barrier to adopting sustainability. Participants feel that due to the high price of green building over that of traditional building the demand for sustainable homes is shrinking. Participants also noted that most of their clients are reluctant to go for sustainable homes and sustainable structures because of their high initial cost. According to participant #4, cost is key to their clients. If costs are high during the building phase it reflects in the rental charges and it therefore gets difficult to attract tenants. And they then get problem with their business. According participant #7, *"I think when you say sustainable construction, most of our clients think that it goanna be cost more to build, it will be more difficult to make them understand".*

Participants also mentioned that due to the economic downturn, companies and the government have a shortage of financial resources to provide support for green building (10 passages). Participants mentioned that due to the recession their company stopped spending money on recruitment, they wanted to get rid of the people, they stopped spending money on advertising and they stopped training people. According to #1, "*Mostly due to this recession the government is more reluctant to spend money for the sustainable construction. They don't have enough in the budget. Govt. is reducing it down at the minimum level and that is creating a problem here with getting people interested in sustainability."*

5.6.2 Project Difficulties

The sub-theme "Project Difficulties" produced 32 related passages. This was predominantly mentioned by DC (18 passages), PM (11 passages) and EC (3 passages). This was then further broken down into three associated mid-level themes.

Project Difficulties	**DC**	**PM**	**EC**	**Total**
Stakeholders high Demand	9	4	1	14
Increase Lead Time	7	4	1	12
Delivery Problems	2	3	1	6
Overall	18	11	3	32

Table 5.46: Thematic Profile of Project Difficulties

The most prominent is the frequent mention of "Stakeholders high Demand" (14 passages). Participants mentioned that sometimes it is difficult to meet the client's unrealistic needs and

repeated change of demand within the limited budget which could lead to losing clients and customers. According to participant #1, *"The obstacle is their unrealistic demand for the sustainable structure. Sometimes our clients are really asking for something which is difficult to fulfil. They say we want this, we want that, demanding approach, sensitive to their request".*

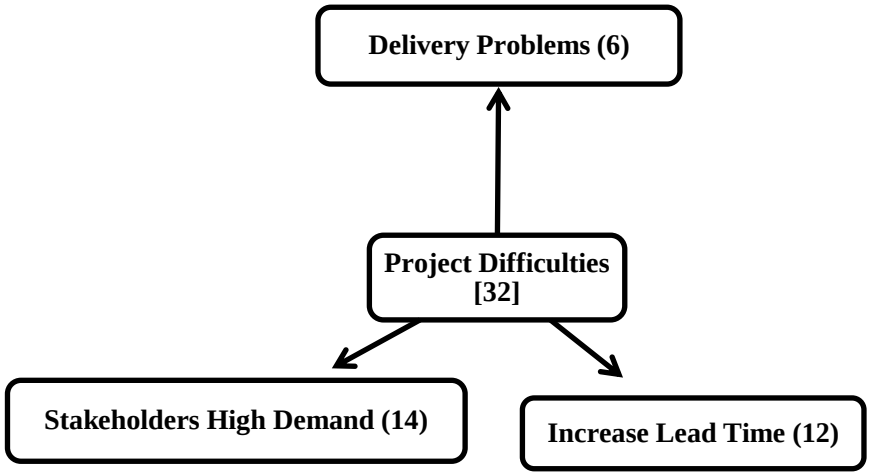


Figure 5.45: Thematic Diagram of Project Difficulties

Participants mentioned that due to some adverse and unexpected situation lead times get increased (12 passages) which could diverge from the original project objectives and reduce the customer satisfaction. Regarding this participant #4 mentioned that, sometimes the long bidding process, adverse environmental conditions and late material supply cause the delay of project delivery. Participants also mentioned some reasons for increasing the lead time, like changing demands or changing design in the middle of the project.

5.6.3 Unfamiliarity with Sustainability

The sub-theme "Unfamiliarity with Sustainability" produced 19 related passages. This was predominantly mentioned by DC (14 passages), PM (4 passages) and EC (1 passage). This was then further broken down into two associated mid-level themes.

The most prominent is the frequently mention of "Lack of Sustainability Knowledge" (13 passages). Participants mentioned that most of the external stakeholders and customers have very poor sustainability knowledge which leads them to be reluctant to adopt sustainability. According to participant #7, *"I think such a lack of knowledge is a big problem. People think*

when you talk about sustainable structure, it's going too expensive to afford, it won't any good value at the end and because people are not fully educated what sustainable construction options are available. Definitely I think its education".

Unfamiliarity with Sustainability	DC	PM	EC	Total
Lack of Sustainability Knowledge	8	4	1	13
Lack of Awareness	6			6
Overall	14	4	1	19

Table 5.47: Thematic Profile of Unfamiliarity with Sustainability

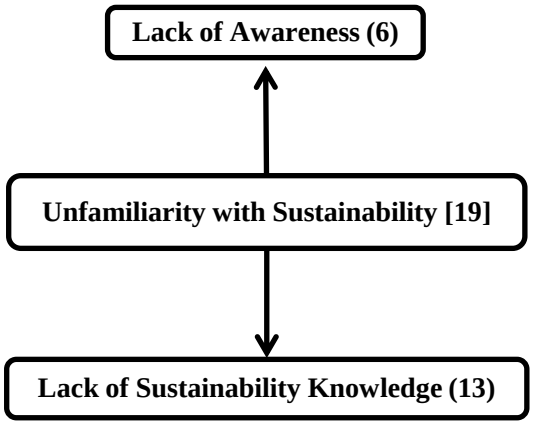


Figure 5.46: Thematic Diagram of Unfamiliarity with Sustainability

Participants also mentioned that lack of sustainability awareness (6 passages) is another big barrier to adopting sustainability in construction and it takes a long time to make them understand. According to #1, *"I think it's the awareness among the community, there is a lack of awareness of sustainability in general, and a lack of expertise and experience in building sustainable developments which is ultimately time consuming to make them understand. Again, an improvement of skills in this sector is required."*

5.6.4 Barrier to Stakeholder Engagement

The sub-theme "Barrier to Stakeholder Engagement" produced 44 related passages. This was predominantly mentioned by DC (29 passages), PM (10 passages) and EC (5 passages). This was then further broken down into three associated mid-level themes.

Barrier to Stakeholder Engagement	DC	PM	EC	Total
Conflicts with the Stakeholders	8	1		9
Stakeholders Diverse Interests	18	7	2	27
Communication Problem	3	2	3	8
Overall	29	10	5	44

Table 5.48: Thematic Profile of Barrier for Stakeholder Engagement

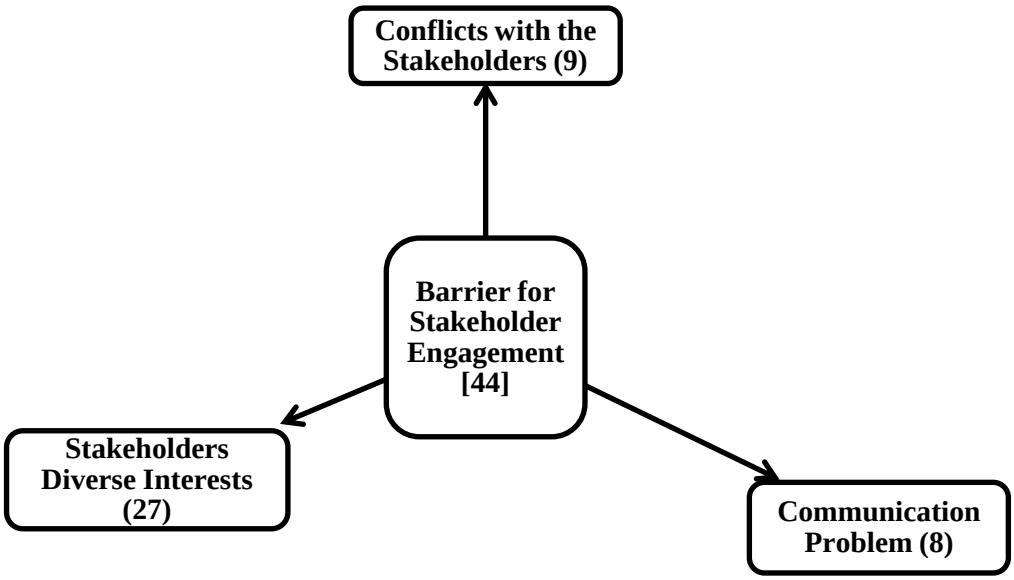


Figure 5.47: Thematic Diagram of Barrier to Stakeholder Engagement

Participants considered stakeholders' diverse interests as one of the big barriers for engaging them for sustainable development. With regard to the sub theme "Stakeholders' Diverse Interests" (27 passages) participants mentioned that in every project different stakeholders have their different interests, they have different expectations as to the results of the project and have different suggestions of to make the project successful which creates difficulties in making stakeholders happy. Regarding this #1 mentioned that, *"sometimes our clients claims that how can we do it differently, can we work together to try to do it differently. Can we make it more sustainable and more contemporary".*

5.7 Interview Results: Key Findings

The thematic analysis performed in this chapter examined and confirmed by the different factors identified in the interview findings. Findings from the interview also revealed some new factors. For the reason of inclusivity, it has been decided that all factors identified both in the literature review and interviews will be considered as recurrent themes, and therefore will

be carried forward into the next phase of research. Based on the findings from literature review and interview findings a questionnaire was developed which is presented in Appendix 4. Correspondingly some of the hypotheses developed in this section are based on the findings from literature review and interview findings. A brief description of all themes and sub-themes is given below –

5.7.1 Findings of "Improving Project Performance"

The performance of the project depends on how its stakeholders are acting to run the business to achieve its final goal. From the interview analysis some integrative strategies have come out which are discussed in the following sections.

5.7.1.1 Promoting the Construction Sustainability

5.7.1.1.1 Stakeholder Engagement for Construction Sustainability

Interview findings identified that most of the participants believed that stakeholder engagement is important to achieve the construction sustainability. They believed that keeping the stakeholders engaged is not the function to confine within the boundaries but a good system of engagement also means that employees continue to work for the company thereby increasing product and service loyalty. The increased level of stakeholder's involvement tends to generate a communal sense of ownership in the whole project process and its outcomes. Some of the proactive strategic approaches like Managing Relationships with Stakeholders, Analysis of Stakeholders and Communication with Stakeholders, Measuring Stakeholder Performance, Continuous Improvement and Creating Sustainability Awareness come out from the interviewee's interest for stakeholder engagement. All these approaches are analysed below which could create a motivation and a driving force among the entire stakeholder community to adopt efficient methods and work for the target.

- Stakeholder Analysis: Participants mentioned that they engage their stakeholders through analysing them and they do this analysis through identifying, mapping and prioritizing them. Participants considered it important as it is a technique that people use to identify and assess the importance of key people, groups of people, or institutions that may significantly influence the success of project activity.

- Stakeholder Mapping: About 9 participants emphasized performing the stakeholder mapping. Participants mentioned different opinions of doing the stakeholder mapping as it

varies on the project management practices and the organisation's approach to stakeholder mapping varies. Some participants feel that mapping is important to identify the key people who have the most impact and knowledge about the project objectives to avoid wasting time; some considered mapping is useful as it visualizes the stakeholders' demands. It is noted from their views that rather than mapping the stakeholders regarding their power and influence participants would like to map them according to their potential impact on the project outcome.

Though the researchers (Newcombe, 2003; Bourne and Walker, 2005; Yang et al, 2009) have considered stakeholder mapping as the best tool for analysing the stakeholders, this research has considered stakeholder mapping independently as the interview participants considered both of the stakeholder analysis and stakeholder mapping are important for engaging the stakeholders. After identifying the stakeholders, stakeholder mapping helps to visualize their position, their influence and demand of sustainable construction which may create the variation in their level of engagement.

- Managing Stakeholders: Participants considered Stakeholder Management is important for achieving construction sustainability as it manages the diverse range of stakeholders, their demand; manages stakeholder risk and stakeholder impact.

From the interview findings it is identified that companies have their own procedure of managing relationships with their stakeholders. This procedure helps them to follow a systematic way to engage their stakeholders. Most of the interviewees hold face to face meetings with their stakeholders. This type of communication is the right manner to present the right information to the right stakeholder. The first element of managing relationships is to ensure that the project's deliverables will meet the requirements of the project supply chain partners. Participants reported that keeping others informed about their project activities maintains and helps to keep a good relationship with them.

Participants considered that employee competencies can be valued through quantifying their skills, experience and capability against the project objectives. The easiest way to motivate the stakeholders is to co-create innovations to offer financial incentives to compensate incurred expenses. Participants also mentioned that highlighting the issues for sustainable development and giving importance to recover it for the wellbeing of the construction,

stakeholders might be convinced to reduce the risks and might increase the motivation to participate in such projects.

- Communication with Stakeholders: Interview participants revealed that to maintain an effective communication with the stakeholders, sharing information and sharing knowledge are most imperative. Rather than only working with the stakeholders, sharing information and knowledge helps to keep a permanent relationship with them. It is also important when project top management want all the stakeholders on the project team to pull in the same direction — toward project success. Participants also mentioned other communication processes like Updating the Company's Website and Discussion with the Stakeholders that produces a collaborative environment to build teamwork, saves time and increases the stakeholder's satisfaction.

- Measuring Stakeholder Performance: To understand the stakeholder issues and to improve their impact on the project, participants emphasized on measuring the stakeholders performance. They considered that the benchmarking and performance survey method makes them better organized to meet the needs of their customers, so that they will be more able to attract their customers than their competitors and their people are more greatly to be motivated to do a greater job.

- Creating Sustainability Awareness: Therefore, participants feel that a lot more determination is necessary to improve the level of environmental, social, economic awareness and community realization among the people to build a sustainable world in the future. Some of the participants mentioned that they are doing research collaboration with the universities on sustainability projects to make their stakeholders more expert and responsive. With this greater participation of stakeholders, they will become stimulated to contribute their own ideas and energies, thus contributing to sustainable living and debates on sustainability issues.

Continuous Improvement: Participants considered that stakeholder engagement accelerates the continuous improvement of the project activities as it makes sure that managing the stakeholders will always enhance the project activities, though participants considered that practising continuous improvement is sometimes time consuming and difficult. Therefore, different stakeholder engagement approaches are –

- Communication With Stakeholders

- Stakeholder Management
- Stakeholder Analysis
- Stakeholder Mapping
- Stakeholder Risk Management
- Stakeholder Performance Measurement

5.7.1.1.2 Findings of "Sustainable Development in Construction Sector"

Some of the following particulars are identified that participants considered important to achieve sustainability in construction sector -

- Practising Sustainable Methodology
- Lean Construction
- Environmental Sustainability
- Economic Sustainability
- Social Sustainability
- Project Risk Management

- Practising Sustainable Methodology: Participants mentioned that they use different standards and specifications that are very generic regarding of the size and scope of a project and compare to the market. Meeting different sustainability standards like Meeting Sustainability Code, Sustainability Guidelines, Egan Agenda and BREEAM Excellence to measure sustainability targets, manages the resource utilization and human wellbeing within and around the building and also enables higher quality buildings to be built. As there is growing interest from the different stakeholders in meeting the sustainability standards subsequently, increasingly professionals are trying to build some form of sustainability standards and specification into the construction they build, the facilities they operate, or the products and services they supply.

According to participant #10, *"……use of Sustainable Technology, Standard Design specification throughout the construction ensures the compliance with the sustainable design that give our all stakeholder's intent to use of the specifications in whole lifetime components that could provide greater reliability of the product".* Participants considered it is important to manage the product value as it will increase the reputation of their service by enhancing its significance. This will also enable them to be competitive in delivering its services, especially in terms of the quality of advice given and proposals produced. Participants reflect that if the

decisions of the value management could be implemented at the early stages of the project, it could help to make sure that the construction projects create a minimal amount of environmental, economic and social damage.

- Economic Sustainability: Cost-management is a valuable tool for planning and decision making for sustainable development. Participants mentioned different techniques, like value engineering (VE), whole life costing, using competitive pricing, using cheap sustainable material that can be deployed effectively for reducing costs, increasing productivity and improving quality. All of these different approaches manage cost by managing the product price and net benefits against the investment, including exactly how the impacts of company policy and regulations may be distributed across various stakeholders.

- Environmental Sustainability: To improve the environmental efficiency, participants have set some targets and have their own defined strategy to achieve the sustainability target. Emphasizing stakeholder importance on the environmental sustainability participant #4 mentioned that, *"our whole project team aim to manage the project activities, buildings and assets in such a way which promotes environmental sustainability; conserves and enhances natural resources; uses ISO standard for environmental sustainability, reduces carbon reduction, manages environmental pollution and brings about a continual improvement in its environmental performance".*

- Lean Construction: Using lean technique is a valuable set of ideas for organisations that have set their intention to learn to live within sustainable limits. Different lean techniques enable the stakeholders to reduce their spend on heating, lighting and ventilating the built environment, and constructors to reduce the costs of creating what clients and owners need.

- Project Risk Management: Almost all of the professionals mentioned that their stakeholders make a risk management plan of their day to day operations. Different companies use different methods like using risk assessment, or risk register to make a list of all risks and track their associated tasks. Analysing project risk deals with minimising the risk so that it can organise the project in such a way that it doesn't encounter any risk anymore.

- Social Sustainability: Participants thinks that social sustainability is involved with shielding the mental and substantial wellbeing of all stakeholders, preserving cultural and

natural heritage, encouraging community, treating all stakeholders honestly and providing essential services. Reviewing the interview findings it evidenced some traditional themes, such as supporting local community, local employment, improving local area fundraising for charity, providing children with parks and providing local youth clubs that are increasingly combined and complemented by more intangible and prolonged concepts such as social cohesion, the benefits of social networks, happiness and quality of life. Few of the participants mentioned that they have their health and safety policy and described how they manage health and safety related issues in their business and let their internal stakeholders and others know about the commitment to health and safety.

Interview findings indicate that different participants have different attitudes in relation to engaging stakeholder for sustainability purpose. This variation might be because of the variation of the participants' roles and involvement with projects. To validate the findings from the interviews some of the following hypotheses are formed. These hypotheses will be tested statistically from the findings of the questionnaire.

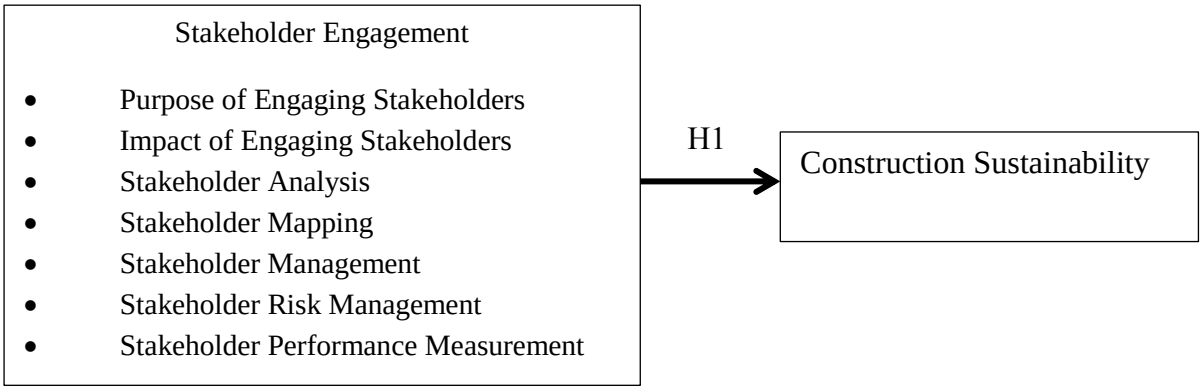


Table 5.49: Impact of Stakeholder Engagement on Construction Sustainability

H1: There is a correlation between the Engagement of Stakeholders and Construction Sustainability.

H1.1 = There is a correlation between the Purpose of Stakeholder Engagement and Construction Sustainability.

H1.2 = There is a correlation between the Impacts of Stakeholder Engagement and Construction Sustainability.

H1.3 = There is a correlation between the Communication with Stakeholders and Construction Sustainability.

H1.4 = There is a correlation between the Stakeholder Analysis and Construction Sustainability.

H1.5 = There is a correlation between the Stakeholder Mapping and Construction Sustainability.

H1.6 = There is a correlation between the Stakeholder Management and Construction Sustainability.

H1.7 = There is a correlation between the Stakeholder Performance Management and Construction Sustainability.

5.7.1.1.3 Findings of "Drivers for Construction Sustainability"

The participants highlighted a number of sustainability drivers. They considered these drivers as better defined sustainability objectives in the perspective of their organizational objectives. Participants also mentioned that to implement the drivers for sustainable development in construction, organisations require close orientation of the interests and needs of the major stakeholders. The validity of these drivers will be tested statistically in the next chapter.

5.7.1.2 Meeting the Project Performance Targets

The direction of the construction industry is now shifting from adopting the sustainability as an integrated project process from the wider context of improving the environmental, social and economic performance. Besides companies are trying to place themselves ahead of the competition by making use of sustainability issues like managing product quality and project lead time to improve their efficiency and business performance.

5.7.1.3 Managing Sustainability Performance

A robust sustainability performance management capability provides the information that is required for decision makers to identify and create value relevant to the sustainability target. However, from the participants' responses it is revealed that for many organisations current efforts to manage sustainability performance is more strategic. Most of the participants mentioned that they monitor their sustainability related performance to achieve their strategic goals. Participants also mentioned that improving their project strategic targets, helps to achieve the project objectives. Most of the operational staff feels that monitoring the project performance helps to track the key project indicator relevant to project objectives that need to measure and identify the emerging performance issues so that correct actions can be taken in a timely manner. Therefore, there is evidence that stakeholder's aim of achieving the project goal is targeted as a way of achieving sustainability and finally improving the project performance. As the different companies have different strategic goals, construction

sustainability related targets and improving the project performance could be varied with strategic goals.

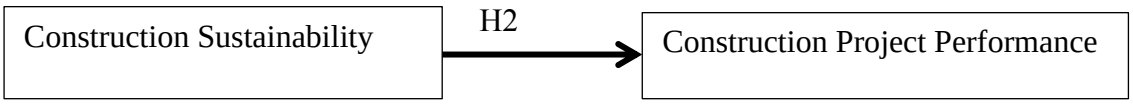


Table 5.50: Impact of Construction Sustainability on Construction Project Performance

H2: There is a correlation between Construction Sustainability related targets and the Construction Project Performance,

5.7.1.4 Measuring the Project Performance

Companies use different indicators based on their internal and external effects to measure the sustainability performance. To evaluate social performance it needs to measure how the stakeholder's activities are impacting socially. Measuring this social sustainability performance provides a good structure to the society and brings the social development. Some of the participants mentioned that they have their own economic model or framework based on which they measure their level of economic achievement against their targets. Participants considered that the economic performance of a project is usually measured in terms of the stakeholder's achievement of its determined economic sustainability objectives. Consequently, measuring the environmental performance provides the facts within the business units that can design more effective sustainable practices, reducing the adverse impact on environment and reducing the carbon impact while at the same time increasing yield and profitability. Good stakeholder engagement is a testimony to their influence in an organization and a key component to excellent project performance. Also from section 5.7.1.1.1 it is identified that stakeholders create great impact to improve the construction project performance. Considering the stakeholders impact on construction sustainability target the following table was developed.

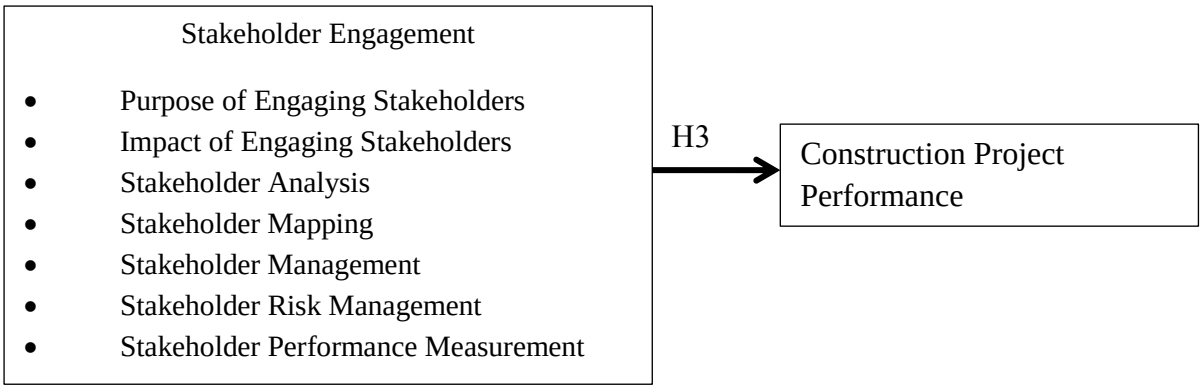


Table 5.51: Impact of Stakeholder Engagement on Construction Project Performance

From the above findings it is revealed that there is a relation between the company's sustainability target, stakeholder's involvement and the project performance. Based on these interview findings and findings from the previous literature the following hypotheses are drawn –

H3: There is a correlation between the Stakeholder Engagement and Construction Project Performance,

H3.1: There is a correlation between the Purpose of Stakeholder Engagement and Construction Project Performance,

H3.2: There is a correlation between Impacts of Stakeholder Engagement and Construction Project Performance,

H3.3: There is a correlation between Communications with Stakeholders and Construction Project Performance,

H3.4: There is a correlation between Stakeholder Analyses and Construction Project Performance,

H3.5: There is a correlation between Stakeholder Mapping and Construction Project Performance.

H3.6: There is a correlation between Stakeholder Management and Construction Project Performance.

H3.7: There is a correlation between Stakeholder Performance Measurement and Construction Project Performance.

Considering variation in different participants' responses, it is assumed that stakeholder engagement process would vary based on the roles of the participants.

H4: There is a variation between the Role of Interview Participants' observations and the Stakeholder Engagement.
H4.1: There is a variation between the Role of Interview Participants' observations and the Purpose of Stakeholder Engagement.
H4.2: There is a variation between the Role of Interview Participants' observations and the Impacts of Stakeholder Engagement.
H4.3: There is a variation between the Role of Interview Participants' observations and Communication with Stakeholders.
H4.4: There is a variation between the Role of Interview Participants' observations and Stakeholder Mapping.
H4.5: There is a variation between the Role of Interview Participants' observations and the Stakeholder Analysis.
H4.6: There is a variation between the Role of Interview Participants' observations and the Stakeholder Management.
H4.7: There is a variation between the Role of Interview Participants' observations and the Stakeholder Performance Measurement.

From the interview findings it is revealed that different companies have diverse strategic goals to determine their organisational success; participants' responses varied, which indicates that stakeholder engagement could vary based on the company's strategic goal.

H5: A successful Stakeholder Engagement is determined by the setting up of a company's strategic focus.
H6: Achievement of the Construction Sustainability is determined by the setting up of a company's strategic focus.
H7: Improving the Construction Project Performance is determined by the setting up of a company's strategic focus.

5.7.2 Findings of Barrier to Construction Sustainability

Most of the participants reported that the key and common obstacles they face is meeting the project cost of the sustainable development. They also revealed that because of expense most of their clients are reluctant to invest money. The reason behind this is the high cost of building sustainable construction and in some cases people don't want to pay the additional cost. In most cases they only want to get the extraordinary service at a cheap price. So they

face losing customers because the clients could get the same services at lower prices from a different company. Therefore, a big obstacle is losing the contract, losing the clients. Participants also mentioned lack of sustainability awareness and sustainability knowledge make the stakeholders more reluctant to get attract for the sustainability. It follows that knowledge of sustainability can be identified as the force behind changing their behaviour and the effects of this behaviour on the sustainable development. To validate the participants' responses all of the barriers are statistically tested in the next chapter.

5.7.3 Validation of Interview Findings

In this research triangulation is used to indicate that two methods are utilised in order to validate the results. The concept of triangulation is borrowed from navigational and land surveying techniques that determine a single point in space with the convergence of measurements taken from two other distinct points (Rothbauer, 2008). The interview questions are developed from the findings of the interviewees. From the interview findings seven hypotheses have been developed. A questionnaire is formed using the findings from the interviews. Hypotheses are statistically analysed through data collected from the questionnaire. From the statistical tests it is shown that the data is within the nominal interval level, which validates the findings from the interviews. Statistical analysis also identified that most of the correlation analysis the interrelations between the variables are within .50 to .60, which proves the validity of the interview findings.

Summary

This chapter has presented the data from the interview exercise, conducted with sixteen constructions professional from different construction sectors. This wide coverage of different infrastructure companies has enabled opinions to be gained that were representative of the entire construction industry and it has been identified that these are likely to be reflections of beliefs formed over some years in the construction sectors. The above hypotheses will be further explored in a series of statistical analyses through a large scale questionnaire in the confirmatory phase of this research in chapter 6 and this will be explained in detail in chapter 7. The next chapter will consider the results from the questionnaire exercise which was conducted after considering the comments from the interviewees and formulating appropriate questions on the bass of the ideas expressed by them.

Chapter Six: Quantitative Data Analyses – Questionnaires Survey Results

6.1 Introduction

This chapter discuss the results derived from the survey as part of the aim to explore the achievement of construction sustainability to improve the construction project performance through the use of quantitative data to generate and test hypothesis. This closely follows the classic hypothetic-deductive model, which uses quantitative data to explain findings and processes. Data collection is presented based around the objective of the research to establish the extent to which the stakeholder engagement process has an impact on improving the construction project performance in UK through making the construction sustainably. All of the hypotheses are generated from the previous literatures and interview findings. The whole Stakeholder Engagement Process is divided into seven different processes which are Purpose of Stakeholder Engagement, Impact of Stakeholder Engagement, and Communication with Stakeholders, Stakeholder Analysis, Stakeholder Mapping, Stakeholder Management and Managing Stakeholder Performance. All the hypotheses and sub level hypothesis are as follows -

H1: There is a Correlation between the Engagement of Stakeholders and Construction Sustainability.

H1.1 = There is a Correlation between the Purpose of Stakeholder Engagement and Construction Sustainability.

H1.2 = There is a Correlation between the Impacts of Stakeholder Engagement and Construction Sustainability.

H1.3 = There is a Correlation between the Communication with Stakeholders and Construction Sustainability.

H1.4 = There is a Correlation between the Stakeholder Analysis and Construction Sustainability.

H1.5 = There is a Correlation between the Stakeholder Mapping and Construction Sustainability.

H1.6 = There is a Correlation between the Stakeholder Management and Construction Sustainability.

H1.7 = There is a Correlation between the Stakeholder Performance Management and Construction Sustainability.

Hypothesis	Variables
H1 = There is a Correlation between the Engagement of Stakeholders and Construction Sustainability.	• Stakeholder Engagement • Construction Sustainability
H1.1 = There is a Correlation between the Purpose of Stakeholder Engagement and Construction Sustainability.	• Purpose of Stakeholder Engagement • Construction Sustainability
H1.2 = There is a Correlation between the Impacts of Stakeholder Engagement and Construction Sustainability.	• Impacts of Stakeholder Engagement • Construction Sustainability
H1.3 = There is a Correlation between the Communication with Stakeholders and Construction Sustainability.	• Communication with Stakeholders • Construction Sustainability
H1.4 = There is a Correlation between the Stakeholder Analysis and Construction Sustainability.	• Stakeholder Analysis • Construction Sustainability
H1.5 = There is a Correlation between the Stakeholder Mapping and Construction Sustainability.	• Stakeholder Mapping • Construction Sustainability
H1.6 = There is a Correlation between the Stakeholder Management and Construction Sustainability.	• Stakeholder Management • Construction Sustainability
H1.7 = There is a Correlation between the Stakeholder Performance Management and Construction Sustainability.	• Stakeholder Performance Management • Construction Sustainability

Table 6.1: Relationship between Hypothesis 1 and its Corresponding Variables

H2: There is a Correlation between Construction Sustainability related targets and the Construction Project Performance.

Hypothesis	Variables
H2: There is a Correlation between Construction Sustainability related targets and the Construction Project Performance	• Construction Sustainability • Construction Project Performance

Table 6.2: Relationship between Hypothesis 2 and its Corresponding Variables

H3: There is a Correlation between the Stakeholder Engagement and Construction Project Performance.

H3.1: There is a Correlation between the Purpose of Stakeholder Engagement and Construction Project Performance

H3.2: There is a Correlation between Impacts of Stakeholder Engagement and Construction Project Performance.

H3.3: There is a Correlation between Communications with Stakeholders and Construction Project Performance

H3.4: There is a Correlation between Stakeholder Analyses and Construction Project Performance.

H3.5: There is a Correlation between Stakeholder Mapping and Construction Project Performance.

H3.6: There is a Correlation between Stakeholder Management and Construction Project Performance.

H3.7: There is a Correlation between Stakeholder Performance Measurement and Construction Project Performance.

Hypothesis	Variables
H3: There is a Correlation between the Stakeholder Engagement and Construction Project Performance.	• Stakeholder Engagement • Construction Project Performance
H3.1: There is a Correlation between the Purpose of Stakeholder Engagement and Construction Project Performance	• Purpose of Stakeholder Engagement • Construction Project Performance
H3.2: There is a Correlation between Impacts of Stakeholder Engagement and Construction Project Performance.	• Impacts of Stakeholder Engagement • Construction Project Performance
H3.3: There is a Correlation between Communications with Stakeholders and Construction Project Performance	• Communication with Stakeholders • Construction Project Performance
H3.4: There is a Correlation between Stakeholder Analyses and Construction Project Performance.	• Stakeholder Analysis • Construction Project Performance
H3.5: There is a Correlation between Stakeholder Mapping and Construction Project Performance.	• Stakeholder Mapping • Construction Project Performance
H3.6: There is a Correlation between Stakeholder Management and Construction Project Performance.	• Stakeholder Management • Construction Project Performance
H3.7: There is a Correlation between Stakeholder Performance Measurement and Construction Project Performance	• Stakeholder Performance Management • Construction Project Performance

Table 6.3: Relationship between Hypothesis 3 and its Corresponding Variables

H4: There is a variation between the Role of Interview Participants observations and the Stakeholder Engagement.

H4.1: There is a variation between the Role of Interview Participants observations and the Purpose of Stakeholder Engagement.

H4.2: There is a variation between the Role of Interview Participants observations and the Impacts of Stakeholder Engagement.

H4.3: There is a variation between the Role of Interview Participants observations and Communication with Stakeholders.

H4.4: There is a variation between the Role of Interview Participants observations and Stakeholder Mapping.

H4.5: There is a variation between the Role of Interview Participants observations and the Stakeholder Analysis.

H4.6: There is a variation between the Role of Interview Participant's observations and the Stakeholder Management.

H4.7: There is a variation between the Role of Interview Participant's observations and the Stakeholder Performance Measurement.

Hypothesis	Variables
H4: There is a variation between the Role of Interview Participants observations and the Stakeholder Engagement.	• Role of Interview Participants • Stakeholder Engagement
H4.1: There is a variation between the Role of Interview Participants observations and the Purpose of Stakeholder Engagement.	• Purpose of Stakeholder Engagement • Role of Interview Participants
H4.2: There is a variation between the Role of Interview Participants observations and the Impacts of Stakeholder Engagement.	• Impacts of Stakeholder Engagement • Construction Project Performance
H4.3: There is a variation between the Role of Interview Participants observations and Communication with Stakeholders.	• Communication with Stakeholders • Role of Interview Participants
H4.4: There is a variation between the Role of Interview Participants observations and Stakeholder Mapping.	• Stakeholder Analysis • Role of Interview Participants
H4.5: There is a variation between the Role of Interview Participants observations and the Stakeholder Analysis.	• Stakeholder Mapping • Role of Interview Participants
H4.6: There is a variation between the Role of Interview Participant's observations and the Stakeholder Management.	• Stakeholder Management • Role of Interview Participants
H4.7: There is a variation between the Role of Interview Participant's observations and the Stakeholder Performance Measurement.	• Stakeholder Performance Management • Role of Interview Participants

Table 6.4: Relationship between Hypothesis 4 and its Corresponding Variables

H5: A successful Stakeholder Engagement varies by setting up of Company's Strategic Focus.

H6: Achievement of Construction Sustainability varies by setting up of Company's Strategic Focus.

H7: Improving the Construction Project Performance varies by setting up of Company's Strategic Focus.

Hypothesis	Variables
H5: A successful Stakeholder Engagement varies by setting up of Company's Strategic Focus.	• Stakeholder Engagement • Company's Strategic Focus
H6: Achievement of Construction Sustainability varies by setting up of Company's Strategic Focus.	• Construction Sustainability • Company's Strategic Focus
H7: Improving the Construction Project Performance varies by setting up of Company's Strategic Focus.	• Construction Project Performance • Company's Strategic Focus

Table 6.5: Relationship between Hypothesis 4,5,6 and its Corresponding Variables

Initially this chapter describes the background of the quantitative data collection. This is followed with sections that deal with descriptive analysis of the data collected from the construction professionals. The third part of this chapter reports the primary results of the statistical analysis with appropriate hypothesis testing pointed out earlier.

6.2 Data Collection

Questionnaire survey and data was collected through electronic and postal media; between January and March 2013. The response rate was medium for statistical analysis. The survey was targeted to all UK construction companies. The total sample size count was for 500 units of construction sectors, 233 questionnaires were returned, representing a 46% total response rate. It is noteworthy that all of the responses received were from all regions throughout the whole UK. Participant's information was collected from the Fame database of UK companies. To increase the response rate the same people identified from the Fame Database were contacted through LinkedIn. A further email was sent to those people requesting them to complete the questionnaire. After the request through LinkedIn more responses were obtained. A five point Likert-type scale is used in the questionnaire to rate the possible answers. Within the results, the lower the score on the variables indicates strong agreement with the question and the higher score vice versa (1 = strongly agree, and 5 = strongly disagree on a 5-point Likert scale). After developing the hypotheses and identifying the impacts between the variables a questionnaire was designed based on each variable. All the questions were derived from the interview findings.

The composed data was analysed using the SPSS package (version 21). Descriptive statistics are used such as frequencies, mean and percentages. In addition, standard statistical analysis procedure was utilised by using *Pearson correlation* analysis, *Univariate* (ANOVA) to analyse the data obtained from the questionnaire. The *Pearson Correlation* coefficient analysis is proposed to examine the relationship between perceptions of importance attached to stakeholder engagement and the extent to which the stakeholder engagement is presented. ANOVA method is used to investigate the differences in the conception and adaption of stakeholder engagement process within the construction companies. In addition they were intended to evaluate the level of implementation of stakeholder engagement success between the respondent groups.

6.3 Drivers that Motivates Sustainability in Construction Sector

Table 6.6 indicates which drivers is the most serious or most frequently liable, in ranking order of the most frequent. Therefore, the descriptive statistics in tables 6.6 indicates which driver is the first choice of the construction professionals to implement sustainability in construction. Therefore, the lower the mean value the driver has the more impact to implement sustainability in construction it has. Having the higher values indicates that the

driver creates less impact. So, considering the lower mean value as big blockades and concentrating on the major blockade first, it can be eliminated, then the subsequent most respectfully. Participants considered "consuming less energy", "reducing waste" and "satisfying customer demand" are the major drivers to push for construction sustainability.

	N	Mean	Std. Deviation
to consume less energy	233	1.60	.960
to reduce waste	233	1.65	.968
to satisfy customer demand	233	1.69	.992
to reduce pollution	233	1.84	.987
to meet building regulations	233	1.87	1.010
to provide durable structures	233	1.96	1.070
to improve the quality of life	233	2.06	.988
to protect biodiversity	233	2.06	1.028
to contribute to economic development	233	2.08	1.041
to develop innovative structures	233	2.27	1.075
to meet pressure from competitors	233	2.28	1.134
to address adverse effects of climate change	233	2.56	1.109
Valid N (list wise)	233		

Table 6.6: Drivers that Motivates Sustainability in Construction Sector

6.4 Barriers that Hinder Sustainability in Construction Sector

Table 6.7 indicates which barrier is the most serious or most frequently liable, in ranking order of the most frequent. The ranking is done based on the mean value which helps to decide which issue or reason is the most serious or most frequent offender. Therefore, the lower the mean value the barrier has the more impediments to implement sustainability in construction it has. So, considering the lower mean value as big blockade and concentrating on the major blockade first, it can be eliminated then the subsequent most respectfully. Participants considered "lack of client awareness" is the major blockade to embracing sustainability in construction which is followed by "lack of sustainability knowledge" and "absence of incentives".

	N	Mean	Std. Deviation
a lack of client awareness	233	1.90	.970
a lack of sustainability knowledge	233	2.16	1.08
the absence of incentives	233	2.20	1.11
a lack of demand from clients	233	2.33	1.18
no affordable solutions	233	2.37	1.21
the nature of the construction industry	233	2.40	1.14
the industry being unwilling to accept change	233	2.51	1.27
disorganised construction supply chain	233	2.62	1.19
unfavourable government rules	233	2.64	1.10
adverse political situation	233	2.68	1.05
Valid N (list wise)	233		

Table 6.7: Barriers that Motivates Sustainability in Construction Sector

6.5 Characteristics of Respondent's Position

In figure 6.1 contractor, subcontractor and architect, designer are put together to reduce the sub-groupings. As can be seen in the majority of the respondents are Director (35%) due to the fact that they are primarily responsible for involving all stakeholders and improving the project performance. This is followed by the contractor/subcontractor (33%). 10% of the respondents hold other positions like Manager, Advisor, Supplier and Client. Therefore their response is considered as reliable and provides the study with valuable information.

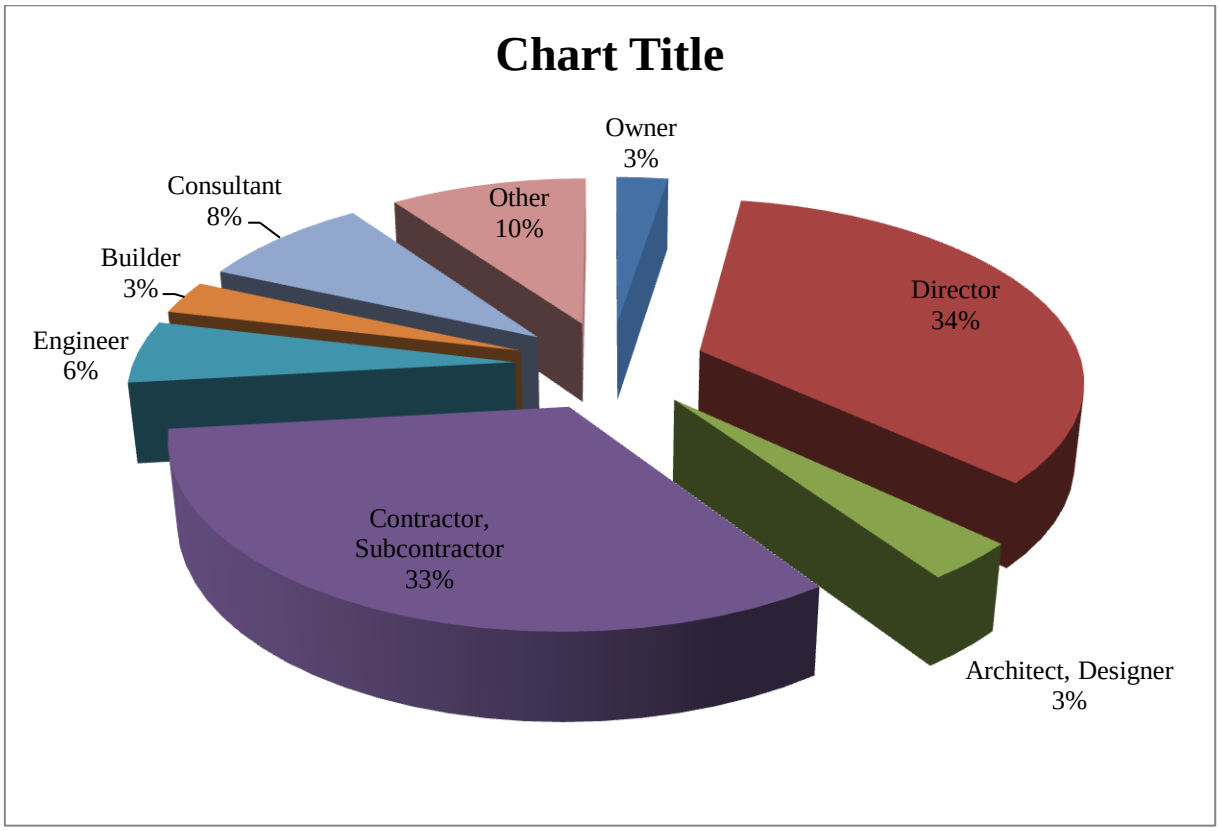


Figure 6.1: Characteristics of respondent's position

6.6 Characteristics of the Projects in which Respondents are Involved

According to the survey results, there are 678 projects from different region in UK respondents are involved with. Figure 6.2 indicates the respondent's involvement with the different project activities. The majority of the respondents (17.55%) are involved with Construction of residential/non-residential buildings. 14.75% are involved with development of buildings followed by 12.09% from the Building completion and finishing. "Others" category (7%) includes "development of roads/railway", "Airport Terminal and related construction projects", "Planned maintenance" and "construction of ports / dredging" etc.

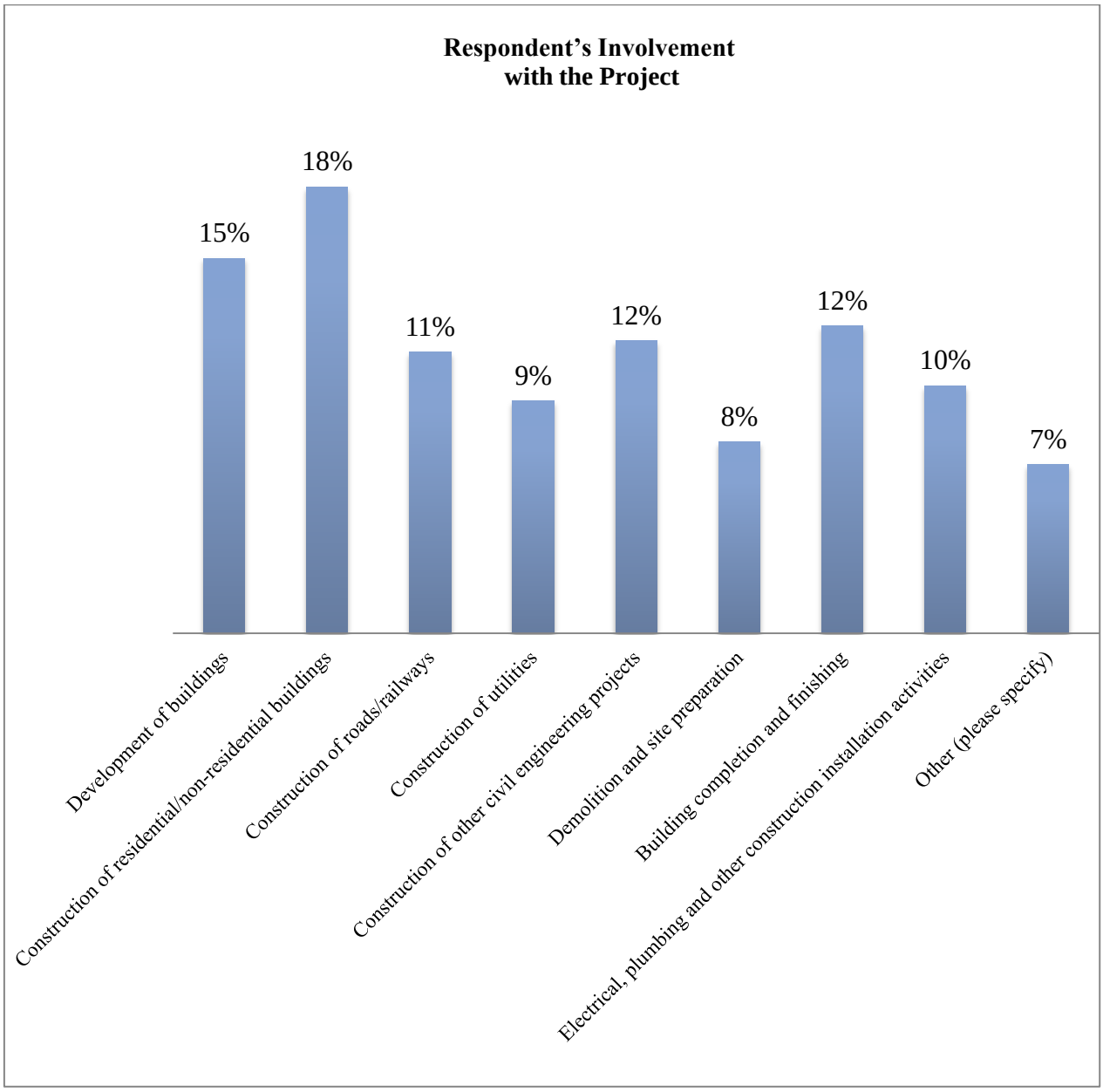


Figure 6.2: Characteristics of Respondent's Involvement with the Project

6.7 Characteristics of Strategic Focuses in Construction Companies

Respondents were asked to specify their practices of strategic focuses in their company. Figure 6.3 highlights that all respondents have their own strategic focuses to lead the business to its greatest competitive advantage. However, out of 233 respondents, the result finds that 53% of the company's strategic focus is to improve their customer satisfaction, which is followed by improving quality. Around 6% have other strategic focuses like Profitability, Delivery on time and all of the above. The survey also finds that only 5% of the respondents reported that Innovation is their main strategic focus.

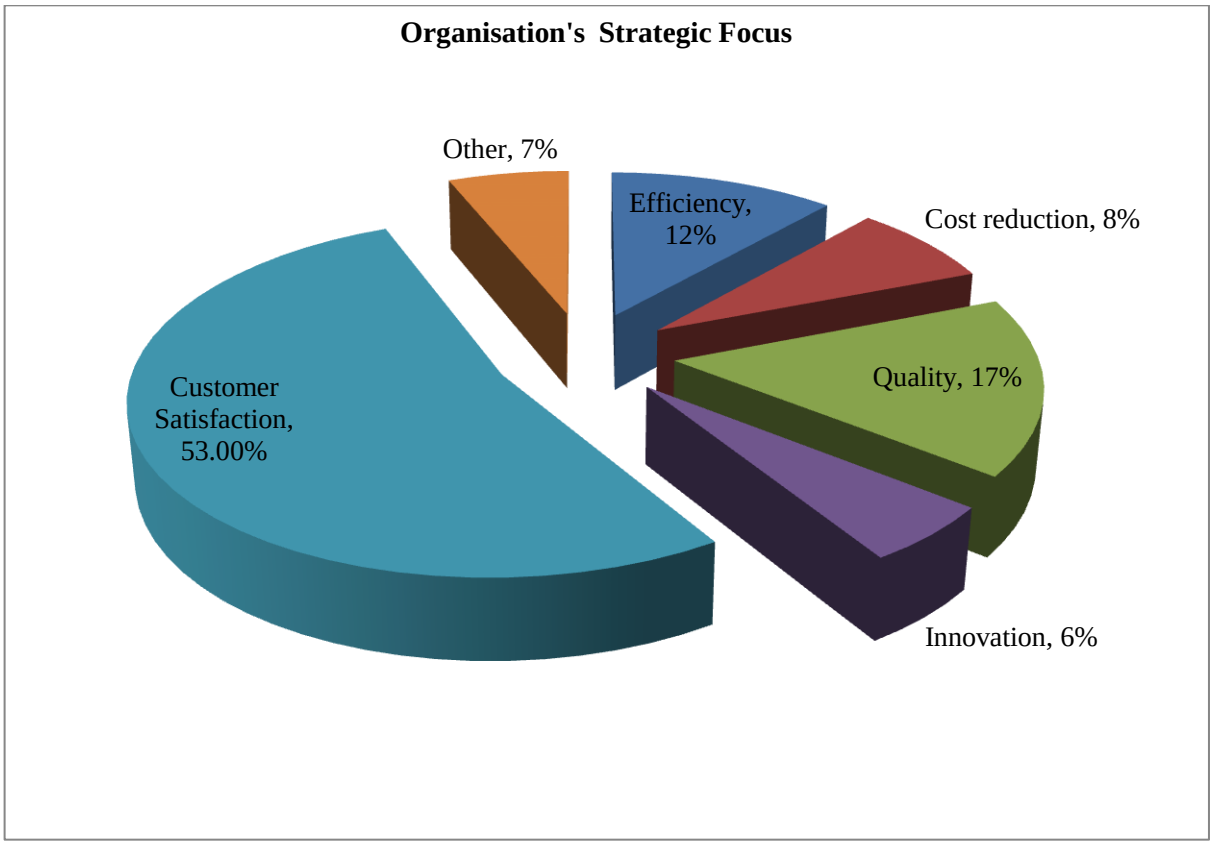


Figure 6.3: Organisation's main strategic focus

6.8 Correlation between Perspective of Importance of Stakeholder Engagement and Construction Sustainability

The Pearson product – moment correlation coefficient was performed to detect the relationship between two variables from the perspective of importance attached to the stakeholder engagement (Independent Variable) and the extent to which the construction sustainability can be improved (Dependent Variable). The statistical test is an appropriate statistical procedure because it is used with scaled data to assess the linear association and comparison between two variables and assumes a normal distribution (Sheskin, 2000). If the calculated value (ignoring the sign if it is negative) is equal to or greater than the critical value then the correlation is significant at the 5% probability level, so the hypothesis can be retained. However, if the calculated value is less than the critical value then the correlation is not significant so the hypothesis can be rejected.

Pearson correlation analysis was performed to quantify the strength of association between the importance of stakeholder engagement and its implementation success perceived by the respondents. The whole Stakeholder Engagement Process is divided into seven different processes which are Purpose of Stakeholder Engagement, Impact of Stakeholder Engagement,

and Communication with Stakeholders, Stakeholder Analysis, Stakeholder Mapping, Stakeholder Management and Stakeholder Performance Management. Overall, different steps of correlation give the overview of stakeholder engagement relationships with the construction sustainability. The outcomes are reported with statements of results and tables from the Pearson Correlation test undertaken. It is noted that a significant correlation is only concluded when the sig. level is below 0.05 or 0.01. Both of these values reflect a 5% and 1% (0.05 and 0.01) chance of the results being down to chance.

6.8.1 Reliability Test

	Chronbach's Alpha (α)	Scale Mean	SD	No. of Items
Stakeholders Engagement	0.973	138.66	41.03	70
Construction Sustainability	0.950	51.47	17.46	26

Table 6.8: Reliability Coefficients for the Stakeholder Engagement, Construction Sustainability with Scale Mean Standard Deviations and No. of Items

An important aspect of a psychometrically developed measure is the reliability of the scale. Table 6.8 shows the reliability test of Stakeholders Engagement and Construction Sustainability. Chronbach's alpha is used to test for internal consistency of scales. Different participants have differing views on what are acceptable alpha levels for measures. Hair and Anderson (2010) however posit that for exploratory research, levels of 0.6 are acceptable. Essentially, Nunnaly and Bernstein (1994) state that 0.70 is an acceptable minimum for a scale that is newly developed.

Reliability for the Stakeholder Engagement is 0.973 and Construction Sustainability is 0.950 overall indicating that the five point scale has acceptably reliable consistency. The mean scores for the Stakeholder Engagement and Construction Sustainability are 138.66 and 51.47 respectively and the standard deviations are 41.030 and 17.464 respectively indicating a good variance across responses. All the subscales have a good relationship with each other, so there is no need to delete any item.

6.8.2 Hypotheses Testing

Hypothesis 1: There is a Correlation between the Engagement of Stakeholders and Construction Sustainability.

6.8.2.1 Hypotheses 1.1: There is a Correlation between the Purpose of Stakeholder Engagement and Construction Sustainability

		Purpose of Stakeholder Engagement
Construction Sustainability	Pearson Correlation	.608**
	Sig. (1-tailed)	.000
	N	231

**. Correlation is significant at the 0.01 level (1-tailed).

Table 6.9: Correlation between Purpose of Stakeholder Engagement and Construction Sustainability

Purpose of Stakeholder Engagement is found to be significant at the 1% level with Construction Sustainability, r (231) = 0.608, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the higher the score on the Purpose of Stakeholder Engagement the higher score on the Construction Sustainability. Therefore the hypothesis 1.1 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_ 1.1. Some of the following items of the variables are identified (Table A_ 1.1, Appendix 1) which has good correlation between each other.

1. Engaging Stakeholders improves the communication process that could manage the project cost/quality/risk to achieve the sustainability.

Purpose of Stakeholder Engagement	Construction Sustainability
	Sustainable construction manage cost/quality/risk/procurement together to improve project performance
to enhance communication	r = 0.540
	p = 0.000

Table 6.9.1: Strong correlation between increasing communication among stakeholders and construction sustainability

2. Engaging Stakeholders reduce risk and uncertainty which has good impact on managing cost, quality, project time and creating opportunities to improve.

Purpose of Stakeholder Engagement	Construction Sustainability		
	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
to reduce risk and uncertainty	r = 0.567	r = 0.547	r = 0.475
	p = 0.000	p = 0.000	p = 0.000

Table 6.9.2: Strong correlation between reducing project risk and uncertainty and construction sustainability

Some of the following items are identified from the item wise relationship which has weak correlation between Purpose of Stakeholder Engagement and Construction Sustainability –

1. Sharing knowledge has less impact on short/long-term cost reductions.

Purpose of Stakeholder Engagement	Construction Sustainability
	Sustainable construction leads to short/long-term cost reductions
to share individual knowledge	r = 0.121
	p = 0.069

Table 6.9.3: Weak correlation between sharing individual knowledge and construction sustainability

2. Purposes of engaging stakeholder like Sharing Knowledge, Reducing risk and uncertainty, Sharing Challenge, for Continuous Improvement and Generating Solution have less impact on evaluating the sustainability outcome

Purpose of Stakeholder Engagement	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
to share individual knowledge	r = 0.143
	p = 0.031
for continuous improvement	r = 0.143
	p = 0.032
to reduce risk and uncertainty	r = 0.180
	p = 0.006
to share challenges	r = 0.136
	p = 0.041
to generate solution	r = 0.074
	p = 0.263

Table 6.9.4: Weak correlation between evaluating the outcomes of sustainable development and purpose of stakeholder engagement

6.8.2.2 Hypotheses 1.2: There is a Correlation Between the Impacts of Stakeholder Engagement and Construction Sustainability

		Impacts of Stakeholder Engagement
Construction Sustainability	Pearson Correlation	.728**
	Sig. (1-tailed)	.000
	N	232

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.10: Correlation between Impacts of Stakeholder Engagement and Construction Sustainability

Impacts of Stakeholder Engagement is found to be significant at the 1% level with Construction Sustainability, r (232) = 0.728, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the higher the change on the Impacts of Stakeholder Engagement the higher score on the Construction Sustainability.

Therefore the hypothesis 1.2 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_ 1.2. Some of the following items of Impact of Stakeholder Engagement and Construction Sustainability have good correlation between them (Appendix 1, Table A_ 1.2) –

1. Stakeholder engagement has good impact to manage the different sustainability issues like time, cost and waste,

Impacts of Stakeholder Engagement	Construction Sustainability					
	Sustainable construction manage cost/quality/ risk/procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use	Waste management helps to achieve acceptable environmental quality	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	r = .568**	r = .478**	r = .437**	r = .416**	r = .445**	r = 0.436**
	p = 0.000	p = 0.000	p = 0.000	p = 0.000	p = 0.000	p = 0.000

Table 6.10.1: Strong correlation between effects of stakeholder engagement and construction sustainability

2. Stakeholder engagement is a powerful mechanism to facilitate the collaborative working situation that helps to find out sustainability solution

Impacts of Stakeholder Engagement	Construction Sustainability					
	Sustainable construction manage cost/quality/risk /procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Risk management helps to get better understanding of different issues related to environmental/ social/ economic/ operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Sustainability target improve the quality of life to aim for getting better project management performance
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	r = 0.490**	r = .493**	r = .486**	r = .440**	r = .456**	r = .451**
	p = .000	p = .000	p = .000	p = .000	p = .000	p = .000

Table 6.10.2: Correlation between impacts of collaboration with stakeholder and construction sustainability

3. Stakeholder engagement helps to manage relationships by aligning stakeholder's mutual interests, reducing project time and mitigating project risk/uncertainty.

Impacts of Stakeholder Engagement	Construction Sustainability			
	Risk management helps to create better value through the management of different threats	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/ strategic issues	Construction sustainability target compresses the project time that helps to add value in our project environments	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	r = 0.533**	r = .544**	r = .534**	r = .546**
	p = .000	p = .000	p = .000	p = .000

Table 6.10.3: Strong correlation between managing relationship with stakeholders and construction sustainability

4. Stakeholder engagement is the process of exchanging information which is helpful to achieve sustainability target

Impacts of Stakeholder Engagement	Construction Sustainability					
	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Risk management helps to create better value through the management of different threats	Environmental impacts (energy use, CO_2 emissions and non-renewable materials) have a major influence on the construction of the finished product	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Waste management helps to achieve acceptable environmental quality
Stakeholder engagement is the process of exchanging information	r = 0.506**	r = .507**	r = .466**	r = .466**	r = 0.424**	r = .435**
	p = .000	p = .000	p = .000	p = .000	p = .000	p = .000

Table 6.10.4: Strong correlation between exchanging information with stakeholders and construction sustainability

Following are some items identified having poor correlation between Impacts of Stakeholder Engagement and Construction Sustainability –

1. Stakeholders are less considerable to share any pain or loss from the project outcome –

Impacts of Stakeholder Engagement	Construction Sustainability				
	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Managing construction waste helps to manage project cost
Stakeholder engagement is the process of sharing pain from the project outcome	r = 0.066**	r = 0.115**	r = 0.109**	r = 0.059**	r = 0.133**
	p = .323	p = .084	p = .098	p = .376	p = .044

Table 6.10.5: Weak correlation between sharing pain with stakeholders and construction sustainability

2. Some of the outcomes of stakeholders engagement i.e. improving the productivity, reducing energy emissions; exchanging information has less impact on the evaluation of the sustainability outcome,

Impacts of Stakeholder Engagement	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
Engaging stakeholders helps to improve the productivity	r = 0.114**
	p = .088
The project manager needs to analyse how the project itself influences the needs	r = 0.114**
	p = .086
It is better to engage with a small number of key stakeholders rather than with all	r = 0.048**
	p = .471
Stakeholders are the sources of different project issues	r = 0.108**
	p = .102

Table 6.10.6: Weak correlation between evaluate the outcomes of sustainable development and stakeholder management

3. Engaging the selective people does not create any impact on the sustainability outcome,

Impacts of Stakeholder Engagement	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
You engage with selective people as stakeholders to your project	r = -0.094**
	p = 0.158

Table 6.10.7: Weak correlation between engaging selective people and Construction Sustainability

6.8.2.3 Hypotheses 1.3: There is a Correlation between the Communication with Stakeholders and Construction Sustainability

		Communication with Stakeholders
Construction Sustainability	Pearson Correlation	.640**
	Sig. (1-tailed)	.000
	N	232

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.11: Correlation between communication with stakeholders and construction sustainability

Communication with Stakeholders is found to be significant at the 1% level with Construction Sustainability, r (232) = 0.640, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the higher the change on the Communication with Stakeholders the higher score on the Construction Sustainability. Therefore the hypothesis 1.3 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.3. Some of the following items have good correlation between the Communication with Stakeholders and Construction Sustainability –

1. Communicating with different stakeholder helps to expose different thoughts which create good impact to improve the construction sustainability.

Communications with Stakeholders	Construction Sustainability				
	Sustainable construction manage cost/quality/risk /procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
Communicating with different stakeholder helps to expose different thoughts	r = 0.441**	r = 0.462**	r = 0.529**	r = 0.454**	r = 0.465**
	p = .000	p = .000	p = .000	p = .000	p = .000

Table 6.11.1: Strong correlation between generating different thoughts and construction sustainability

2. Collaborating with stakeholders at the initial stages of a project helps to manage risk and improve the quality.

Communications with Stakeholders	Construction Sustainability		
	Waste management helps to achieve acceptable environmental quality	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/strategic issues	Sustainability target improve the quality of life to aim for getting better project management performance
Communicating with stakeholders at the early stages of the design process can provide innovative high-quality solutions at competitive prices	r = 0.431**	r = 0.443**	r = 0.461**
	p = 0.000	p = 0.000	p = 0.000

Table 6.11.2: Strong correlation between communication at the initial stages and construction sustainability

3. Keeping stakeholders informed as the project progresses by sending updated information promotes to manage the sustainability target and manage risk,

Communications with Stakeholders	Construction Sustainability				
	Sustainable construction manage cost/quality/risk /procurement together to improve project performance	It is important to provide local employment as an aspect of our construction activity	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	r = 0.551**	r = 0.482**	r = 0.539**	r = 0.537**	r = 0.489**
	p = .000	p = .000	p = .000	p = .000	p = .000

Table 6.11.3: Strong correlation between keeping the stakeholders informed and construction sustainability

Some of the following items have low correlation between Communication with Stakeholders and Construction Sustainability –

1. Keeping the stakeholders informed with updating information has less impact on evaluating the sustainability outcome

Communications with Stakeholders	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	r = 0.156**
	p = .018

Table 6.11.4: Weak correlation between keeping the stakeholders informed and construction sustainability

2. Discussing with stakeholders has less impact on improving energy efficiency and improving the productivity,

Communications with Stakeholders	Construction Sustainability	
	Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Managing waste helps to improve productivity
I like to communicate with stakeholders privately to discuss issues	r = 0.140**	r = 0.130**
	p = .035	p = .049

Table 6.11.5: Weak correlation between discussing different project issues and construction sustainability

3. Communicating with stakeholders at early stage provide the innovative solution has less impact to evaluate the sustainability outcome

Communications with Stakeholders	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
Communicating with stakeholders at the early stages of the design process can provide innovative high-quality solutions at competitive price	r = 0.126**
	p = .057

Table 6.11.6: Weak correlation between communications early with stakeholders and construction sustainability

4. Communicating through formal meeting has less impact on the sustainability

Communications with Stakeholders	Construction Sustainability		
	Sustainable buildings minimise energy use	Sustainable construction leads to short/long-term cost reductions	Waste management helps to achieve acceptable environmental quality
I communicate with stakeholders through formal meeting	r = 0.139**	r = 0.128**	r = 0.144**
	p = .035	p = .053	p = .029

Table 6.11.7: Weak correlation between discussing with stakeholders privately and construction sustainability

6.8.2.4 Hypotheses 1.4: There is a Correlation between the Stakeholder Analysis and Construction Sustainability.

		Stakeholder Analyses
Construction Sustainability	Pearson Correlation	.680**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.12: Correlation between Stakeholder Analysis and Construction Sustainability

Stakeholder Analysis is found to be significant at the 1% level with Construction Sustainability, r (233) = 0.680, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the higher the change on the Stakeholder Analysis the higher score on the Construction Sustainability. Therefore the hypothesis 1.4 is

accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.4. Some of the following items have good correlation with each other –

1. All stakeholders are equally analysed and prioritized to evaluate the project sustainability outcome rather than prioritizing the internal stakeholders.

Stakeholder Analyses	Construction Sustainability			
	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Managing construction waste helps to manage project cost	Managing construction waste helps to achieve better resource management	Reducing construction waste helps to lower the carbon emissions during the construction phase
Internal Stakeholders are prioritized above external stakeholders	r = 0.043**	r = 0.079**	r = 0.070**	r = 0.047**
	p = 0.513	p = 0.233	p = 0.294	p = 0.474

Table 6.12.1: Strong correlation between prioritizing stakeholder and construction sustainability

2. Stakeholder identification helps to identify the individual having unique knowledge related to any aspect of the project to improve the cost, manage risk, minimise energy use, bring environmental sustainability and manage the project lead time,

Stakeholder Analysis	Construction Sustainability			
	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Sustainable buildings minimise energy use	Risk management helps to create better value through the management of different threats	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
Stakeholder identification helps to find out who has unique knowledge related to any aspect of the project	r = 0.455**	r = 0.445**	r = 0.521**	r = 0.454**
	p = 0.000	p = 0.000	p = 0.000	p = 0.000

Table 6.12.2: Strong correlation between impact of identifying stakeholders and construction sustainability

3. Stakeholder analysis helps to prioritize the stakeholders needs depending on each stakeholders potential to influence project objectives and it also helps to manage the project cost and risk,

Stakeholder Analysis	Construction Sustainability	
	Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Risk management helps to create better value through the management of different threats
The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	r = 0.530**	r = 0.445**
	p = 0.000	p = 0.000

Table 6.12.3: Strong correlation between prioritizing different stakeholders and construction sustainability

Some of the following facts are identified from the item wise low correlation between the variables Communication with Stakeholders and Construction Sustainability –

1. Identifying all stakeholders at the early stage has less impact on evaluating the sustainability outcome ,

Stakeholder Analysis	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
Project managers should identify the stakeholders as early as possible in the project life cycle	r = 0.035**
	p = 0.603

Table 6.12.4: Weak correlation identify the stakeholders early and construction sustainability

2. Prioritizing stakeholders (e.g. clients, end users) demand creates less impact on sustainable related development like protecting ecosystem, managing project cost, improving productivity and achieving social sustainability

Stakeholder Analysis	Construction Sustainability			
	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Managing construction waste helps to manage project cost	Managing waste helps to improve productivity	It is important to provide local employment as an aspect of our construction activity
I prioritize stakeholders demand for the project	r = 0.135**	r = 0.166**	r = 0.152**	r = 0.159**
	p = 0.041	p = 0.012	p = 0.022	p = 0.016

Table 6.12.5: Weak correlation identify the stakeholders early and construction sustainability

3. Analysing Stakeholder according to power and urgency has less impact on evaluating the sustainable outcome.

Stakeholder Analysis	Construction Sustainability		
	My company have the approach to evaluate the outcomes of sustainable development	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product
I prioritize stakeholders according to their power to influence the project outcome	r = 0.073**	r = 0.156**	r = 0.077**
	p = 0.271	p = 0.018	p = 0.244

Table 6.12.6: Weak correlation identifying the stakeholders early and construction sustainability

6.8.2.5 Hypotheses 1.5: There is Correlation between the Stakeholder Mapping and Construction Sustainability

		Stakeholders Mapping
Construction Sustainability	Pearson Correlation	.531**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.13: Correlation between Stakeholders Mapping and Construction Sustainability

Stakeholder Mapping is found to be significant at the 1% level with Construction Sustainability, r (233) = 0.531, p<0.001. This result reflects a positively medium and significant correlation, therefore it could be concluded that the higher the change on the Stakeholder Mapping the higher change on the Construction Sustainability. Therefore the hypothesis 1.5 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.5. Some of the items between Stakeholder Mapping and Construction Sustainability have good correlation between them (Appendix 1, Table A_1.5) –

1. Stakeholder mapping assist to work together with other stakeholders by identifying and visualizing their relationship,

Construction Sustainability	Stakeholder Mapping			
	Stakeholder mapping helps to find out the relationship between the stakeholders	Stakeholder mapping helps to find out the stakeholders relationship with the project activities	Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project
Working together with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	r = 0.412**	r = 0.423**	r = 0.492**	r = 0.443**
	p = 0.00	p = 0.000	p = 0.000	p = 0.000

Table 6.8.1: Strong correlation between impact of mapping the stakeholder and construction sustainability

2. Stakeholder mapping helps to visualise the stakeholder's relationship with the project activities and prioritizing tasks into crucial areas. It could improve the project effectiveness through managing time, managing cost, and managing risk, improve environmental sustainability.

Stakeholder Mapping	Construction Sustainability			
	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Risk management helps to create better value through the management of different threats	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
Stakeholder mapping helps to find out the stakeholders relationship with the project activities	r = 0.484**	r = 0.432**	r = 0.427**	r = 0.485**
	p = 0.000	p = 0.000	p = 0.000	p = 0.000

Table 6.13.2: Strong correlation between mapping the stakeholder relationship and construction sustainability

Some of the following items are identified which have low correlation ship -

1. Stakeholders mapping has less impact on evaluating the sustainability outcome. It is also difficult to map the entire stakeholder during the project planning, designing and implementation stage as they might get change at the middle of the project.

Stakeholder Mapping	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
Stakeholder mapping is a simple technique to make sure anyone important in the planning the project is not missed out	r = 0.181**
	p = 0.006
Stakeholder mapping helps to find out the relationship between the stakeholders	r = 0.160**
	p = 0.016
Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	r = 0.149**
	p = 0.026
Stakeholder mapping is a simple technique to make sure anyone important in the project implementing process is not missed out	r = 0.177**
	p = 0.007

Table 6.13.3: Weak correlation between evaluating the outcomes of sustainable development and stakeholder mapping

2. Stakeholders mapping visualizes the key stakeholder's demand that creates less impact on the sustainability outcome.

Stakeholder Mapping	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project	r = 0.048**
	p = 0.476

Table 6.13.4: Weak correlation between impact of mapping the stakeholder demand and construction sustainability

6.8.2.5 Hypotheses 1.6: There is a correlation between the Stakeholder Management and Construction Sustainability

		Stakeholder Management
Construction Sustainability	Pearson Correlation	.735**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.14: Correlation between Stakeholder Management and Construction Sustainability

Stakeholder Management is found to be significant at the 1% level with the variable Construction Sustainability, r (233) = 0.735, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the higher the change on the Stakeholder Management the higher change on the Construction Sustainability. Therefore the hypothesis is 1.6 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.6. Therefore, some of the following items have good correlation between Stakeholder Management and Construction Sustainability.

1. When stakeholders are managed properly they are more motivated that could manage project cost, project time, risk and also manage waste,

Stakeholder Management	Construction Sustainability			
	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/ strategic issues	Waste management helps to achieve acceptable environmental quality
When stakeholders are managed properly they will be more motivated to the project	r = 0.521**	r = 0.454**	r = 0.480**	r = 0.480**
	p = 0.000	p = 0.000	p = 0.000	p = 0.000

Table 6.14.1: Strong correlation between stakeholder's motivation to the project and construction sustainability

2. Stakeholder management manages the project risk to increase the project value through managing cost, highlighting the opportunities to improve. Stakeholder management is important to achieve sustainability as it involves external/internal stakeholders in creating positive relationships among them,

Stakeholder Management	Construction Sustainability		
	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/strategic issues	Measuring sustainability performance helps to highlight opportunities to improve
Stakeholder management can assist in reducing the risk	r = 0.539**	r = 0.534**	r = 0.563**
	p = 0.000	p = 0.000	p = 0.000
Stakeholder management is important for project success as it involves external	r = 0.512**	r = 0.422**	r = 0.490**
	p = 0.000	p = 0.000	p = 0.000

Table 6.14.2: Strong correlation between impact of managing stakeholder and construction sustainability

3. Managing Stakeholder relationship improve the project effectiveness and manage cost, quality and risk

Stakeholder Management	Construction Sustainability	
	Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
Developing good relationship with stakeholders makes it easier to manage them	r = 0.535**	r = 0.570**
	p = 0.000	p = 0.000

Table 6.14.3: Strong correlation between managing relationship with stakeholder and construction sustainability

Some of the following items are identified from the low correlation between the Stakeholder Management and Construction Sustainability –

1. Importance of stakeholders academic training has less impact on construction sustainability

Stakeholder Management	Construction Sustainability			
	My company have the approach to evaluate the outcomes of sustainable development	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
Stakeholders need academic training to improve their sustainability	r = 0.194**	r = 0.159**	r = 0.207**	r = 0.201**
	p = 0.003	p = 0.016	p = 0.002	p = 0.002

Table 6.14.4: Weak correlation between providing training to the stakeholder and construction sustainability

2. Stakeholder Management has less impact on evaluating the project outcome,

Construction Sustainability	Stakeholder Management		
	Stakeholder management helps to deal with conflicting among stakeholders views	On the job training in key areas is important for all contractors	When stakeholders are managed properly they will be more motivated to the project
My company have the approach to evaluate the outcomes of sustainable development	r = 0.192**	r = 0.159**	r = 0.154**
	p = 0.004	p = 0.017	p = 0.021

Table 6.14.5: Weak correlation between evaluate the outcomes of sustainable development and stakeholder management

6.8.2.7 Hypotheses 1.7: There is a Correlation between the Stakeholder Performance Measurements and Construction Sustainability

		Stakeholder Performance Measurements
Construction Sustainability	Pearson Correlation	.643**
	Sig. (1-tailed)	.000
	N	231

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.15: Correlation between impact of Stakeholder Performance Measurements and Construction Sustainability

Stakeholder Performance Measurements is found to be significant at 1% level with Construction Sustainability, r (231) = 0.643, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the higher the change on the Stakeholder Performance Measurements the higher change on the Construction Sustainability. Therefore the hypothesis is 1.7 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.7. Some of the following items are identified from the strong correlation between Stakeholder Performance Measurement and Construction Sustainability.

1. Project manager, employees and other stakeholders are very concerned to measure the stakeholder's performance to improve the cost and manage the project opportunities,

Stakeholder Performance Management	Construction Sustainability	
	Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve
It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	r = 0.542**	r = 0569**
	p = 0.000	p = 0.000

Table 6.15.1: Strong correlation between awareness of the specific KPIs and construction sustainability

2. A Key Performance Indicator (KPI) reflects how well a stakeholder is performing against the stated responsibilities helps to improve the opportunities.

Stakeholder Performance Measurement	Construction Sustainability
	Measuring sustainability performance helps to highlight opportunities to improve
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	r = 0537**
	p = 0.000

Table 6.15.2: Strong correlation between impact of KPIs to measure stakeholder performance and construction sustainability

3. Evaluating the individual performance has less impact to manage risk that could create better value through the management of different threats,

Stakeholder Performance Measurement	Construction Sustainability
	Risk management helps to create better value through the management of different threats
Evaluating individual performance assists in finding out the individuals qualities which is important	r = 0.550**
	p = 0.000

Table 6.15.3: Strong correlation between evaluating individual stakeholders performance and construction sustainability

4. Measuring stakeholder performance helps to improve the project performance that creates good impact on achieving construction sustainability.

Stakeholder Performance Measurement	Construction Sustainability			
	Measuring sustainability performance helps to highlight opportunities to improve	Sustainable buildings maximize re-use of materials	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Managing construction waste helps to achieve better resource management
Measuring stakeholder performance helps to improve project performance	r = 0.469**	r = 0.511**	r = 0.438**	r = 0.439**
	p = 0.000	p = 0.000	p = 0.000	p = 0.000

Table 6.15.4: Strong correlation between awareness of the specific KPIs and construction sustainability

Some of the following items are identified from the low correlation between Stakeholder Performance Management and Construction Sustainability –

1. Choosing the correct KPI's to measure stakeholders performance has less impact to manage, cost, quality, economic and environmental sustainability performance,

Stakeholder Performance Measurement	Construction Sustainability		
	Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Sustainable construction results short/long-term cost reductions	Managing construction waste helps to manage project cost
It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	r = 0.179**	r = 0.136**	r = 0.130**
	p = 0.007	p = 0.041	p = 0.050

Table 6.15.5: Weak correlation between choosing the correct KPIs and construction sustainability

2. Stakeholder's capabilities to quantify the sustainability performance have less impact on evaluating the outcomes of sustainable development.

Stakeholder Performance Measurement	Construction Sustainability
	My company have the approach to evaluate the outcomes of sustainable development
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	r = 0.150**
	p = 0.024

Table 6.15.6: Weak correlation between impact of KPIs to measure stakeholder performance and construction sustainability

As all of the processes of Stakeholder Engagement is positively correlated with Construction Sustainability, therefore hypothesis one is accepted.

6.8.2.8 Descriptive analysis of "Stakeholder's Impact on Sustainability"

Participants were asked to respond to the stakeholder's impact on sustainability listed in section C of the questionnaire, based on the five point Likert scale of relative importance (1-strongly agree, 5 – strongly disagree). This instrument is designed to rank the Stakeholder's Impact on Sustainability Target based on construction sustainability perception. Table 6.16 shows the output from the analysis outlining three key descriptive statistical parameters: number of responses, mean and standard deviation.

	N	Mean	Std. Deviation
1. We increase sustainability knowledge amongst all stakeholders to encourage and support the sustainability capacity,	233	1.55	.700
2. The External Stakeholders (i.e. customers, contractors, sub-contractors and suppliers) are more motivated to achieve the sustainability target than the internal stakeholders,	233	1.99	.917
3. All of my project stakeholders work together so that it motivates them to deliver sustainable buildings at an affordable price,	233	1.91	.826
4. External Stakeholders (i.e. customers, contractors, sub-contractors and suppliers) come up with more innovative, creative ideas than the Internal Stakeholder,	233	2.06	.862
5. Internal Stakeholders (i.e. employees, managers) are more motivated to achieving sustainability related target than external stakeholders (i.e. shareholders, community members, government agencies, and media),	233	2.17	1.040
6. On my projects all stakeholders collaborate to generate ideas in order to reduce the project risk,	233	2.18	.849
7. In our organisation stakeholders like Government, Regulatory Bodies, Local Community and Media are more supportive to our sustainability target,	233	2.75	1.345
8. Most of the innovative ideas on sustainability are generated from the internal stakeholders within the organisation,	233	3.21	1.468
9. Valid N (list wise)	233		

Table 6.16: Stakeholder's Impact on Sustainability Rank Analysis, Ordered by Ascending Mean Value

Descriptive statistics from the table 6.11 noted some of the factors to have a mean value of 2 and above which were ranked according to their means. Primarily, having stakeholder knowledge, external stakeholder's motivation, working together to improve the motivation, External Stakeholder comes up with more innovative, creative ideas, Internal Stakeholders are more motivated to achieving sustainability, stakeholders collaborate to generate ideas are found to be critical in relation to stakeholder's relationship with sustainability.

Summary

Based on the correlation results it is apparent that there is a positive correlation between Stakeholder Engagement and Construction Sustainability. A descriptive analysis of Stakeholder's Impact on Construction Sustainability is also shown in table 6.16 which considers that stakeholders mostly agreed with the fact that stakeholders can create a good impact on the sustainability outcome. As all the correlations show the positive relationship and the descriptive statistics data lies in the agreed limit, therefore it can be assumed that these respondents assign a relatively high importance to deal with the stakeholder engagement to accelerate the Stakeholder's relationship with the sustainability target and their impact on Sustainability. From the relationship it is also apparent that there is no negative hypothesis for the whole stakeholder engagement process. From the item wise relationship between the variables it is identified that few of the items of stakeholder engagement processes have low impact to evaluate the project sustainability outcome.

6.9 Correlation between Construction Sustainability and Construction Project Performance

This hypothesis intends to establish if there is any significant correlation between the achievements of construction sustainability related target with the improvement of construction project performance. The data was obtained from the composite score of the two variables. This relationship employed implementation effectiveness of sustainability action with compared to expected achievement of Construction Project Performance and has led to the following hypothesis testing.

6.9.1 Hypothesis 2 - There is Correlation between Construction Sustainability Related Targets with the Construction Project Performance

Alternative Hypothesis (H_1)

There is a correlation between Construction Sustainability related targets and the Construction Project Performance.

		Construction Project Performance
Construction Sustainability	Pearson Correlation	.608**
	Sig. (1-tailed)	.000
	N	232

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.17: Correlation between Construction Sustainability and Construction Project Performance

Construction Sustainability is found to be significant at the 1% level with Project Performance, r (232) = 0.608, p<0.001. This result reflects a positively medium and significant correlation, hence it could be concluded that the higher the score on the "Construction Sustainability" the higher score on the "Construction Project Performance". Though both of the variables are positively correlated, their medium correlation shows that the change of one variable has medium impact to change the other variable. It determines that to improve the construction project performance the sustainability related target needs to be modified. The alternative hypothesis is retained. Therefore the hypothesis 2 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.8. From the item wise correlation between construction sustainability and construction project performance some of the following facts are identified rom the strong correlation –

1. Project sustainability target has good impact to improve the project performance.

Construction Sustainability	Construction Project Performance		
	We usually meet our environmental sustainability goals on project	Our Project specifications are usually met by the time of handover	End users are usually happy with the results from our projects
Sustainable construction manage cost/quality/risk/procurement together to improve project performance	r = 0. 546**	r = 0. 576**	r = 0. 554**
	p = 0.000	p = 0.000	p = 0.000

Table 6.17.1: Strong correlation between sustainable construction's impact and construction project performance

2. Environmental sustainability target protect the ecosystem to improve the project outcome,

Construction Sustainability	Construction Project Performance	
	We usually meet our environmental sustainability goals on project	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects
Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	r = 0. 531**	r = 0. 531**
	p = 0.000	p = 0.000

Table 6.17.2: Strong correlation between environmental sustainability to protect the ecosystem and construction project performance

3. Project time management improves the work effectiveness through prioritizing tasks into crucial areas to improve the project outcome

Construction Sustainability	Construction Project Performance		
	We usually meet our environmental sustainability goals on project	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects
Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	r = 0. 518**	r = 0. 490**	r = 0. 481**
	p = 0.000	p = 0.000	p = 0.000

Table 6.17.3: Strong correlation between sustainability target and construction project performance

4. Improving safety issues to achieve social sustainability which could bring tangible benefits and improve the customer satisfaction

Construction Sustainability	Construction Project Performance		
	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects
We focus on safety as an aspect of achieving social sustainability in construction	r = 0. 495**	r = 0. 463**	r = 0. 462**
	p = 0.000	p = 0.000	p = 0.000

Table 6.17.4: Strong correlation between achieving social sustainability and construction project performance

5. Performance measurement helps to highlight opportunities to improve the sustainability target

Construction Sustainability	Construction Project Performance		
	We usually meet our environmental sustainability goals on project	Project specifications are usually met by the time of handover	End users are usually happy with the results from our projects
Measuring sustainability performance helps to highlight opportunities to improve	r = 0. 479**	r = 0. 485**	r = 0. 499**
	p = 0.000	p = 0.000	p = 0.000

Table 6.17.5: Strong correlation between measuring sustainability performance and construction project performance

Some of the following items having low correlation are identified –

1. Some of the sustainability targets like improving quality, minimising energy use and minimising waste has less impact to meet the project time objectives

Construction Project Performance	Construction Sustainability		
	Application of a Lean technique in construction improves project quality	Sustainable buildings minimise energy use	Sustainable buildings minimise construction waste/pollution
Generally our projects are successful to meet the time objectives	r = 0. 068**	r = 0. 139**	r = 0. 103**
	p = 0.308	p = 0.035	p = 0.119

Table 6.17.6: Weak correlation between meet the project time objectives and construction sustainability

2. Application of lean techniques has less impact on meeting the project time objectives

Construction Project Performance	Construction Sustainability	
	Application of a Lean technique in construction delivers projects on time	Application of a Lean technique in construction delivers projects to budget
Generally our projects are successful to meet the time objectives	r = 0. 013**	r = 0. 079**
	p = 0.850	p = 0.234

Table 6.17.7: Weak correlation between meet the project time objectives and construction sustainability

3. Project sustainability outcome has less impact meeting the project specification,

Construction Sustainability	Construction Project Performance
	Project specifications are usually met by the time of handover
My company have the approach to evaluate the outcomes of sustainable development	r = 0. 065**
	p = 0.327

Table 6.17.8: Weak correlation between evaluate the sustainability outcomes and construction project performance

6.10 Hypothesis 3: There is a Correlation between the Stakeholder Engagement and Construction Project Performance

Reliability for the Construction Project Performance is 0.951 indicating that the five point scale has acceptably reliable consistency. The mean score for the Construction Project Performance 22.88 and the standard deviation is 9.280 indicting a good variance across responses. The subscales have a good relationship with each other, so there is no need to delete any item.

Alternative Hypothesis (H_1)

There is a correlation between the Stakeholder Engagement and Construction Project Performance.

As the Stakeholder Engagement is classified into seven different stages, each of the step's correlation with Construction Project Performance is presented in the following section.

6.10.1 Hypothesis 3.1: There is a Correlation between the Purpose of Stakeholder Engagement and Construction Project Performance

a) Correlation between Purpose of Stakeholder Engagement with Project Performance

		Purpose of Stakeholder Engagement
Construction Project Performance	Pearson Correlation	.600**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.18: Correlation between Purposes of Stakeholder Engagement and Construction Project Performance

Purpose of Stakeholder Engagement is found to be significant at the 1% level with Project Performance, r (233) = 0.600, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the change on the "Purpose of Stakeholder Engagement" could change the "Construction Project Performance". Therefore the hypothesis 3.1 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.9. Some of the following items have low correlations between Purposes of Stakeholder Engagement and Construction Project Performance (Appendix 1, Table A_1.9) –

1. Reducing the project risk and uncertainty keeps the end users happy and achieves the sustainability goal,

Purposes of Stakeholder Engagement	Construction Project Performance			
	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	End users are usually happy with the results from our projects
to reduce risk and uncertainty	r = 0.492**	r = 0.546**	r = 0.510**	r = 0.524**
	p = 0.000	p = 0.000	p = 0.000	p = 0.000

Table 6.18.1: Strong correlation between stakeholder engagement's impact on reducing risk and uncertainty and construction project performance

2. Project specification are met through discussing the current project issues,

Purposes of Stakeholder Engagement	Construction Project Performance
	Project specifications are usually met by the time of handover
to discuss current issues	r = 0. 437**
	p = 0.000

Table 6.18.2: Strong correlation between stakeholder engagement's impact on discussing current issues and construction project performance

Some of the following items have weak correlation between Purposes of Stakeholder Engagement and Construction Project Performance-

1. Lack of sharing knowledge has less impact to meet the project economic sustainability to deliver the project on estimated budget,

Purposes of Stakeholder Engagement	Construction Project Performance
	We usually meet our economic sustainability goals on project
to share individual knowledge	r = 0. 437**
	p = 0.003

Table 6.18.3: Weak correlation between stakeholder engagement's impact on share individual knowledge and construction project performance

2. Constant communication and discussion among the internal and external stakeholders has less impact to meet the project time objectives,

Construction Project Performance	Purposes of Stakeholder Engagement	
	To enhance communication	To discuss current issues
Generally our projects are successful to meet the time objectives	r = 0. 159**	r = 0. 120**
	p = 0.016	p = 0.073

Table 6.18.4: Weak correlation between meeting the project time objectives and purposes of stakeholder engagement

3. Continuous Improvement has less impact to meet the project time objectives,

Purposes of Stakeholder Engagement	Construction Project Performance
	Generally our projects are successful to meet the time objectives
for continuous improvement	r = 0. 152**
	p = 0.023

Table 6.18.5: Weak correlation engaging stakeholders for continuous improvement and purposes of stakeholder engagement

6.10.2 Hypothesis 3.2: There is a Correlation between Impacts of Stakeholder Engagement with Construction Project Performance

		Impacts of Stakeholder Engagement
Construction Project Performance	Pearson Correlation	.619**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.19: Correlation between Impact of Stakeholder Engagement and Construction Project Performance

Impact of Stakeholder Engagement is found to be significant at the 1% level with Project Performance, r (233) = 0.619, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the change on the "Impact of Stakeholder Engagement" could change the "Construction Project Performance". Therefore the hypothesis 3.2 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.10. Some of the following items have low correlations between Impact of Stakeholder Engagement and Construction Project Performance.

1. Meeting the diverse need of the different stakeholders helps to create a broader scope to fulfil the project objectives which as a whole meet the need of the end users. Stakeholder Engagement is also a powerful mechanism to facilitate collaborative working that would generate solution to improve the project performance,

Construction Project Performance	Impact of Stakeholder Engagement		
	In construction there are different stakeholders with different needs	Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Stakeholder engagement is a powerful mechanism to facilitate collaborative working
There are clearly identified in tangible benefits from the projects we carry out	r = 0. 605**	r = 0. 517**	r = 0. 461**
	p = 0.000	p = 0.000	p = 0.000

Table 6.19.1: Strong correlation between engaging different stakeholders with different needs/issues and construction project performance

2. Stakeholder Engagement is the process of exchanging information that could generate solution to keep the customers happy,

Impact of Stakeholder Engagement	Construction Project Performance
	Our Project specifications are usually met by the time of handover
Stakeholder engagement is the process of exchanging information	r = 0. 447**
	p = 0.000

Table 6.19.2: Strong correlation between exchanging information with stakeholders and construction project performance

Some of the following items have low correlation between the variables Impacts of Stakeholder Engagement and construction project performance are –

1. Using the Stakeholder Register, reducing the energy emission, reducing risk and uncertainty, improving the productivity, improving business opportunities has less impact on managing the project time,

Construction Project Performance	Impact of Stakeholder Engagement				
	Stakeholder engagement is a powerful mechanism to identify new business opportunities	Stakeholders are generally very supportive of the need to reduce energy emissions	Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Engaging stakeholders helps to improve the productivity	A "Stakeholder Register" is a useful tool to analyse the key project stakeholders
Generally our projects are successful to meet the time objectives	r = 0. 156**	r = 0. 108**	r = 0. 127**	r = 0. 115**	r = 0. 048**
	p = 0.018	p = 0.106	p = 0.056	p = 0.085	p = 0.472

Table 6.19.3: Weak correlation between impact of stakeholder engagement and successfully meeting the project time objectives

2. Sharing pain from the project outcome has less impact on project performance,

Impact of Stakeholder Engagement	Construction Project Performance			
	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Project specifications are usually met by the time of handover	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects
Stakeholder engagement is the process of sharing pain from the project outcome	r = 0. 136**	r = 0. 163**	r = 0. 112**	r = 0. 133**
	p = 0.040	p = 0.013	p = 0.090	p = 0.045

Table 6.19.4: Weak correlation between sharing pain among stakeholders and construction project performance

6.10.3 Hypothesis 3.3: There is a Correlation between Communications with Stakeholders and Construction Project Performance

		Communications with Stakeholders
Construction Project Performance	Pearson Correlation	.601**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.20: Correlation between Communications with Stakeholders and Construction Project Performance

Communication with Stakeholders is found to be significant at the 1% level with Project Performance, r (233) = 0.601, p<0.001. This result reflects a positively medium but significant correlation. Therefore it could be concluded that any change of the score on the "Communication with Stakeholders" make the change on "Construction Project Performance". Therefore the hypothesis 3.3 is accepted. The item wise correlation of the

variables is shown in Appendix 1, Table A_1.11. Some of the correlation is identified from the item wise relationships (Appendix 1, Table A_1.11) –

1. Project Whole Customers/clients are more satisfied when they are regularly updated. Regular communication with stakeholder supports to prioritize the their demand,

Communication with Stakeholders	Construction Project Performance	
	End users are usually happy with the results from our projects	Our Project specifications are usually met by the time of handover
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	r = 0. 536**	r = 0. 491**
	p = 0.000	p = 0.000

Table 6.20.1: Strong correlation between keeping stakeholders informed and construction project performance

Some of the following items have low correlation between Communications with Stakeholders and Construction Project Performance –

1. Communicating with the stakeholders creates low impact on meeting the project time objectives,

Construction Project Performance	Communication with Stakeholders		
	I like to have face-to-face meetings with the particular stakeholders	I like to communicate with stakeholders privately to discuss issues	I communicate with stakeholders through formal meeting
Generally our projects are successful to meet the time objectives	r = 0. 158**	r = 0. 177**	r = 0. 121**
	p = 0.017	p = 0.008	p = 0.069

Table 6.20.2: Weak correlation between communication medium between stakeholders and construction project performance

2. Providing feedback has less impact on meeting project time objective.

Construction Project Performance	Communication with Stakeholders
	Our all Stakeholders have a medium to provide feedback to the project
Generally our projects are successful to meet the time objectives	r = 0. 180**
	p = 0.007

Table 6.20.3: Weak correlation between stakeholder feedback to the project and construction project performance

6.10.4 Hypothesis 3.4: There is a Correlation between Stakeholder Analysis and Construction Project Performance

		Stakeholder Analysis
Construction Project Performance	Pearson Correlation	.505**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.21: Correlation between Stakeholder Analysis and Construction Project Performance

Stakeholder Analysis is found to be significant at the 1% level with Project Performance, r (233) = 0.505, p<0.001. This result reflects a positively small and significant correlation, hence it could be concluded that the higher the change on the Stakeholder Analysis the higher score on the Construction Project Performance. Therefore the hypothesis 3.4 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.12. Some of the following items have strong correlation between them (Appendix 1, Table A_1.12) –

1. Stakeholder Analysis ensures the quality of decision making by diverse range of project stakeholders that will bring the tangible benefit and meet the sustainability goals.

Stakeholder Analysis	Construction Project Performance		
	We usually meet our economic sustainability goals on project	There are clearly identified in tangible benefits from the projects we carry out	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects
In order to ensure the quality of the decision-making processes, stakeholder analysis is useful	r = 0. 335**	r = 0. 416**	r = 0. 414**
	p = 0.000	p = 0.000	p = 0.000

Table 6.21.1: Strong correlation between stakeholder analysis's impact on decision-making and construction project performance

2. Stakeholder Analysis helps to identify all stakeholders as early as possible that could improve the project performance,

Stakeholder Analysis	Construction Project Performance			
	Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	Our Project specifications are usually met by the time of handover	End users are usually happy with the results from our projects
Project managers should identify the stakeholders as early as possible in the project life cycle	r = 0. 439**	r = 0. 400**	r = 0. 455**	r = 0. 467**
	p = 0.000	p = 0.000	p = 0.000	p = 0.000

Table 6.21.2: Strong correlation between stakeholder analysis's impact on decision-making and construction project performance

Some of the following items have low correlation between Stakeholder Analysis and Construction Project Performance –

1. Prioritizing stakeholders by their demand and influence has less impact on project performance. Prioritizing stakeholders according to their power, impact and urgency has less impact to meet the project time objective,

Construction Project Performance	Stakeholder Analyses				
	The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	I prioritize stakeholders demand for the project	I prioritize stakeholders according to their power to influence the project outcome	I prioritize stakeholders according to their impact to the project	I prioritize stakeholders according to how urgent they see the project interest in
Generally our projects are successful to meet the time objectives	r = 0. 146**	r = 0. 064**	r = 0. 052**	r = 0. 128**	r = 0. 108**
	p = 0.027	p = 0.336	p = 0.431	p = 0.052	p = 0.106

Table 6.21.3: Weak correlation between stakeholder analysis's impact on project and construction project performance

2. Analysing the stakeholder's according to their power creates does not meet the economic and social sustainability goal,

Stakeholder Analyses	Construction Project Performance	
	We usually meet our economic sustainability goals on project	We usually meet our social sustainability goals on projects
I prioritize stakeholders according to their power to influence the project outcome	r = 0. 158**	r = 0. 172**
	p = 0.017	p = 0.009

Table 6.21.4: Weak correlation between stakeholder analysis's impact on project and construction project performance

3. Prioritizing the internal stakeholder has less impact on project performance,

Stakeholder Analyses	Construction Project Performance		
	Generally our projects are successful to meet the time objectives	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	We usually meet our social sustainability goals on projects
Internal Stakeholders are prioritized above external stakeholders	r = 0. 092**	r = 0. 060**	r = 0. 057**
	p = 0.167	p = 0.367	p = 0.392

Table 6.21.5: Weak correlation between prioritizing the stakeholders and construction project performance

6.10.5 Hypothesis 3.5: There is a correlation between Stakeholder Mapping and Construction Project Performance

		Stakeholder Mapping
Construction Project Performance	Pearson Correlation	.446**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.22: Correlation between Stakeholder Mapping and Construction Project Performance

Stakeholder Mapping is found to be significant at the 1% level with Construction Project Performance, r (233) = 0.446, p<0.001. This result reflects a positively small and significant correlation. Though it could be decided from the relationship that the higher the change on the Stakeholder Mapping the higher variation on the Construction Project Performance. Therefore the hypothesis 3.5 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.13. Some of the following items have strong correlation between Stakeholder Mapping and Construction Project Performance (Appendix 1, Table A_1.13).

1. Stakeholder Mapping helps to find out the relationship between the stakeholders with the project performance activities,

Stakeholder Mapping	Construction Project Performance	
	We usually meet our environmental sustainability goals on project	We usually meet our economic sustainability goals on project
Stakeholder mapping helps to find out the relationship between the stakeholders	r = 0. 353**	r = 0. 346**
	p = 0.000	p = 0.000

Table 6.22.1: Strong correlation between mapping the stakeholders relationship and construction project performance

2. It makes sure that no one is missed out during the project design and implementation stage which is supportive to increases the project performance,

Stakeholder Mapping	Construction Project Performance		
	We usually meet our environmental sustainability goals on project	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects
Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	r = 0. 396**	r = 0. 451**	r = 0. 416**
	p = 0.000	p = 0.000	p = 0.000
Stakeholder mapping is a simple technique to make sure anyone important in the project implementing processes not missed out	r = 0. 383**	r = 0. 400**	r = 0. 393**
	p = 0.000	p = 0.000	p = 0.000

Table 6.22.2: Strong correlation between outcome of stakeholder mapping and construction project performance

Some of the following items have low relationship between Stakeholder Mapping and Construction Project Performance –

1. Mapping the stakeholders make sure no-one is missed out during project process has less impact to meet the project time objectives. And Stakeholders Mapping only visualize the relationship between them and with the project activities but it has less impact to evaluate the project performance specially to meet the project time,

Construction Project Performance	Stakeholder Mapping			
	Stakeholder mapping helps to find out the relationship between the stakeholders	Stakeholder mapping helps to find out the stakeholders relationship with the project activities	Stakeholder mapping is a simple technique to make sure anyone important in the project implementing processes not missed out	Stakeholder mapping is a simple technique to make sure anyone important in the project planning process is not missed out
Generally our projects are successful to meet the time objectives	r = 0. 138**	r = 0. 173**	r = 0. 169**	r = 0. 036**
	p = 0.040	p = 0.010	p = 0.587	p = 0.011

Table 6.22.3: Weak correlation between outcome of mapping stakeholders and construction project performance

2. Stakeholder mapping helps to identify the stakeholders demand which has less impact to fulfil the project time objectives,

Stakeholder Mapping	Construction Project Performance
	Generally our projects are successful to meet the time objectives
Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project	r = 0. 106**
	p = 0.114

Table 6.22.4: Weak correlation between mapping stakeholders demand and construction project performance

6.10.6 Hypothesis 3.6: There is a Correlation between Stakeholder Management and Construction Project Performance

		Stakeholder Management
Construction Project Performance	Pearson Correlation	.600**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.23: Correlation between Stakeholder Management and Construction Project Performance

Stakeholder Management is found to be significant at the 1% level with Construction Project Performance, r (233) = 0.600, p<0.001. This result reflects a positively strong and significant correlation, hence it could be concluded that the higher the score on the Stakeholder Management the higher score on the Construction Project Performance. Therefore the hypothesis is 3.6 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.14.

Some of the following items have good correlation between Stakeholder Management and Construction Project Performance –

1. Developing good relationship with stakeholders makes easier to manage them which will improve the project performance,

Stakeholder Management	Construction Project Performance		
	Our Project specifications are usually met by the time of handover	End users are usually happy with the results from our projects	We usually employ an effective project management process
Developing good relationship with stakeholders makes it easier to manage them	r = 0. 488**	r = 0. 537**	r = 0. 499**
	p = 0.000	p = 0.000	p = 0.000

Table 6.23.1: Strong correlation between developing relationship with stakeholders and construction project performance

2. Stakeholder Management assists to reduce the project risk which improves the project performance,

Stakeholder Management	Construction Project Performance		
	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover
Stakeholder management can assist in reducing the risk	r = 0. 359**	r = 0. 348**	r = 0. 355**
	p = 0.000	p = 0.000	p = 0.000

Table 6.23.2: Strong correlation between stakeholder management's benefit to reduce the risk and construction project performance

3. Stakeholder Management system promotes learning from past experiences which improves the project performance,

Stakeholder Management	Construction Project Performance		
	We usually meet our environmental sustainability goals on project	Our Project specifications are usually met by the time of handover	We usually meet our social sustainability goals on projects
Stakeholder management system promotes learning from past experiences	r = 0. 497**	r = 0. 480**	r = 0. 514**
	p = 0.000	p = 0.000	p = 0.000

Table 6.23.3: Strong correlation between stakeholder management's benefit to promote learning from past experiences and construction project performance

Some of the following items are identified having low relationship between Stakeholder Mapping and Construction Project Performance –

1. Effect of Stakeholder Management like managing conflicting and reducing risk, developing relationship, increasing the sustainability knowledge has less impact to manage the project time.

Construction Project Performance	Stakeholder Management			
	Stakeholder management helps to deal with conflicting among stakeholders views	Stakeholder management can assist in reducing the risk	Developing good relationship with stakeholders makes it easier to manage them	Stakeholders need academic training to improve their sustainability knowledge
Generally our projects are successful to meet the time objectives	r = 0. 110**	r = 0. 129**	r = 0. 181**	r = 0. 060**
	p = 0.098	p = 0.054	p = 0.006	p = 0.366

Table 6.23.4: Strong correlation between outcome of stakeholder management's and construction project performance

6.10.7 Hypothesis 3.7: There is a correlation between Stakeholder Performance Measurement and Construction Project Performance

		Stakeholder Performance Measurement
Construction Project Performance	Pearson Correlation	.563**
	Sig. (1-tailed)	.000
	N	233

**. Correlation is significant at the 0.01 level (1-tailed)

Table 6.24: Correlation between Impact of Stakeholder Performance Measurement and Construction Project Performance

Stakeholder Performance Measurement is found to be significant at the 1% level with Construction Project Performance, r (233) = 0.563, p<0.001. This result reflects a positively small and significant correlation, hence it could be concluded that the positive change on the Stakeholder Performance Measurement brings positive change on the Project Performance. Therefore the hypothesis 3.7 is accepted. The item wise correlation of the variables is shown in Appendix 1, Table A_1.15. Some of the following items are identified from having strong item wise relationship (Appendix 1, Table A_1.15).

1. Evaluating individual performance assists in finding out the individuals qualities which improve the project performance.

Stakeholder Performance Measurement	Construction Project Performance		
	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	End users are usually happy with the results from our projects
Evaluating individual performance assists in finding out the individuals qualities which is important	r = 0. 446**	r = 0. 448**	r = 0. 474**
	p = 0.000	p = 0.000	p = 0.000

Table 6.24.1: Strong correlation between evaluating individual stakeholder's performance and construction project performance

2. If the project managers, employees and other members of the teams are aware of the specific KPIs to measure it will improve the project performance

Stakeholder Performance Measurement	Construction Project Performance		
	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	End users are usually happy with the results from our projects
It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	r = 0. 438**	r = 0. 429**	r = 0. 405**
	p = 0.000	p = 0.000	p = 0.000

Table 6.24.2: Strong correlation between awareness of specific KPI's and construction project performance

Some of the following items are identified from having weak item wise relationship -

1. Measuring stakeholder performance against the stated responsibilities increases the project time,

Stakeholder Performance Measurement	Construction Project Performance
	Generally our projects are successful to meet the time objectives
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	r = 0. 163**
	p = 0.014

Table 6.24.3: Weak correlation between KPI's measuring stakeholder performance and construction project performance

2. Choosing right KPI's has less impact on measuring the economic and environmental sustainability performance.

Stakeholder Performance Measurement	Construction Project Performance	
	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	We usually meet our environmental sustainability goals on project
It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	r = 0. 125**	r = 0. 196**
	p = 0.061	p = 0.003

Table 6.24.4: Weak correlation between choosing correct KPI's and construction project performance

Summary

As the correlation of the all processes of Stakeholder Engagement and Construction Project Performance is positive, it can be assumed that respondents considered that engaging stakeholder is highly important to improve the project performance effectively. Therefore Hypotheses 3 is accepted. The item wise relationship between the variables of Stakeholder Engagement and Construction Project Performance is briefly discussed in the next discussion chapter. From the item wise relationship it is identified that some of the items of stakeholder's

engagement has low impact on the project performance which is explained in the next chapter.

6.11 Hypothesis 4: There is a variation between the Role of Interview Participants observations and the Stakeholder Engagement.

6.11.1 Hypotheses 4.1: There is a variation between the Role of Interview Participants observations and the Purpose of Stakeholder Engagement

In this ANOVA test both the HSD and LSD test have shown. The LSD is generally more powerful than the HSD because, for each pairwise comparison. This might be because the LSD uses α (rather than a reduced α used in HSD) which is more powerful than the Tukey HSD method. Thus, the LSD was able to detect the small differences between the groups and means (Weinberg et al., 2008). However the LSD runs a greater risk of committing a Type I error that is, declaring a difference between means where there truly is none.

Test of Homogeneity of Variances

Purpose of Stakeholder Engagement

Levene Statistic	df1	df2	Sig.
1.362	9	221	0.207

Table 6.25: Test of Homogeneity for Purpose of Stakeholder Engagement

The ANOVA output includes a test of the underlying assumption of equal variances in all case, even when the samples are equal in size. The Levene statistic provides a p value to test the assumption that all population have equal variances. Because p = 0.207 (p < .05) in this case, we can conclude that the homogeneity of the variance assumption is met for these data.

Purpose of Stakeholder Engagement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	638.139	9	70.904	2.403	.013
Within Groups	6520.458	221	29.504		
Total	7158.597	230			

Table 6.26: One-way ANOVA in Purpose of Stakeholder Engagement test on the Role of the Participants

The ANOVA test results in table 6.26 indicates that the mean value of Purpose of Stakeholder Engagement varied differed or varied significantly between groups = {F (9,221) = 2.403; P = 0.013}. As a result, the assumption of variation between the variable and group factor is

retained, thus suggesting that the mean value of Participants' Role in the Projects from the samples varied significantly.

According to the ANOVA it may be noted that the obtained F (9, 221) = 2.403 with p < .013, suggests that it is highly unlikely that the hypothesis is true. The ANOVA test tells nothing about which means are different, only that not all of them are equal. To find out where the specific mean is different among the items of the variables, post-hoc test is used. Post-hoc test refers to the fact that the data is used to decide which comparison to make; that not all population means are equal.

The Table A_2.1 (Appendix 2) shows the results from two different post-hoc tests: Tukey Honestly Significance Different (HSD) and Fisher's Least Significance Difference (LSD). Among these two tests only LSD method was able to precisely identify the specific difference between the means. From the table it is evident that different participants have different level of perception for the "Purpose of Stakeholder Engagement". The study tests the hypothesis whether the "Purpose of Stakeholder Engagement" differs significantly among the roles of the participants. From the Table A_2.1 (Appendix 2) Architects' response on the "Purpose of Stakeholder Engagement" differ with five other roles, producing the highest number of differences among the 10 roles. This is then followed by the role of Director whose response differs with four other roles. The engineer and owner responses were also varied with two and one other roles respectively. Therefore the responses from the Designer did not differ with any of other roles.

6.11.2 Hypotheses 4.2: There is a variation between the Role of Interview Participants Observations and the Impacts of Stakeholder Engagement.

Impacts of Stakeholder Engagement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3130.646	9	347.850	2.819	.004
Within Groups	27393.130	222	123.392		
Total	30523.776	231			

Table 6.27: One-way ANOVA in Impacts of Stakeholder Engagement test on Role of the Participants

The ANOVA test results in table 6.27 indicates that the mean value of Impact of Stakeholder Engagement varied, differed or varied significantly between groups = {F (9,222) = 2.819; P =

0.004}. As a result, the assumption of variation between the variable and group factor is retained and thus suggesting that the mean value of Participants Role in the Projects from the samples varied significantly. From the table it is evident that different participants have different level of perception for the impact of stakeholder engagement.

To find out where the specific mean differences exist, post-hoc tests are used. Following Table A_2.2 (Appendix 2) shows the results of Fisher's Least Significance Difference (LSD). The response from the Table A_2.2 (Appendix 2) Architects on the "Impact of Stakeholder Engagement" differs with eight other roles, producing the highest number of differences among the 10 roles. This is then followed by the role of Director whose response differs with three other roles. The subcontractor and builder responses were also different with other professionals.

6.11.3 Hypothesis 4.3: There is a Variation between the Role of Interview Participants Observations and Communication with Stakeholders.

Communication with Stakeholders

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	655.445	9	72.827	2.018	.038
Within Groups	8010.124	222	36.082		
Total	8665.569	231			

Table 6.28: One-way ANOVA in Communication with Stakeholders test by Role of Participants

ANOVA test results in table 6.28 indicates that the mean value of Communication with Stakeholders varied differed or varied significantly between groups = {F (9,222) = 2.018; P = 0.038}. As a result, the assumption of variation between the variable and group factor is retained and thus suggesting that the mean value of Participants Role in the Projects from the samples varied significantly.

The Table A_2.3 shows the ANOVA test result in Appendix 2. To find out where the specific mean differences exist, post-hoc tests are used. Table A_2.3 shows the results of Fisher's Least Significance Difference (LSD). From the table it is evident that different participants have different level of perception for the Communication with Stakeholders. The response from the Table A_2.3 (Appendix 2) Architects on the "Communication with Stakeholders" differs with eight other roles, producing the highest number of differences among the 9 roles.

This is then followed by the role of Director whose response differs with three other roles. The subcontractor and other responses were also different with other two professionals. Builder, Engineer and Consultant were differed with only Architect.

6.11.4 Hypothesis 4.4: There is a variation between the Role of Interview Participants observations and the Stakeholder Analysis

ANOVA test results in table 6.29 indicates that the mean value of Stakeholder Analysis varied differed or varied significantly between groups {F (9,222) = 1.254; P = 0.264}. As a result, the assumption of variation between the variable and group factor is retained and thus suggesting that the mean value of Participants Role in the Projects from the samples varied significantly.

Stakeholder Analysis

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	623.315	9	69.257	1.254	.264
Within Groups	12261.771	222	55.233		
Total	12885.086	231			

Table 6.29: One-way ANOVA in Stakeholders Analysis test on Role of participants

The Table A_2.4 shows ANOVA test in Appendix 2. To find out where the specific mean differences exist, post-hoc tests are used. From the table it is evident that different participants have different level of perception for the Stakeholders Analysis. Participant's responses from the Table A_2.4 (Appendix 2) Architects on the "Stakeholder Analysis" differ with eight other roles, producing the highest number of differences among the 9 roles. All other 9 professionals' responses are the same and only differ with the Architect. As only 3 Architects participated in the questionnaire process, the response could be considered as irrational.

6.11.5 Hypothesis 4.5: There is a Variation between the Role of Interview Participants Observations and Stakeholder Mapping

ANOVA test results in table 6.30 indicates that the mean value of Stakeholder Mapping varied differed or varied significantly between groups = {F (9,220) = 1.295; P = 0.241}. As a result, the assumption of variation between the variable and group factor is retained and thus suggesting that the mean value of Participants Role in the Projects from the samples varied significantly.

Stakeholder Mapping

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	308.735	9	34.304	1.295	.241
Within Groups	5829.739	220	26.499		
Total	6138.474	229			

Table 6.30: One-way ANOVA in Stakeholder Mapping test by Role of participants

The Table A_2.5 shows the ANOVA test in Appendix 2. To find out where the specific mean differences exist, post-hoc tests are used. From the table it is evident that different participants have different level of perception for the Stakeholder Mapping. Participant's responses from the Table A_2.5 (Appendix 2) Architects on the "Stakeholder Mapping" differ with eight other roles, producing the highest number of differences among the 7 roles. Responses from designer and builders haven't varied with anyone. Other participant's responses only varied with Architect.

6.11.6 Hypothesis 4.6: There is a Variation between the Role of Interview Participant's Observations and the Stakeholder Management.

Stakeholder Management

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	661.425	9	73.492	2.205	.023
Within Groups	7365.753	221	33.329		
Total	8027.177	230			

Table 6.31: One-way ANOVA in Stakeholders Management test on Role of participants

ANOVA test results in table 6.31 indicates that the mean value of Stakeholder Management varied, differed or varied significantly between groups = {F (9,221) = 2.205; P = 0.023}. As a result, the assumption of variation between the variable and group factor is retained thus suggesting that the mean value of Participants' Role in the Projects from the samples varied significantly.

To find out where the specific mean differences exist, post-hoc tests are used. Appendix 2, Table A_2.6 shows the results of Fisher's Least Significance Difference (LSD). From the table it is evident that different participants have different levels of perception for the Stakeholder Management. Participants' responses from the Table A_2.6 (Appendix 2) Architects on the "Stakeholder Management" differ with eight other roles, producing the

highest number of differences among the 10 roles. Secondly Engineer's response varied with Directors response. Other participant's responses only varied with Architect.

6.11.7 Hypothesis 4.7: There is a Variation between the Role of Interview Participant's Observations and the Stakeholder Performance Measurement.

Stakeholder Performance Measurement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	578.758	9	64.306	2.359	.015
Within Groups	6025.666	221	27.265		
Total	6604.424	230			

Table 6.32: One-way ANOVA in Stakeholder Performance Measurement test on Role of Participants

ANOVA test results in table 6.32 indicates that the mean value of Stakeholder Performance Measurement varied differed or varied significantly between groups = {F (9,221) = 2.359; P = 0.015}. As a result, the assumption of variation between the variable and group factor is retained thus suggesting that the mean value of Participants Role in the Projects from the samples varied significantly.

To find out where the specific mean differences exist, post-hoc tests are used. Appendix 2, Table A_2.7 shows the results of Fisher's Least Significance Difference (LSD). From the table it is evident that different participants have different levels of perception for the Stakeholder Mapping. Architects on the "Stakeholder Performance Measurement" differ with eight other roles, producing the highest number of differences among the 10 roles. After that Engineer, Directors and Contractors responses varied with each other. Designer's response hasn't varied with anyone. Other participant's responses only varied with Architects.

Table 6.33 shows that among all of the variables "Impacts of Stakeholder Engagement" has the highest mean (39.66) and standard deviation (11.49). It also indicates that among all of the participants Architects responses mostly differ for all of the variables which is marked in grey.

Which of the following best describes your role on projects?		Purpose of Stakeholder Engagement	Impacts of Stakeholder Engagement	Communication with Stakeholders	Stakeholder Analysis	Stakeholder Mapping	Stakeholder Management	Stakeholder Performance Measurement
Owner	Mean	13.5000	40.1667	16.8333	24.8333	9.8333	18.1667	13.0000
	Std. Deviation	4.92950	12.92156	6.14546	8.44788	4.66548	8.32867	6.92820
Director	Mean	12.5309	37.3457	15.7654	25.1481	11.4750	15.0759	12.6456
	Std. Deviation	4.38773	7.95010	4.31646	6.44420	5.11878	4.70889	4.46651
Architect	Mean	22.6667	62.0000	27.6667	38.0000	20.0000	26.3333	24.0000
	Std. Deviation	9.29157	17.57840	8.73689	12.49000	4.35890	9.50438	5.29150
Designer	Mean	16.0000	40.0000	17.3333	27.3333	13.0000	17.0000	16.0000
	Std. Deviation	1.73205	1.73205	2.51661	4.61880	1.73205	1.73205	2.64575
Contractor	Mean	14.5439	39.8621	16.3966	25.1724	12.2456	16.2586	14.6379
	Std. Deviation	6.17908	12.39616	6.63838	7.82066	5.50740	6.23955	6.08622
Subcontractor	Mean	13.8333	43.0556	18.5000	27.3889	12.8333	17.9474	14.4737
	Std. Deviation	4.73100	12.60939	8.12585	7.46079	5.22719	6.28467	5.16794
Builder	Mean	15.1429	47.4286	17.8571	25.4286	13.2857	18.1429	15.7143
	Std. Deviation	4.94734	15.80988	8.66850	10.24463	5.05682	8.02971	6.49908
Engineer	Mean	16.6923	43.2308	18.2308	27.4615	13.4615	19.6154	15.0000
	Std. Deviation	6.44702	15.11706	8.44742	9.87096	6.57794	8.25165	5.98609
Consultant	Mean	15.7000	41.3000	16.5000	24.8500	11.4000	16.7500	13.3500
	Std. Deviation	6.38337	11.57174	6.91680	7.58999	5.12373	5.37905	4.94469
Other	Mean	12.5652	35.7826	14.3043	25.0000	11.7391	16.0435	12.3913
	Std. Deviation	5.80616	10.93350	3.78315	6.40312	3.51901	4.36388	4.36660
Total	Mean	13.9221	39.6638	16.4569	25.6121	12.0478	16.4502	13.7576
	Std. Deviation	5.57892	11.49511	6.12481	7.46857	5.17741	5.90769	5.35863

Table 6.33: Descriptive analysis of Stakeholders Role with the Stakeholder Engagement

Summary

From the ANOVA test it is identified the different role of the participants has different understanding on stakeholder engagement. It also specifies that the approach of engaging stakeholders is different for different roles in a project. As different stakeholders are assigned for different purposes and at different phases their level of improving project performance and importance of stakeholder engagement is different.

6.12 Establishing the Company's Strategic Focus

Companies need to have a strategic focus by seeking to use their core competencies to serve the needs of their customer, to be competitive and to earn above average return on investment. One of the Project Managers noted that, *"we focus on our strategic approaches: a strong divisional focus, Group-wide initiatives that leverage our operating business and a unified corporate culture and value set"*. From the interview findings Efficiency, Cost Reduction, Quality, Innovation and Customer Satisfaction are found as companies targeted strategic focuses. Rolstadås, (1998) proposed that performance of an organizational system is a complex interrelationship between the following seven performance criteria Effectiveness, Efficiency, Quality, Productivity and Quality of work life, Innovation and Profitability/budget ability. Cost performance is the most important indicator of project success used by all parties. Time performance is as important to all construction parties as cost performance. As stated by Garsden (1995), construction time usually interrelates and functions with the actual cost because increasing construction time always results in additional cost to the whole project and also erodes the company's profits or the other way around. Ashley et al. (1987) used measures such as cost, schedule, quality, safety, and participant satisfaction to measure the success of projects. Thomas et al. (1998) used the amount of rework, schedule performance, and budget performance as the characteristics of a successful project. Odusami (2003) observed that cost and time performance always fall into one of the top five of the main project objectives, as seen in the works of Sanvido et al. (1992), Ahmed and Kangari (1995) and Ashley et al. (1987). From the interview findings and literature reviews some of the strategic focuses are determined which are considered to be important to improve the project performance. It is also identified that a successful engagement of stakeholders is important to achieve the strategic focus. A hypothesis is developed to test the variation of companies' strategic focus with the stakeholder engagement process and companies' project performance.

Therefore the hypothesis deals with measuring participants perceived level of relationship of companies' strategic focus with the stakeholder engagement and project performance. There are currently no mechanisms by which to measure overall success of stakeholder engagement process based on companies' established strategic focus. Hence the aim of this section is to test if the engagement of stakeholders to improve the construction project performance varies with companies' strategic focus.

Therefore an ANOVA test will be done to examine the variation of companies' strategic focus with the stakeholder engagement, Construction Sustainability and Construction Project Performance.

6.12.1 Variation of Companies' Strategic Focus on Stakeholder Engagement, Construction Sustainability and Construction Project Performance

6.12.1.1 Hypothesis 5: A successful engagement of stakeholders' varies by setting up of Companies Strategic Focus.

ANOVA on the effect of stakeholder engagement among the different strategic focuses of construction sector scheme format was based on an initial hypothetical premise as summarised by the aforesaid null hypothesis. Variation is calculated as the ratio of the mean square deviation between construction sector stakeholder groups and within construction sector stakeholder groups, otherwise known as the (F) statistics, where $P \leq 0.05$, the level of variation is said to be statistically significant. As shown, Table 6.29 shows the variation (Sum of Squares), the degrees of freedom (df), and variance (Mean Square) within and between the groups, as well as the F value (F) and the significance of the F (Sig.).

Stakeholder Engagement

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	230.338	5	46.068	1.409	.222
Within Groups	7420.702	227	32.690		
Total	7651.040	232			

Table 6.34: One-way ANOVA test of Stakeholder Engagement by Companies Strategic Focuses

The ANOVA test results in table 6.34 indicate that the mean value of implementation of stakeholder Engagement did not vary, differed or varied significantly between groups = {F

(5, 227) = 1.409}. As a result, the hypothesis is rejected as its suggesting that the mean value of companies' strategic focuses from the samples did not vary significantly. Therefore, as the company's strategic focuses did not vary with the Stakeholder Engagement, this result indicates that achieving any of the strategic focus depends on the Stakeholder Engagement.

6.12.1.2 Hypothesis 6: Achievement of the Construction Sustainability Varies by Setting up of Companies' Strategic Focuses

Construction Sustainability

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1939.939	5	387.988	1.304	.263
Within Groups	67537.778	227	297.523		
Total	67537.778	227	297.523		

Table 6.35: One-way ANOVA test of Construction Sustainability by Companies Strategic Focuses

The ANOVA test results in table 6.35 indicates that the mean value of implementation of stakeholder Engagement did not varied differed or varied significantly between groups = {F (5, 227) = 1.304}, P = 0.263. As a result, the hypothesis is rejected as it's suggested that the mean value of company's strategic focuses from the samples did not vary significantly. Therefore, as the company's strategic focuses did not vary with the company's sustainability target, this result indicates that achieving any of the strategic focus could improve the construction sustainability.

6.12.1.3 Hypothesis 7: Improving the Construction Project Performance Varies by Setting up of Company's Strategic Focus.

Construction Project Performance

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	517.063	5	103.413	1.214	.303
Within Groups	19250.920	226	85.181		
Total	19767.983	231			

Table 6.36: One-way ANOVA test of Construction Project Performance by Companies Strategic Focuses

The ANOVA test results in table 6.36 indicates that the mean value of implementation of stakeholder Engagement did not differ or vary significantly between the groups = {F (5, 226) = 1.214}, P = 0.303. As a result, the hypothesis is rejected as it suggests that the mean value

of company's strategic focuses from the samples did not vary significantly. Therefore, as the companies' strategic focuses did not vary with the companies' project performance, this result indicates that achieving any of the strategic focus could improve the construction project performance.

Summary

The above ANOVA result indicates that the level of implementing stakeholder engagement process is based on companies' different strategic focuses. Rejecting the hypothesis means there is not any difference between the strategic focuses. The ANOVA test remarked that all strategic focuses mean are not different from each other for successfully engagement of stakeholders and construction project performance. This result indicates that to improve the construction project performance and successful engagement of stakeholder is equally important to target for all of the strategic focus.

6.13 Hypothesis Table

All of the hypotheses are summarised with their position in the following table 6.37. The correlation coefficient and significant value for each hypothesis are also mentioned. From the correlation coefficient it is identified that Communication with Stakeholders, Stakeholder Management both have good impact on construction sustainability which are marked as green. On the other hand stakeholder mapping has less impact on the construction sustainability which is marked as grey.

Hypotheses		Hypotheses	Yes	No	Coefficient
Main	Sub		Accepted		
H1	1	There is a Correlation between the Engagement of Stakeholders and Construction Sustainability.	×		
	1.1	There is a Correlation between the Purpose of Stakeholder Engagement and Construction Sustainability.	×		.608**
	1.2	There is a Correlation between the Impacts of Stakeholder Engagement and Construction Sustainability.	×		.728**
	1.3	There is a Correlation between the Communication with Stakeholders and Construction Sustainability.	×		.640**
	1.4	There is a Correlation between the Stakeholder Analysis and Construction Sustainability.	×		.680**
	1.5	There is a Correlation between the Stakeholder Mapping and Construction Sustainability.	×		.531**
	1.6	There is a Correlation between the Stakeholder Management and Construction Sustainability.	×		.735**
	1.7	There is a Correlation between the Stakeholder Performance Management and Construction Sustainability.	×		.643**
H2	2	There is a Correlation between Construction Sustainability related targets and the Construction Project Performance.	×		.608**
H3	3	There is a Correlation between the stakeholder engagement and construction project performance.	×		
	3.1	There is a Correlation between the purpose of Stakeholder Engagement and Construction Project Performance.	×		.600**
	3.2	There is Correlation between the Impact of Stakeholder Engagement and Construction Project Performance.	×		.619**
	3.3	There is a Correlation between the Communication with Stakeholders and Construction Project Performance.	×		.601**
	3.4	There is a Correlation between the Stakeholder Analysis and Construction Project Performance.	×		.505**
	3.5	There is a Correlation between the Stakeholder Mapping and Construction Project Performance.	×		.446**
	3.6	There is a Correlation between the Stakeholder Management and Construction Project Performance.	×		.600**
	3.7	There is Correlation between the Stakeholder Performance Measurement and Construction Project Performance.	×		.563**
H4	4	There is a variation between the Role of Interview Participants and the Stakeholder Engagement.			
	4.1	There is a variation between the Role of Interview Participants observations with the Purpose of Stakeholder Engagement.	×		.013
	4.2	There is a variation between the Role of Interview Participants observations with the Impacts of Stakeholder Engagement.	×		.004
	4.3	There is a variation between the Role of Interview Participants observations with the Communication with Stakeholders.	×		.038
	4.4	There is a variation between the Role of Interview Participants observations with the Stakeholder Analysis.	×		.264
	4.5	There is a variation between the Role of Interview Participants observations with the Stakeholder Mapping	×		.241
	4.6	There is a variation between the Role of Interview Participants observations with the Stakeholder Management.	×		.023
	4.7	There is a variation between the Role of Interview Participant's observations and the Stakeholder Performance Measurement	×		.015
H5	5	A successful engagement of stakeholder varies by setting up Company's Strategic Focus.		×	.222
H6	6	Achievement of the Construction Sustainability is varies by setting up of Company's Strategic Focus.		×	.263
H7	7	Improving the Construction Project Performance is varies by setting up Company's Strategic Focus.		×	.303

Table 6.37: Hypotheses Status Results after Statistical Testing

Summary

The mean value of Table 6.6 indicates that most of the drivers have positive impact on changing construction performance and construction sustainability. Drivers of improving Construction Project Performance and Construction sustainability are the collection of people, information, and conditions that initiate and support activities to help an organization to accomplish its mission. These drivers should be the guiding force behind performance improvement because they represent key factors or influences that matter to an organization's success. Project performance improvement efforts should be driven by project strategic focus. Due to the differentiation of the strategic focus the drivers for improving project performance could be different. For this reason the correlation between Drivers that motivates sustainability in construction with construction project performance is moderate. Then, the mean value of Table 6.7 indicates that most of the disablers have low impact on construction project performance and construction sustainability. The reason behind it could be businesses are finding ways to overcome these barriers—through adapting strategies and techniques.

Several Statistical procedures are applied out to the trends and relevant hypothesis findings based around the data collected from the 233 respondents who have experience in stakeholder engagement and construction sustainability project in UK constriction sector. From Hypothesis one the relationship between the Stakeholder Engagement and Construction Sustainability is identified which shows that both are positively correlated. Few of the processes are moderately correlated and most of the processes are in strong correlation with Construction Sustainability. All of the processes item wise relationship is also identified which identifies significant strong and weak relationships between the items. From this item wise relationship it can be suggested that the influence of all these processes may not be very persistent this was likely due to lack of Stakeholders understanding of Sustainability and constraint of limited resources. Some of the causes behind the weak relationships are identified from the correlation which is discussed elaborately in next discussion chapter.

Hypothesis two tested the correlation between the Construction Sustainability and the Construction Project Performance. Hypothesis two identified strong correlation between Construction Sustainability and the Construction Project Performance. Their item wise relationship is identified that some of the items between the variables have weak correlation which is discussed in next chapter.

From Hypothesis three the relationship between the stakeholder engagement and construction project performance is identified which shows that both are positively correlated. Some of the processes are moderately correlated and some of the processes of stakeholder engagement are in good correlation with Construction Project Performance. For hypothesis three all of the variables' item wise relationship is shown Appendix 1. From their relationship it can be recommends the influence of all of the processes of stakeholder engagement's may not very pervasive and the reason behind this relationship is discussed in next discussion chapter.

Hypothesis four tested the variation of the Role of Interview Participants with the Stakeholder Engagement. Hypothesis five, six and seven tested the variation of company's strategic focuses with construction project performance, construction sustainability and stakeholder engagement. ANOVA test identified that all of the strategic focuses are equally important to improve the construction project performance. It also identified that stakeholder engagement could help to achieve all of the strategic focuses.

Chapter Seven: Findings and Discussion

7.1 Introduction

This chapter aims to provide discussion of the results originated from the questionnaire and semi-structured interviews. Through the utilisation of literature, each of the findings will be addressed to identify the links to previous studies, current knowledge gaps and possible additional questions for future research. The study has explored the perception within the UK Construction Sector toward improving the construction project performance through achieving construction sustainability.

Figure 6.2 identifies that most of the participants (18%) are from "construction of residential/non-residential building" which is followed by "development of building" (15%) sector. From the understanding of the survey results it is revealed that most of the companies are striving for sustainability and practising stakeholder engagement directly or indirectly. As residential construction and development of building there is a possibility of having huge demand from customers for sustainable materials, technologies, cost management and waste management. As the world population are rising, a sustainable design in residential building is more important than ever before. That's why most of the interviewees believed that innovative building can bring about a better quality of life for communities, good value for property and sustainable approaches. Therefore a careful planning of stakeholder engagement is needed here. The discussions of this chapter are centred on the overarching findings in relation to existing knowledge, reflecting on from the differences discovered and the magnitude by which current knowledge in construction project performance and construction sustainability has been extended. This chapter will discuss each hypothesis individually.

These research findings are listed and will be discussed throughout this chapter.

1. Overall, Stakeholder Engagement is positively interrelated with Construction Sustainability and Construction Project Performance,
2. The correlation between the Stakeholder Engagement and Construction Project Performance identified that stakeholder engagement has less impact to meet the construction project time objectives,
3. The correlation of Stakeholder Engagement with Construction Sustainability and Construction Project Performance identified that some of the process of stakeholder engagement has low impact to evaluate the project sustainability and performance outcome.

4. Construction sustainability has good correlation to achieve the construction project performance,
5. Correlation identified that Stakeholder Mapping has comparatively less impact on improving the Sustainability related Project Performance,
6. Some of the barriers and drivers that create the most impact on the Construction Sustainability outcome are identified,
7. The understandings for Stakeholder Engagement are varied with the roles of the construction professionals,
8. Targets for Stakeholder Engagement, Construction Sustainability and Construction Project Performance do not vary with the company's strategic goals.

Briefly, the findings are based on comprehensive discussion in relation to the analysis of results from both qualitative and quantitative data which has been presented in Chapter Five and Six of this thesis and subsequently scrutinised with respect to the current related literatures. Each of the hypotheses is discussed separately according to a triangulation method. It will be linked to the previous literature studies in Chapter Two and Three, the results of the interview data analysis in Chapter Five and results of quantitative analysis in Chapter Six. All of the hypotheses are discussed in the following section. The item wise correlation of the variables is shown in Appendix 1 and the ANOVA result in Appendix 2. Based on the different participants diverse observation some of the improvement actions have been developed from the discussion.

7.2 Drivers and Barriers for Implementing Sustainability in Construction

Most of the interview participants (section 5.5.4.1, p. 83) considered that pressure from the competitors and customer satisfaction as the main drivers for adapting sustainability in construction. Comparatively survey participates considered that all of the drivers have motivation to adopt sustainability in construction. However, still the interview participants considered some of the following facts that have less impact on implementing sustainability in construction.

1. Building regulation does not meet the outcome of the sustainable development,
2. People are not very interested about the climate change and protecting biodiversity that impacts on sustainable development,
3. Using traditional method, not welcoming the new method like lean techniques to improve the project qualities,

4. Unorganised supply chain is more reluctant to adapt the new technology,
5. Due to the high cost of sustainable building people are unwilling to accept the change,
6. Minimising energy solution is beyond the peoples affordability,
7. Lack of sustainability knowledge and importance of reusing of material or recycling,
8. Lack of client awareness about managing waste.

Analysing the survey some of the barriers (section 6.4, p. 144) are identified that participants considered being the most important constraint to implement sustainability in construction. Survey Participant mostly agreed with the lack of client awareness (Mean 1.90) and lack of sustainability knowledge (Mean 2.16) are the important barriers to implement sustainability in construction. Interviewees also mentioned about the variation of stakeholders demand with the project allocated budget and time. Interview participants considered lack of awareness among employees as the main challenge pertaining to sustainability adoption. Participant #14 mentioned that, *"…….lack of the sustainability knowledge leads to reduces our stakeholders awareness, maybe that's the reason they are reluctant to make changes towards more sustainable consumption, they also feel that their individual decisions will not have a significant impact, particularly in the long-term".*

Interviewees commented that there is a need to create strong leadership, such as a sustainability champion as well as recommended that support of high-powered management is a critical component of successful sustainable projects. Interview participants considered that Sustainability knowledge is also an important pre-requisite to the construction of green buildings. Some of the interview participants mentioned that they are trying to deal with improving the sustainability knowledge that requires a supportive approach from the academic institutions through organizing research and education and need to relate it to the community. It will ultimately discover more affordable solutions. Researchers (Graedel, 2002; Rimanoczy and Pearson, 2010), also declared that education and collaboration have benefits for all parties involved, by lowering the operating costs and developing sustainable design expertise, minimizing scepticism towards green buildings and by applying academics research in practice, which benefits both the environment and helps secure future grant applications.

Correspondingly survey result identified "Unfavourable Government Rules" as one of the barriers (Mean 2.64). Interview participants emphasized on the role of Government and company's top management in developing sustainable organizations and explicated that the

main goal needs to be changing the organizational cultures. They also proposed that understanding the sustainability blockades will lead to adopt more sustainable homes, improving the organisation's environment, occupier's health and stimulate the growth in the currently struggling infrastructure industry. The recommendations include in figure 7.1:

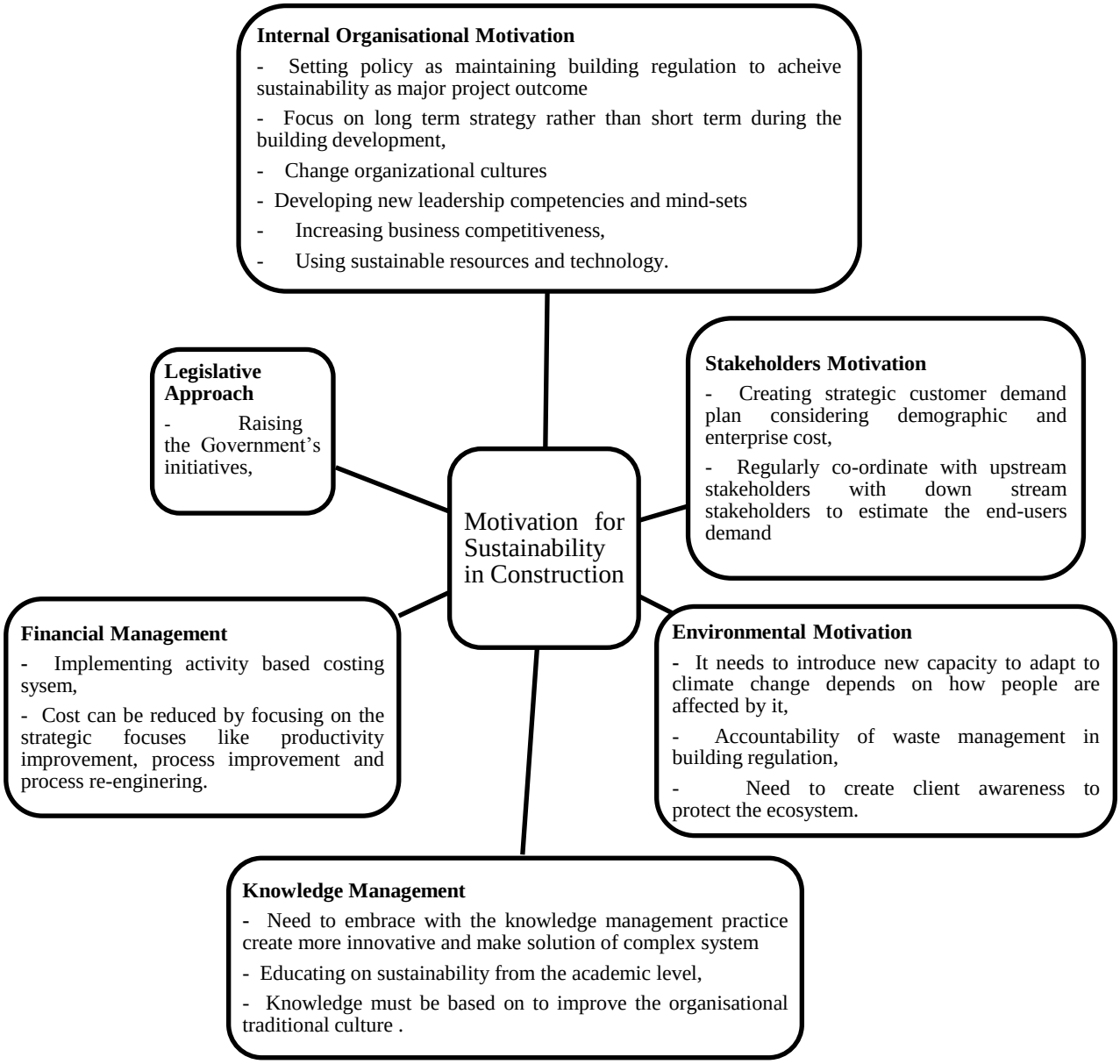


Figure 7.1: Approaches to improve the Sustainability Responsiveness

Few of the technical barriers are identified from the Interview findings to implement sustainability. Barriers are mostly related to the legislative, economic and social. Participants concerned that from the stakeholder engagement perspective the problem is how to motivate the stakeholders within a grant regime that ultimately seeks to deliver the maximum number of residences within the sustainability constraints. Interviewees also realized that eventually

sustainability of construction can be delivered not only by maintaining the standards of the Building Regulation, but also by the manner in which organisations and individuals behave and collaborate to overcome the constraints and barriers. The target for sustainability goals will be better achieved by integrating innovation and sustainability as an approach for achieving competitiveness in construction. Because of the negative impact of the construction industry to the environment, it is essential that companies working in the construction field strive to deliver sustainable built environment thus saving the environment, enhancing society and prospering the economy (Tan et al, 2010). The overview of sustainable building regulations needs to ensure that the adverse environmental, economic and social effects of new construction and renovations are reduced. Based on the different issues related to implementing the sustainability in construction a list of action is suggested to make the sustainability more feasible and to overcome the barriers.

7.3 Analysis of Relationship between the Stakeholder Engagement and Construction Sustainability

From the correlation it is identified that as a whole the stakeholder engagement creates good impact on the construction sustainability but some of the items of stakeholder engagement have weak correlation with the items of construction sustainability which is shown in (Table A_ 1.1, Appendix 1). Regarding these low correlation some of the recommendations have suggested in following sections which could improve the relationship between the Stakeholder Engagement and Construction Sustainability.

7.3.1 Relationship between Purpose of Stakeholder Engagement and Construction Sustainability

The correlation between Purpose of Stakeholder Engagement and Construction Sustainability shows that the purpose of engaging stakeholders creates a positive impact on the construction sustainability outcome. This engagement helps to exchange and share useful resources relating to the technical, behavioural and regulatory issues of the organisation as they strive to cope with the environmental, economic and social adversity. The correlation between the variables identified that the purpose of stakeholder engagement i.e. Sharing Knowledge, Generating Solution, Reducing risk and uncertainty, Sharing Challenge and for continuous improvement has less impact on evaluating the sustainability outcome. Interview Participant #2 mentioned that, *"…….the mechanism of the stakeholder's involvement regarding the sustainable infrastructure depends on the improvement of organisational culture, structure,*

communities of practise, information technology, common knowledge and organisation's environment". Evaluation of sustainability outcome is to ensure the delivery of the combination of social, economic and environmental sustainability as well as satisfying all the stakeholder demand. Interview Participant #3 mentioned that, *"……..ensuring the sustainable development through managing the stakeholder's knowledge provides ideas, resources and helps to communicate that could motivate everybody to bring environmental, economic and social benefits".* Most of the interviewees consider the stakeholder engagement process into their core project management process. From the interview findings it is also evident that involvement of stakeholders is important to improve the long-term benefits for the people, the organisation and the environment. Therefore, the purpose of stakeholder engagement could be considered as the standard of achieving sustainability outcome rather than assessing the sustainability outcome.

And regarding the continuous improvement as unnecessary and excessive continuous improvement approaches sometimes divert the motivation from the challenge to earn and it is time consuming as well, which could deviate from the sustainability outcome. Few of the interview participants (section 5.5.4.2.8, p. 99) also mentioned that sometimes giving too much concentration on the continuous improvement means spending excessive time and putting effort on a single area rather than the whole project objective.

Although sharing information has immense benefit to improve the sustainability outcome still there is a low correlation between reducing the project cost and sharing knowledge. Sometimes unnecessary sharing of knowledge reduces the motivation, creates dissatisfaction for responsibilities, and creates lack of opportunity and pushing the people seek for alternative employment. Interview participants also mentioned (Section 5.5.4.2.1, p. 86) to use the real time information and it needs to be shared if it's requisite. Sharing the up to date and exact information with stakeholders could create the solution to manage the cost.

Purpose of Stakeholder Engagement	
1. Sharing real time and exact information to the key person, 2. Customizing Continuous improvement to reduce time, 3. Considering the Purpose of Stakeholder Engagement as a standard to achieve the sustainability.	→ Construction Sustainability

Table 7.1: Steps to Improve the Purpose of Stakeholder Engagement on Construction Sustainability

7.3.2 Relationship between the Impact of Stakeholder Engagement and Construction Sustainability

The correlation between Impact of Stakeholder Engagement and Construction Sustainability shows that the Impact of Stakeholder Engagement creates a strong positive impact on the construction sustainability outcome. Correlation identified that stakeholder engagement works as a powerful mechanism to facilitate the collaborative working situation to work out sustainability solutions. Though these variables have good correlation, some of the items of these variables are found to be poorly correlated which is shown in (Appendix 1, Table A_ 1.2). Firstly, the correlation identified that stakeholders are less likely to share any pain or loss from the sustainability outcome. Interview participants mentioned that a contractual agreement helps to share the risk and gain/pain mechanisms that are set by the client; it can modulate its exposure to risk. He also noted that Project Manager's obligation is to take into account that stakeholders may desire, expect or be entitled with a particular level of involvement. Participants #5 mentioned that, *"The main difference between a target agreement and a predictable agreement is the mechanism for sharing risk and opportunity. Sharing the profit and loss allows the project team to jointly look at the potential cost of a project and look at ways to innovate and bring the cost down".* An organisation needs to clearly define that how much it wishes to be involved its stakeholders in the project programme or project objectives. An initial discussion, interaction with or observation of target stakeholder groups and a review of legal requirements can be very helpful to determine the appropriate level of involvement to share the project outcome. It needs to assess all the risks related to the stakeholders from the very beginning when the stakeholders are planning to engage. It will keep the management prepared to manage those risks. Therefore, it will create a pain and gain sharing situation from the very beginning and creates the incentive for both parties to work together to minimise the project risk. Espling and Olsson (2004) also mentioned that the commercial, ecological and social project performance alignment comes from a meaningful target being established around which stakeholder's performance and pain and gain can be shared.

Secondly, Some of the impact of stakeholders engagement i.e. improving the productivity, reducing energy emissions; exchanging information have less impact on the evaluation of sustainability outcome. In order to provide a solution to minimise the added costs of sustainability, to deliver innovative solutions, the productivity improvement issues need to be considered at the very initial stage, during the original-planning and design stage. Regarding

the sustainability questions interview Participants mentioned that most of their clients, consumers and other stakeholders are concerned with the cost issue. The interview participants concerned with the fear of initial cost of sustainable building (section 5.6.1, p. 123), managing the diverse stakeholders, fulfilling the customer and client demands are the reason for ignoring the implementation of sustainable design and technology in the construction industry. The Interview participants #10 (Design Engineer) mentioned that, *"……..our whole Project Team try to be co-ordinated and supported from the very beginning to deliver a sustainable good design, procurement and reasonable contract solution which delivers the best value to our clients; both considering the reduction of the cost of sustainable technological solutions and understanding the market values, through accessing affordable funding and demonstrating the dwellers benefits*". Therefore, the impact of stakeholder engagement on sustainability target needs to be assessed from the very beginning rather than at the end during the evaluation of sustainability outcome.

Thirdly, the correlation also identified that engaging the selective people has no impact on the sustainability outcome. It specifies that participants want to prioritize all people according to the condition rather than selective. Even the interviewees mentioned that (section 5.5.4.2.5.1, p. 93) involving all stakeholders improves the project team performance in relation to other stakeholders. Most projects require a diverse mix of stakeholders which need to be integrated into an effective unit as a project team. It's important to understand the different stakeholder's with special skills, attitudes, commitment and their impacts on the overall project performance.

Impact of Stakeholder Engagement		
1. Having collaborative business agreement at the project initiation to share any circumstances, 2. Considering stakeholders desire, expect or be entitled for a particular level of involvement to share pain and gain, 3. Need to engage all stakeholders, 4. Assessing the impact of stakeholder Engagement at project initial stage.	→	Construction Sustainability

Table 7.2: Steps to Improve the Impact of Stakeholder Engagement on Construction Sustainability

7.3.3 Relationship between the Communication with Stakeholders and Construction Sustainability

The correlation between Communication with Stakeholders and Construction Sustainability identifies that the importance of communication between the stakeholders is to facilitate the construction sustainability. Some of the items are identified to be weakly correlated which are shown in (Appendix 1, Table A_1.3). Correlation shows that keeping the stakeholders informed with updating information has less impact on evaluating the sustainability outcome. Correct and up to date information flows both upwards and downwards enables the company to find out the current demand trend, quantify the impact of alterations in pricing, product mix, content or customer service before any changes are made and predictive customer experience analytics are a piece of that puzzle. Communication flows from both the upward and downward in a project provides feedback on how well the organization is functioning as the subordinates use upward communication to convey their problems and performances to their superiors (Gustavsson and Gohary, 2012). Interview participants also mentioned that the two way flow of communication from initial to final stage leads to more committed and loyal workforce in an organization as it gives the employees chance to raise their dissatisfaction issues. Few of the interviewees mentioned that they are trying to become good listeners to their customers and show them that they are valuing their opinion so that they will be grateful and supportive to them and to the company's mission.

Correlation also shows that communicating with stakeholders has less impact on improving energy efficiency and improving the productivity. Interviewees stated their concern that once the customers are asked about their feedback and opinion, sometimes they demand excessively and unconditionally which does not match with the project resources and budget. This type of risk creates an unplanned, undesirable effect on the project when they are not properly communicated and informed with the on-going situation. Interview participants mentioned that (section 5.6.3, p.125) customers or clients have very little interest and poor sustainability knowledge on reducing energy emissions and improving productivity. Most of the stakeholders especially the clients are only concerned with the low cost of the product. Interviewees concerned about the fact that clients/customers are reluctant to discuss about the change from the traditional design and specification. The reason behind these circumstances is lack of sustainability knowledge and lack of sustainability awareness of the stakeholders.

Usually customer demand is significantly higher in the pressure periods and the project leaders or project managers should make sure that they are actively engaging and supporting their stakeholders with correct information flow from upward to downwards and vice versa. In order to improve productivity it needs to motivate the stakeholders by exploring the competitors, market research and consumer information's. It will help to find out, what the opponents are currently selling, what services they are providing and their service/product pricing. Based on these statistics it needs to let the stakeholders know what the companies are planning to change to deliver the better value.

Correlation identified that communication with the stakeholders at the early stages creates less impact on the innovative solution to evaluate the sustainability outcomes. The reason could be that effective communication is vital to whole project process rather than only in the early stage. Sometimes too much communication flow creates a problem of excessive information. Even the interviewees also emphasized the importance of discussion with the stakeholders at the every stage of the project (section 5.5.4.2.1, p. 86). The reason behind the low impact of meetings with stakeholders on sustainability outcomes is, spending too much time in meetings can waste everyone's time. It consumes a huge amount of time instead of generating any solution. Considering the above issues the following steps are proposed to make the communication more effective to evaluate the sustainability outcome –

Communication with Stakeholders		
1. Information needs to be central and easily accessible, 2. Upwards and downwards flow of communication leads to a more committed and loyal workforce, 3. Exploring competitor, market data to know the current market trend and let the customers know what they are offering better than that,	→	Construction Sustainability

Table 7.3: Steps to Communication with Stakeholders to bring the Construction Sustainability

7.3.4 Relationship between the Stakeholder Analysis and Construction Sustainability

This correlation between the Stakeholder Analysis and Construction Sustainability indicates that Stakeholder analysis helps to investigate the stakeholder's needs depending on each of the stakeholders' potential to influence the project objectives and it helps to manage the

project cost and project risk. The following positive remarks are found from the stepwise correlation between Stakeholder Analysis and Construction Sustainability –

1. All stakeholders are equally analysed and prioritized to evaluate the project outcome,
2. Stakeholder identification helps to find out who has the unique knowledge related to any aspect of the project to improve the cost, manage risk, bring environmental sustainability and manage the project lead time,
3. Stakeholder analysis helps to prioritize the their needs depending on each stakeholders potential to influence project objectives and it helps to manage the project cost and project risk.

If the project entities rely on in the strategy starting with the formulation phase to the project implementation phase, stakeholder analysis could be executed well and the resulting strategy creates a better chance for succeeding. Correlation identified some of the items between the variables are weakly correlated with each other. It identified that engaging all stakeholders at the early stage has less impact on evaluating the sustainability outcome. Interviewees mentioned that sometimes it's difficult to identify the right stakeholders during the project initiation stage due to the change in their demand and leaving in the middle of the project (section 5.5.4.2.4, p. 90). Therefore, the management needs to change all strategies according to the stakeholders demand and then new stakeholders need to be identified as the project progresses. The interview participants explained the problem of identifying different stakeholders at different project levels as they can create diverse impacts at different project levels.

Prioritizing stakeholders' (e.g. clients, end users) demand creates less impact on sustainable development like protecting ecosystem, managing project cost, managing resources, reducing carbon emission, improving productivity and achieving social sustainability. Interview participants mentioned that the higher the stakeholders' importance the more their demands need to be prioritized and this also requires an in-depth analysis of the stakeholders' demands. Interviewees also mentioned that concentrating only on prioritizing the stakeholders' demand sometimes moves away from the original sustainability objectives. Interview Participant #1 mentioned that, *"Once we identify our stakeholders, there is a struggle to consider: who needs to prioritize, who to give more importance and who to ignore. When this confliction arise it is important to prioritize the stakeholder according to the situation for the success of the organization".* Therefore, most of the interview participants felt that organizations should

attempt to identify all the stakeholders' demands rather than narrowing them by their attributes. One way to do this is prioritizing the demands considering the project goals, objectives and resource constraints.

Correspondingly correlation identified that analysing Stakeholders' according to the power and urgency has less impact on evaluating the sustainable outcome. The correlation indicates that participants want stakeholders to be prioritized not by their power but also based on their importance and relationship with the project/activity. Researchers (De Villiers & Van Staden, 2006) and interviewees mentioned that stakeholders having power and urgency holds the usual nature to dominate and impose their will on the less powerful stakeholders. Participants #8 mentioned that, *"as the powerful stakeholders try to keep their control on other……for the time being it is beneficial to motivate the other, the less powerful stakeholders but in most cases it ignores the interest and needs of the other stakeholders".* For that reason, disregarding the other stakeholders' interests could hinder the evaluation of the sustainability outcome. Therefore these findings imply that stakeholders need to prioritize according to their demand and relationship with the project outcome rather than prioritizing them by their power and urgency. Some of the following actions are summarized in table 7.4 to improve the relationship between Stakeholder Analysis and Construction Sustainability –

Stakeholder Analysis	→	Construction Sustainability
1. Prioritizing stakeholders' demand according to the importance of time, cost, effort and risk estimates, 2. Prioritizing stakeholders' demand according to their relationship with the sustainability outcome not only by their power, 3. Analysing stakeholders according to the importance of their demand and their relationship with project activities, 4. All stakeholders need to be equally analysed, 5. Giving Importance to the knowledgeable stakeholders to deal with project cost, risk, sustainability and lead time.		

Table 7.4: Steps to Improve the Stakeholder Analysis to bring the Construction Sustainability

7.3.5 Relationship between the Stakeholder Mapping and Construction Sustainability

The correlation between Stakeholder Mapping and Construction Sustainability evidenced that as a whole Stakeholder Mapping has weak but positive impact on Construction Sustainability. The item wise relationship is shown in (Appendix 1; Table A_1.5). Though the correlation identified that Stakeholder Mapping has weak impact on the construction sustainability, the

relationship identifies that stakeholder mapping helps to visualise the stakeholder's relationship with the project activities and prioritizing tasks into crucial areas. It is evidenced from the findings that mapping improves the project effectiveness through managing the project time, cost, risk, and improving environmental sustainability. Though the stakeholder mapping does not have a direct impact on the construction sustainability approach, it could be used as a technique and as an impact chart through organizing the insights into how deferent stakeholders impact effect on the different sustainability issues.

Correlation identifies that, one of the drawbacks of stakeholders mapping is it has less impact on evaluating the sustainability outcome. Stakeholder maps only visualize the relationship between them and their own demands and with the project activities but it often has less impact to evaluate the project sustainability outcome or their sustainability related demand. Researchers (Mathur et al., 2007) and Interviewees also mentioned that it needs to map stakeholder's relationship with the sustainability objectives altogether, which helps to show which stakeholders have interest on which issues. This interest can be evaluated based on having enough sustainability knowledge.

Correlation identified that visualizing key stakeholders demand in stakeholder mapping creates less impact on the sustainability outcome. As mentioned before (section 7.3.3, p. 205) prioritizing the key stakeholders' demand sometimes means that they impose their will on the other stakeholders and it ignores the interest of other less powerful stakeholders. To improve this situation it needs to prioritize those stakeholders whose demand is mostly related with the sustainability objectives and has most impact on the sustainability outcome, rather than only the Key Stakeholders demand.

The correlation shows that mapping the entire stakeholder community during the project planning, designing and implementation stage is difficult as they might get change at the middle of the project. Interviewees also stressed that it takes long time to understand all the project stakeholders during the project initiation and map them. The common problem most of the construction projects face is changing of external stakeholder or supply chain members at the middle of the project due to the change of their demand, design and the budget failure. To improve this situation it needs to map the stakeholder based on their demand manageability considering the cost, time and risk. Based on this mapping it could be decided what type of relationship and communication need to maintain with the whole project team.

Some of the following actions are summarized in table 7.5 to improve the relationship between Stakeholder Mapping and Construction Sustainability –

Stakeholder Mapping	
1. Stakeholders' relationship with the sustainability objectives needs to be mapped, 2. All possible project stakeholders need to be identified from the project initiation stage, 3. All stakeholders' demands need to be identified from the project initiation stage and need to be mapped, 4. Map the stakeholders based on their demand manageability considering the cost, time and risk, 5. Map the stakeholders based on their sustainability knowledge.	→ Construction Sustainability

Table 7.5: Steps for Stakeholder Mapping to improve the Construction Sustainability

7.3.6 Relationship between the Stakeholder Management and Construction Sustainability

The strong correlation between Stakeholder Management and Construction Sustainability identifies that stakeholder management creates a good impact on improving the construction sustainability. Almost all of the interview participants and researchers (Olander & Landin, 2005; Karim et al., 2007) found that Stakeholder Management helps to understand each other's view point to build relationships, thus avoiding preconceived ideas and assumptions. Participant #6 mentioned that, *"……..when the stakeholders are managed it groups them in the different matrix and then produce a better picture of how communication and relationships between stakeholders has affected the project and its implementation"*.

The correlation also identifies that some of the items of the variables are weakly correlated. Correlation shows that people are less interested in taking the academic training to improve their sustainability knowledge. To overcome this problem there is a need to create motivation between the stakeholders to improve knowledge. Interviewees also emphasized on the importance of having academic training or academic attachment as they think it is an effective way to embed new thinking that maximises people's understanding of sustainability and change in behaviour. Interview participants emphasized (section 5.5.4.2.4, p.90) on improving the stakeholder knowledge to organize, store and manage their understanding of the sustainable development.

Correlation shows that managing the stakeholder relationship has less impact on evaluating the sustainable outcome. Sometimes it takes a long time to manage the stakeholders which could divert the project aim from the project objectives. Regarding the conflicts between the stakeholders participants #8 mentioned that *"…….. When client's requests for something innovative other's starts criticising, the supplier or contractor is likely to become reluctant and very defensive. Then the conflict grows over time, this criticism getting become hatred, and more likely to be fulfilled by the other partner by blocking it out or obstructing".* These behaviours can be deadly for the relationship between the stakeholders and also for achieving the sustainability outcome. Different stakeholders have different attitudes and different demands which may create conflicts between them. Therefore it is really important to find out the ways to manage the issues that are leading to conflict. However when problems happens it is important to solve mutually through discussion, as it is far more important to resolve the problems rather than dissolve the relationship. When the conflicts arise the company needs to collaborate with the all stakeholders together to generate new solution and to make a prioritization of their demands mutually. To evaluate the project outcome it needs to build specific measures into the project programme and project management processes to ensure continued and effective management of relationship with stakeholders. Some of the following actions are summarized in table 7.6 to improve the relationship between Stakeholder Management and Construction Sustainability –

Stakeholder Management	
1. Need to create mutual understanding to support stakeholders and reduces the project cost, 2. Collaboration with all the stakeholders together to generate new solution and to make a prioritization of their demands mutually, 3. Needs to build specific measures to evaluate the project outcome to ensure continued and effective involvement of stakeholders, 4. Managing stakeholder relationship to manage the conflicts between them, 5. Creating motivation between the stakeholders to improve their sustainability knowledge.	→ Construction Sustainability

Table 7.6: Steps for Managing Stakeholders to Improve the Construction Sustainability

7.3.7 Relationship between the Stakeholder Performance Measurement and Construction Sustainability

The correlation between Stakeholder Performance Measurement and Construction Sustainability identifies that Measuring the Stakeholder's Performance motivates to improve the construction sustainability. Correlation also identified that Key Performance Indicator (KPI) is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities creates the opportunities that need to be improved. Stakeholders performance measurement and management practice in a project is a key supporting mechanism for the management that helps to take effective decision. Paprika *et al.* (2008), also noted that stakeholder management of information systems, performance measurement and management practice and other management tools to support the maintenance and develop a good relationship among all the stakeholders. Participant #11 mentioned that, *"Accurate and efficient performance measurement not only forms the basis of an accurate performance review but also gives way to judging and measuring employee potential".*

The low correlation Stakeholder Performance Measurement and Construction Sustainability revealed that it is difficult to choose the right KPI's to measure the stakeholder performance that creates less impact on reducing the cost, improving the energy efficiency, improving quality and managing waste and providing the local employment. There could be certain reason for these relationships. Firstly, Stakeholders themselves do not represent the whole project's performance; it is their responsibility to create the organization's performance through their decisions, skills and activities. Sometimes their individual performance in different areas doesn't improve the whole project performance. When an employee's goal is defined in terms of an organizational KPI, it ensures that what the employee is doing is well aligned with the goals of the organization. This is the critical link between employee performance and organizational success.

Interview Participants pointed out the difficulty to develop social, environmental and economic indicators as one of the main issues companies have been facing in the development of sustainability key performance indicators. A key issue for challenging sustainability measurement is the lack of consensus on sustainability indicators which represents a major barrier to implement sustainability strategies (Veleva and Ellenbecker, 2001) and drives the need to ''define common methodological standards and indicator sets'' (Warhurst, 2002: pp. 14). They reinforced measurement by insisting that key elements of the business strategy are

measured and that their performance be evaluated against such measures. They make sure that policies related to performance reflect a measurement bias, and that employees have the tools and the training to enable them to play a role in performance measurement within their areas of responsibility. Usually the performance indicators the management chooses differ depending on the specific business type, operations and industry.

Therefore, management needs to choose the KPIs that need to be controlled to relate to the aspects of the business and should also be linked to the high level goals of the business. Interview Participant #3 mentioned that, *"…….we selects the indicators which indicate into those particulars areas that requires further improvement action".* Therefore, the indicator needs to be linked into the overall business objectives against which stakeholders are assigned to achieve those objectives. Interview participants suggest some of the KPI's like measuring Productivity of stakeholder, measuring energy consumed by the stakeholders, measuring customer satisfaction, measuring health and safety performance and measuring stakeholder personal knowledge. Some of the following actions are summarized in table 7.7 to improve the relationship between Stakeholder Management and Construction Sustainability –

Stakeholder Performance Measurement	
1. Measuring performance to improve the project cost and finding better opportunities, 2. Measure how well a stakeholder is performing against the sustainability objectives, 3. Measuring stakeholder's knowledge and skills to quantify their capabilities, 4. Indicator needs to be linked into the overall business objectives.	→ Construction Sustainability

Table 7.7: Steps for Measuring Stakeholder Performance to Improve the Construction Sustainability

7.3.8 Analysis of Stakeholder's Impact on Sustainability

From Table 6.11 it is evidence that having sustainability knowledge (Mean = 1.55) is considered to be important to encourage and support the stakeholders to increase the sustainability capacity. Though the interview participants considered "Lack of Sustainability Knowledge" (section 5.6.3, p. 125) as one of the barriers to implement the sustainability, survey participants focused on improving the stakeholder's sustainability knowledge. Therefore, having proper sustainability knowledge could be considered as an important initiative for sustainability. Secondly, survey participants considered that external stakeholder

are more motivated to achieve the sustainability target than the internal stakeholders (Mean = 1.99). Thirdly, working in a team is considered to be important to motivate the stakeholders to deliver sustainable buildings at an affordable price. Interview Participants also mentioned that "Working in a Team" (section 5.5.4.2.5, p. 92) is important for construction to deliver the whole life solutions to drive systemic and scalable social, environmental and economic change.

From Table 6.11 it's also evident that impact of Government, Regulatory Bodies, Local Community and Media has less impact on the sustainability target (Mean = 2.75). Interview participants also considered "Government Initiatives" (section 5.6, p.119) as one of the barriers to implement the sustainability in construction. Finally, participants considered that internal stakeholders (Mean = 3.21) have less impact on bringing innovative ideas than the external stakeholders (Mean = 2.06) for sustainable development. Following outcome could be drawn from the descriptive chart –

- Having sustainability knowledge amongst all stakeholders encourages and supports the sustainability development,
- Both the Internal and External Stakeholders need to be motivated to achieve the sustainability target,
- Working in a team motivates the stakeholders to deliver sustainable buildings at an affordable price,
- External stakeholders bring more innovative and creative ideas than internal stakeholders. To create the innovation the company needs to take the approach of developing the creative thinking of internal stakeholders to develop effective communications and authority,
- Stakeholder's collaboration helps to generate ideas in order to reduce the project risk.

Summary

All of the findings from the correlation between Stakeholder Engagement and Construction Sustainability are summarised in the following table 7.8 –

	Improvement Actions
Purpose of Stakeholder Engagement	1. Sharing real time and exact information to the key person, 2. Customizing continuous improvement of the project to reduce time. 3. Considering the Purpose of Stakeholder Engagement as a standard to achieve the sustainability
Impact of Stakeholder Engagement	1. Having collaborative business agreement at the project initiation to share any circumstances, 2. Considering stakeholders desire, expect or be entitled for a particular level of involvement to share pain and gain, 3. Need to engage all stakeholders, 4. Assessing the impact of stakeholder Engagement at project initial stage.
Communication with Stakeholders	1. Information needs to be central and easily accessible, 2. Upwards and downwards flow of communication leads to a more committed and loyal workforce, 3. Exploring competitor, market data to know the current market trend and let the customers know what they are offering better than that,
Stakeholder Analysis	1. Prioritizing stakeholders' demand according to the importance of time, cost, effort and risk estimates, 2. Prioritizing stakeholders' demand according to their relationship with the sustainability outcome not only by their power, 3. Analysing stakeholders according to the importance of their demand and their relationship with project activities, 4. All stakeholders need to be equally analysed, 5. Giving Importance to the knowledgeable stakeholders to deal with project cost, risk, sustainability and lead time.
Stakeholder Mapping	1. Stakeholders' relationship with the sustainability objectives needs to be mapped, 2. All possible project stakeholders need to be identified from the project initiation stage, 3. All stakeholders' demands need to be identified from the project initiation stage and need to be mapped, 4. Map the stakeholders based on their demand manageability considering the cost, time and risk, 5. Map the stakeholders based on their sustainability knowledge.
Stakeholder Management	1. Need to create mutual understanding to support stakeholders and reduces the project cost, 2. Collaboration with all the stakeholders together to generate new solution and to make a prioritization of their demands mutually, 3. Needs to build specific measures to evaluate the project outcome to ensure continued and effective involvement of stakeholders, 4. Managing stakeholder relationship to manage the conflicts between them, 5. Creating motivation between the stakeholders to improve their sustainability knowledge.
Stakeholder Performance Measurement	1. Measuring performance to improve the project cost and finding better opportunities, 2. Measure how well a stakeholder is performing against the sustainability objectives, 3. Measuring stakeholder's knowledge and skills to measure their capabilities, 4. Indicator needs to be linked into the overall business objectives.

Table 7.8: Actions for Stakeholder Engagement to Improve the Construction Sustainability

7.4 Analysing the Relationship between Construction Sustainability and Construction Project Performance

The correlation between Construction Sustainability and Construction Project Performance identifies that change in one variable creates the impact to change on other variable. Achieving the construction sustainability is a strategic process to establish performance goals for environmental, social and economic resource utilization and management. Few of the items of the variables are weakly correlated with each other which are shown in Appendix 1, Table A_1.8.

Correlation identified that sustainable development has less impact on meeting the project time objectives. Most of the participants from the survey and interviewees were agreed on the adoption and importance of Lean philosophy in construction sustainability. However, there were a few studies which argued that lean may show a negative impact on project environmental performance (Cusumano, 1994; Rothenberg et al., 2001). Lean is a tool that will help to deliver successful management of the supply chain. Different lean tools and techniques (i.e. Value Stream Mapping) help to reduce the project operation and process lead time through nurturing the closer relationships between the supply chain partners. Therefore, lean techniques can be adopted as an essential part to improve the project performance of the construction industry and delivering better client satisfaction. Interview Participants mentioned that adopting Lean techniques offers a solution to many of the construction problems including the lead time and already evidenced its success in a large number of individual construction projects (Section 5.5.4.3.4, p.116). Participant #5 mentioned that *"……the contribution of the lean concept could not be fully assessed by reducing its initial costs and eliminating waste where we set at the targets".* So the concepts of lean needs to be investigated and its application to manage the project lead time.

The correlations also identified that customers are less satisfied with the companies' mechanism of evaluating the sustainable development as the project does not meet the project time objectives. Every sustainable development, at a minimum, must be designed to minimise the usage of resources, reduce the adverse environmental impact. Sometimes to ensure this sustainable development it increases the project time; which is considered as one of the big sustainability issues. From the interview it was identified that in most cases projects face lead the time problems because of design change, framework, late delivery etc. Few of the participants mentioned about the time management to meet the project performance.

According to #13, "we s*chedule our project activities which are the perfect way of managing project time. In this approach, the activities of the project are assessed from before and the durations of the project are determined based on the resource utilized for each activity. Moreover, to estimate and allot the resources, cost always plays a vital role in time management. Because when the schedule over-runs then the project gets quite expensive".* To manage the time objectives, company needs to prioritize and engage those project team members who have a vast working knowledge, clear idea of the problem and project goal. Thus they can suggest diverse perceptions, will be capable and willing to contribute to the project, and can make change positively within the organization.

Correlation also identified that project specification does not match with the company's sustainability objectives. Interview Participants (section 5.5.4.3.1.1, p. 102) mentioned that they try to obtain the product design specification to ensure that the subsequent design and development of a product meets the needs of the user. Hence, project specification must be inserted throughout the construction documents to ensure compliance with the sustainable design requirements. More information needs to be provided to assess current trends in economic, social and environmental phenomena related to Sustainable Development and evaluate the result. Maintaining the sustainability specification allows the top management to measure and therefore improve performance and to further improve the transparency of project outcome, and it will support the engagement of the communities in the project performance. Some of the steps are mentioned to improve the correlation between construction sustainability and construction project performance –

Construction Sustainability	
1. Appropriate information needs to be provided to assess the current trends of sustainable development, 2. Accurate project specification and design standard must be inserted into sustainable design requirements, 3. Need to further investigate the concept of lean and its application to the construction project performance especially to meet the project lead time, 4. Measuring the sustainability target helps to meet the project performance.	→ Improvement of Construction Project Performance

Table 7.9: Steps for Construction Sustainability and Construction Project Performance

7.5 Analysis of Relationship between Stakeholder Engagements and Construction Project Performance

From the correlation it is identified that as a whole the stakeholder engagement creates good impact on the construction project performance but some of the items of stakeholder engagement have weak correlation with the items of construction project performance which is shown in (Table A_1.9 - A_1.15, Appendix 1). Regarding these low correlation some of the recommendations have suggested in following sections which could improve the relationship between the Stakeholder Engagement and Construction project performance.

7.5.1 Analysing the Purpose of Stakeholder Engagement's Impact on Construction Project Performance

The overall purpose of stakeholder engagement is to drive the strategic direction and operational excellence for organisations and to contribute to the kind of sustainable development from which organisations, their stakeholders and wider society can benefit. Considering stakeholder engagement as firm-centred, the company's top management might want an exhaustive list of stakeholders in order to evaluate various claims and interests with the purpose of firm's survival, economic wellbeing, damage control and taking advantage of opportunities as a whole to promote sustainable innovation orientation (Atkinson, 1997; Ayuso et al. 2011; Savage et al., 1992). The motivation for engaging project stakeholders depends upon the project strategic objectives. Therefore, the positive relationship between the "Purpose of Engaging Stakeholders" and "Project Performance" could be improved by more precisely relating and explaining the purpose of stakeholder engagement with the project objectives. Correlation identified some of the items have low correlation which is shown in (Appendix 1, Table A_1.9).

The interviewees considered that motivation of stakeholder's engagement aims to improve the project efficiency through their commitments and responsibilities. Correlation shows that sharing knowledge has less impact to achieve the economic sustainability which means that it fails to meet the project estimated budget. When the knowledge and information sharing is pre scheduled or pre planned from upward to downward hierarchy level sometimes it might create conflict and disruption with others as knowledge does not come under deep analysis. Interview participants mentioned that (section 5.5.4.2.1, p. 86) the company needs to consider exactly what type of information is required for making better decisions and need to avoid the unnecessary flow of information. Interview participants mentioned that in some cases

especially for the novice or newcomers are considered to be less important to share information. Participant #13 mentioned that *"…..some of the best knowledge sharing cultures is where everybody believes that their knowledge is respected, valued and used to inform decisions".* It needs to make sure that all the project team members are equally considered to participate in sharing information which will eventually generate more innovative solution to improve the economic sustainability.

Correlation also identifies that putting too much concentration on continuous improvement increases the project lead time. As discussed before in section 7.3.1 (p. 201) that participants concerned about the fact that sometime their excessive concentration on continuous improvement focus on only improving the project efficiency rather than improving the targeted area. They also recommended that one type of continuous improvement process does not fit for all purposes. It could increase the project lead time. Therefore it needs to customize.

Correlation also finds that excessive communication and discussion among the internal and external stakeholders could increase the project time. Participant #2 mentioned that, *"In every project, it needs to assign one person to make sure that communication actually happens - but must be the right communication. If not then the team will start having long meetings…… dispute about things they don't really care about only to make out their own opinions."* The major communication problems are that there is usually not enough information or there is unnecessary information or it is delivered after-the-fact. Therefore to make the communication more helpful, it must be properly delivered and in the amount needed for people to become only knowledgeable without causing them to respond excessively or misinterpret. It also will be helpful creating a leadership to deal with the information to reduce excessive communication flow and manage the time objectives. Some of the following measurement steps could be taken as steps to improve the correlation between the variables –

Purpose of Stakeholder Engagement	
1. Sharing real time information and making sure of its usage to reduce unnecessary communication, 2. Reducing the project risk and uncertainty to keeps the end users happy, 3. Reducing the project risk and uncertainty to improve the sustainable development, 4. Meeting the project specification through discussing the current project issues. 5. Prioritizing the knowledge of all stakeholders, 6. Creating Leadership to deal with the information to reduce excessive communication flow, 7. Giving importance to the whole project team in decision making to manage innovation,	→ Improvement of Construction Project Performance

Table 7.10: Steps to Improve the Purpose of Stakeholder Engagement on Construction Project Performance

7.5.2 Analysing the Relationship between Impact of Stakeholder Engagement on Construction Project Performance

It is evidenced from the correlation (section 6.10.2) between Impact of Stakeholder Engagement and Construction Project Performance that Stakeholder Engagement has a good impact to improve the project performance. Andriof (2001) suggested that Stakeholder engagement is premised on the notion that *'those groups who can affect or are affected by the achievements of an organisation's purpose*' should be given the opportunity to comment and input into the development of decisions that affect them. Interview Participants suggested that during the project planning process rather than deciding whether the stakeholders want to engage with or not; the decision needs to be taken about the purpose of engagement and how successfully they need to be engaged. Some of the items between the variables have low correlation between them which is shown in (Appendix 1, Table A_1.10).

Interview participants mentioned that (section 7.3.2, p. 203) sharing the pain and gain creates comparatively strong motivation simply when certain conditions are met mutually. Therefore, it needs to ensure that all key terms in an agreement are written down and agreed to. This agreement will create the need for collaboration and integration between the stakeholders and up and down in the supply chains. An integrated project team or an integrated supply chain creates collaborative relationships and targets to share the pain and gain. Participants also considered that an appropriate risk management strategy is also helpful to prepare for managing risk and sharing the outcome.

Correlation shows that reducing the energy emission, reducing risk and uncertainty, improving the productivity, improving business opportunities has less impact on managing the project time. Interview Participant #9 quoted that, *"We try to estimate the total project time……..we don't know how long the project will take and won't be able to get commitment from the stakeholders who will continue or who will sign off. We try to estimate all of the assumptions, exclusions and constraints that are relevant and it will help when estimates are questioned, and will also help to identify any risky or problematic areas if circumstances get varied".* Therefore to make the project successful it needs to estimate the total project time at the initial stage considering project resources, constraint and project target. Trying to apply sustainable project methodologies to the time management group may seem challenging, but it is simpler than one might think. With regards to manage time, the processes required to manage the timely completion of a project which includes that the stakeholders need to aware of all the project activities, the resources estimation, each activity duration and the project schedule. Each of the activity could be broken down into small activities with time allocation and need to be treated from sustainability perspective.

Impact of Stakeholder Engagement	
1. Need collaborative agreement from the project initiation to generate solution, 2. Creating an integrated project team or supply chain to share pain/gain, 3. Need to estimate the total project time considering the project resources and constraint, 4. Breaking down the project activity with small activities with the allocated time, 5. Adopting risk management strategy to keep the stakeholders prepared to share pain/gain.	→ Improvement of Construction Project Performance

Table 7.11: Steps to Improve the Impact of Stakeholder Engagement on Construction Project Performance

7.5.3 Analysing the relationship between the Communication with Stakeholders and Construction Project Performance

This correlation between Communication with Stakeholders and Construction Project Performance proves that communication among the stakeholders plays a vital role to improve the construction project performance. In fact effective communication helps to change the people's perceptions and helps to adjust the expectations to make them more realistic and achievable. To improve the communication about 9 of the interviewees emphasized on

sharing information to create a collaborative environment that builds teamwork and increases stakeholder's satisfaction with their work. Some of the interviewees (section 5.5.4.2.1, p. 86) stressed on sharing knowledge as a way of sharing information that helps to transmit knowledge to others when it is combined with experience, context, interpretation and reflection. The evidence from both the interview and survey perception therefore confirms that strong communication skills are critical to keep the stakeholders informed, supportive and enthusiastic. Correlation also identifies that some of the items have low correlation between the variables which is shown in (Appendix 1, Table A_1.11).

Correlation shows that communication process creates low impact to meet the project time objectives. Though communication works as an effective method of making more socializing and interaction with each other, sometimes people find that during communication people spend too much time deciding what it is they want to say, what the core messages are that they want their employees to receive (Quirke, 1996; Dawkins, 2004). Interviewees also showed their concern that most of the clients and customers are not aware of the sustainable infrastructure so it takes a long time for them to convince them (section 5.6.3, p. 125). Therefore when stakeholders agree that communication is needed so it needs to be done with those who knows what needs to be changed, who want to change and to those who have the capability to make change happen. Participant #5 mentioned that, *"wasting time at meetings often leads to cynicism, demotivate the team and it's also reduce the confidence among the team members".* Avoiding the tendency to involve every possible person in every discussion it needs to make more progress with a small number of the right people. Then it will change the behaviours and decision-making ability of the stakeholders depending on how things are communicated with them.

Correlation shows that participants are less interested in communicating through meetings or consultation with other team members. Sometimes it takes plenty of time to arrange a meeting. In a rising commercial world and globalizing era, at times travelling to communicate with customers or team members is not always feasible or economical. Similarly, interview participants mentioned that (section 5.5.4.2.5, p. 92) it is just waste of time doing lots of formal meetings, also waste of resources and money. It needs to adopt the stakeholders' decision-making style and find out how they actually make decisions and adopt communications accordingly. Not all decision-makers have the same approach, so it needs to look at how the people like to communicate.

Correlation shows that clients have less opportunity to provide their feedback. In order to measure the quality of both service relationships and performance in these types of situations there is need for individualized feedback methods. Interview participants mentioned that (section 5.5.4.2.1, p. 86) participants discuss with their stakeholders and take feedback from them for continuous improvement. The following measurement could be suggested to summarise the above evidences –

Communication with Stakeholders	
1. Understanding problem and involving the right person in communication process, 2. Regular communication with extended project team supports, 3. Using simple and understand able message for communication, 4. Communicating with the required and exact stakeholders rather than with all, 5. Creating opportunities for stakeholders to provide their feedback.	→ Improvement of Construction Project Performance

Table 7.12: Steps to Improve the Communication with Stakeholders on Construction Project Performance

7.5.4 Relationship between Stakeholder Analysis and Construction Project Performance

This correlation between Stakeholder Analysis and Construction Project Performance proves that stakeholder analysis has moderate impact on improving the project performance. In spite of having modest impact between these two variables survey participants agreed with the fact that Stakeholder Analysis helps to identify all stakeholders as early as possible that could improve the project performance. Correlation shows that prioritizing stakeholders according to their power, impact and urgency has less impact to fulfil the project outcome. As mentioned in the (section 7.3.3, p. 205) sometimes prioritizing stakeholder's demands according to their power and urgency focuses on only the most important stakeholder's requirements. This could impact on the project outcome as the weaker stakeholders' demands get supressed.

Correlation between the stakeholder analysis and construction project performance identified that prioritizing internal stakeholders has less impact on construction project performance. Correlation also identifies that analysing the stakeholders according to their power does not meet the project time objectives. Participants #13 mentioned that, *"In analysing the stakeholders the perception of power being misinterpreted as it dominates the expectations of*

other less power full stakeholders". Researchers (Val, 2005; De Villiers & Van Staden, 2006) and some of the interviewee's disagreed with the prioritization of stakeholders based on their power and they also remarked from their experience that this power is used where stakeholder expectations dominate and/or compromise strategic development. It could underestimate or differentiate the level of interest of the different stakeholder groups and ultimately increase project time to manage this conflict.

Most of the interviewees differed on prioritizing the stakeholders and their demands as it creates discordance among the extended project team. They mentioned that the situation could arise when the external stakeholder interests do not match with the internal; it needs to consider potentially competing interests among different stakeholders. Usually external stakeholders' aim is to achieve the user and client-related marketing goals and the internal stakeholder's intention is to accomplish the employee-related marketing goals. When the conflict of prioritizing the demand arises it is important to prioritize each stakeholder's demand according to the situation or the success of the organization. To manage the stakeholders demand, Slater (1997) proposed the strategic integration of demand and supply processes originated in the economics literature as a way to explain how superior customer value can be obtained through effective knowledge management. Participant #6 mentioned that, *"……..to improve these situation* (demand priority) *we estimate the situation by valuing time, effort, or risk estimations to prioritize the situation to improve through the using of the planning sessions where estimates are caused using group estimation techniques from all stakeholders".* Participants also mentioned that they share the market data and information between the supply and demand functions and strategic management of customer views corresponding with the fulfilment of customer satisfaction. Hence, it needs to prioritize stakeholders by balancing their demand and supply, resources capability. Therefore, the correlation between stakeholder analysis and construction project performance summarised the following findings.

Stakeholder Analysis	
1. Identifying all stakeholders as early as possible, 2. Ensuring the quality of decision making by diverse range of project stakeholders, 3. Prioritizing stakeholders by balancing their demand and supply, resources capability through sharing market data, sharing information, 4. Prioritizing stakeholders demand according manageability by their time, effort, or risk estimations rather than prioritizing by power.	→ Improvement of Construction Project Performance

Table 7.13: Steps to Improve the Impact of Stakeholder Analysis on Construction Project Performance

7.5.5 Analysis of Relationship between the Stakeholder Mapping and Construction Project Performance

Survey Participants agreed with the fact that stakeholder mapping visualizes that no one important has been overlooked in planning, designing, implementing or evaluating the project. Survey participant also agreed that stakeholder mapping identifies all those people or organisations that may have an important impact on the project or who may be affected by the project. Some of the following factors are identified as from the low relationship between Stakeholder Mapping and Construction Project Performance which is shown in (Appendix 1, Table A_1.13).

Correlation shows that though mapping the stakeholders makes sure that no one has been missed out during project planning and implementing stage, it does not create any impact on meeting the project time objectives. Similarly, interviewees were concerned that (section 5.5.4.2.4, p. 90**)** stakeholders might change in the middle of the project due to the change in design and clients and customers change. As a result, the change of the stakeholders could increase the project time schedule as well as the cost. During interview no one has mentioned any further explanation to recover this condition; moreover they concerned that they were struggling to overcome the situation. Adopting risk management approach would be useful solution to mitigate this situation. It also assesses the risk related to each stakeholder based on their interest and impact on the project.

Correlation also identifies that though the stakeholder mapping helps to identify the stakeholders' demands and helps to visualize the relationship between the stakeholders which

creates less impact to fulfil the project time objectives. Interviewees mentioned that in most cases when the key stakeholder's demands are not fulfilled they are more likely to create difficulties than any other stakeholders. Key stakeholders are considered to be important as most of the project work depends on them. Most of the interviewees mentioned that the nature of the project is changeable, so there is every chance that the initial expectations of the key stakeholders need to be modified in some way over time. Sometimes their demand is unrealistic and is challenging and time consuming to fulfil. They need to understand that there are other stakeholders' expectations which are also need to be considered. When they are well managed they will feel more aligned, committed and motivated to understand. As previously mentioned in (section 7.3.5, p.208) one way to improve this situation is mapping the stakeholders' demands based on their manageability considering the project time, cost and risk. Based on this mapping it will then be easy to determine what type of relationship needs to be maintained with these stakeholders to make them understand about the others demand.

Interview Participant #10 mentioned that, *"……it needs to make all the stakeholders understand that importance is depending on their requisite in the project not based on their supremacy".* Prioritizing stakeholders based on stakeholders' authority needs to be based on their influence to motivate others, and should not be done by their demand, knowledge and opinion. All stakeholders in a particular group or sub-group do not have the same concerns or have unified opinions or priorities. They might have the different levels of interest and levels of influence over the project performance. If all of the stakeholders' needs and concerns are mapped together with the stakeholders it might be easier and reduce time to manage them and manage their demand. Therefore, the correlation between stakeholder analysis and construction project performance summarised the following findings.

Stakeholder Mapping	
1. Assessing the risk from the map related to each stakeholder based on their interest and impact on the project, 2. Maintaining a good relationship with the stakeholders to make them aware of the others demands, 3. Need to equally consider the requirement and motivation of weak /less important stakeholders and map them, 4. Stakeholder demand and concerns related to the project objectives needs to be mapped.	→ Improvement of Construction Project Performance

Table 7.14: Steps to Improve the Impact of Stakeholder Mapping on Construction Project Performance

7.5.6 Analysis of the Relationship between the Stakeholder Management and Construction Project Performance

Correlation between composite Stakeholder Management and Construction Project Performance identifies that stakeholder management has a good impact on improving the construction project performance. Researchers (Garvare and Johansson, 2010; Yang et al., 2009) and all of the interview participants considered the importance of stakeholder management as helping to satisfy the needs and expectations of its stakeholders. Yang et al. (2009), also determined the importance of stakeholder management in construction projects to deal with the issues such as complexity in many process and parties involved, temporary relationships among stakeholders and their different interests, poor understanding of their own duties, roles and finally to address the causes of time delays and cost overruns.

The correlation shows that, effects of stakeholder management like managing conflicting and reducing risk, developing relationships, increasing sustainability knowledge has less impact to manage the project time. Participant #3 mentioned, *"There are also disadvantages to engage stakeholders. Involving stakeholders often takes long time. Depending on the project timeline, we don't get sufficient time to engage stakeholders. And again, if we include the stakeholders but don't agree with their advice, it could rise complain that hasn't been met, which can lead to cynicism and reduce morale".* Usually, stakeholder management involves taking into consideration of the different interests and values that stakeholders have and need to address them during the project to ensure that all stakeholders are happy at the end. Interview participant mentioned that when it is planned to engage the stakeholders and to manage them, most of the time the whole process turned into very time consuming and expensive. It ultimately increases the project lead time. But it is also obvious that stakeholders are the main controller of the project and if they are not properly managed it will fail the whole project. Therefore, if the stakeholder's demands and concerns are co-ordinated with the project objectives and an effective management of relationships between stakeholders is maintained it would be easier to manage the stakeholder. Interview participants also agreed with the fact that managing relationship with the stakeholders is time consuming and complex. However, managing good relationship with stakeholders is a consistent way of generating new business solutions and keeping the management prepared to manage risk. The company needs to keep the relationship channel open for all stakeholders and adopt it as an organisational culture. Therefore all stakeholders will be more motivated to manage their own relationship.

Stakeholder Management	
1. Adopting stakeholder's risk management approach to manage conflicts among extended project team, 2. Co-ordinating the stakeholders' demands and concerns with the project objectives, 3. Practising stakeholder Management system to promote learning from past experiences, 4. Keeping the relationship channel open for all stakeholders and adapt it as an organisational culture.	→ Improvement of Construction Project Performance

Table 7.15: Steps to Improve the Impact of Stakeholder Management on Construction Project Performance

7.5.7 Analysis of Relationship between the Stakeholder Performance Measurement and Construction Project Performance

This correlation between Stakeholder Performance Management and Construction Project Performance identified that measuring stakeholder's performance creates a moderate impact on the construction project performance. Interview participants and researchers (Paprika et al, 2008 and Cooper, 2007) also considered the importance of measuring stakeholder performance, as a key supporting mechanism for project managerial decision making purpose.

Correlation shows that, measuring stakeholder performance against the stated responsibilities increases the project time. Interviewees mentioned that some of the stakeholders were unwilling to measure their performance as it could put them under pressure and could reduce the quality of the work. Though measuring the stakeholder's performance and collecting measurable data is time consuming, there is a need to measure the stakeholder's performance to know how they are performing. Interviewees mentioned that (section 5.5.4.2.3, p. 89) for each measure, performance needs to be defined to identify the data to measure and to understand the important aspects that will effectively make up the action plan to ensure that the right thing is measured in an appropriate way. If the set of metrics and the measurement system is identified from the beginning of the project, it will be easier and less time consuming to measure the stakeholder's performance.

Correlation also shows that it is difficult to select the correct KPI to measure the social and environmental performance. Firstly, Stakeholders do not represent the whole project's performance; their usual responsibility is to create the organisation's performance through

their decisions and activities with their collaboration. Sometimes their individual performance in different areas doesn't improve the whole project performance. When an employee's goal is defined in terms of an organizational KPI, it ensures that what the employee is doing is well aligned with the goals of the organization. This is the critical link between employee performance and organizational success. KPI's need to be linked into the overall business objectives against which stakeholders are assigned to achieve these objectives. Interview participants identified some of the KPI's like Productivity, Energy Consumption, Customer Satisfaction, Health and Safety Performance, Personal Knowledge, Creativity of new product development, Earned Revenue, Projects completed on time and on budget to measure the stakeholder performance. Participant also mentioned Practices to Measure the KPI like Continuous Improvement, Risk Management Process, Use of Balance Scorecard, Existence of Peer Appraisal, and Process for Evaluation of Competencies. Metrics need to be based on the stakeholder's relationship with the project objectives and are determined based on their performance. Success by the different stakeholders in meeting their respective Key Performance Indicators related to their roles and responsibilities will help the company to meet its overall KPI.

Stakeholder Performance Measurement	
1. Performance measurement identifies the individual qualities which delivers better outcome of the project, 2. Performance needs to be defined and specific, 3. Indicator needs to be coordinated with the project objectives, 4. Metrics and the measurement system needs to be identified from the beginning of the project, 5. Metrics need to be based on the stakeholder's relationship with the project objectives.	→ Improvement of Construction Project Performance

Table 7.16: Steps to Improve the Impact of Stakeholder Performance Measurement on Construction Project Performances'

Summary

A successful stakeholder engagement approach will focus on delivering the project on time across the entire stakeholder experience (Jagersma, P. K., 2009; Jones, 2008). All projects will have some stakeholder engagement, but the level of stakeholder engagement will vary from stakeholder to stakeholder. All of the improvement actions of Stakeholder Engagement on Construction Project Performance have been merged in the following Table 7.17.

	Improvement Actions
Purpose of Stakeholder Engagement	1. Sharing real time information and making sure of its usage to reduce unnecessary communication, 2. Reducing the project risk and uncertainty to keeps the end users happy, 3. Reducing the project risk and uncertainty to improve the sustainable development, 4. Meeting the project specification through discussing the current project issues 5. Prioritizing the knowledge of all stakeholders 6. Creating Leadership to deal with the information to reduce excessive communication flow, 7. Giving importance to the whole project team in decision making to manage innovation,
Impact of Stakeholder Engagement	1. Need collaborative agreement from the project initiation to generate solution, 2. Creating an integrated project team or supply chain to share pain/gain, 3. Need to estimate the total project time considering the project resources and constraint, 4. Breaking down the project activity with small activities with the allocated time, 5. Adopting risk management strategy to keep the stakeholders prepared to share pain/gain.
Communication with Stakeholders	1. Understanding problem and involving the right person in communication process, 2. Regular communication with extended project team supports, 3. Using simple and understand able message for communication, 4. Communicating with the required and exact stakeholders rather than with all, 5. Creating opportunities for stakeholders to provide their feedback.
Stakeholder Analysis	1. Identifying all stakeholders as early as possible, 2. Ensuring the quality of decision making by diverse range of project stakeholders, 3. Prioritizing stakeholders by balancing their demand and supply, resources capability through sharing market data, sharing information, Prioritizing stakeholders demand according manageability by their time, effort, or risk estimations rather than prioritizing by power.
Stakeholder Mapping	1. Assessing the risk from the map related to each stakeholder based on their interest and impact on the project, 2. Maintaining a good relationship with the stakeholders to make them aware of the others demands, 3. Need to equally consider the requirement and motivation of weak /less important stakeholders and map them, 4. Stakeholder demand and concerns related to the project objectives needs to be mapped.
Stakeholder Management	1. Adopting stakeholder's risk management approach to manage conflicts among extended project team, 2. Co-ordinating the stakeholders' demands and concerns with the project objectives, 3. Practising stakeholder Management system to promote learning from past experiences, 4. Keeping the relationship channel open for all stakeholders and adapt it as an organisational culture.
Stakeholder Performance Measurement	1. Performance measurement identifies the individual qualities which delivers better outcome of the project, 2. Performance needs to be defined and specific, 3. Indicator needs to be coordinated with the project objectives, 4. Metrics and the measurement system needs to be identified from the beginning of the project, 5. Metrics need to be based on the stakeholder's relationship with the project objectives

Table 7.17: Areas to improve the impact of Stakeholder Engagement on construction project performance

Ideally, the diverse expectations of stakeholders need to be mutually well-matched, but in some cases, it needs to balance between different priorities, as well as between external demands. Among 233 questionnaire responses and 16 interviews, the participants have shown different attitudes about the stakeholder engagement and construction project performance related activities. The correlation identified some of the issues and all these issues are analysed to improve the relationship between the variables. After analysing these issues some of the improvement actions are proposed to improve the stakeholder engagement's impact on the construction sustainability and construction project performance.

7.6 Analysis of Variation between the Role of Interview Participants Observations and the Stakeholder Engagement

The role of the survey participants are Owner, Director, Architect, Designer, Contractor, Subcontractor, Builder, Engineer, Consultant and Other. Other includes the Health, Safety and Environmental Management, Procurement Manager, project and construction manager, Supplier, Operations Manager etc.

The ANOVA test result shows that the difference in participant's responses about the stakeholder engagement. Test results indicate that different participants have different reactions and they differ with the participant's roles. The reason for this variation is the variation of their responsibilities and their involvement with the project activities. Table 6.28 (p.185) and Appendix 2 indicate that in most cases Architects' responses varied with the other roles. The reason for this variation is Architects' responsibilities. Architects are mostly involved with the implementation of delivering detail drawings and designs rather than with the management of the team. As their responsibilities are varied from the managing of the project activities and managing the stakeholders, possibly that would be the reason for the variation of their responses with all other participants. As only three Architects participated in the questionnaire process, the response could be considered as irrational.

After that, directors' and owners' responses varied with the other participants. Directors and owners are considered as the main regulators of the project. As a key regulator of the project it is their responsibility to control over the other stakeholders. Moreover they belong to the top project management level and set up the planning of the project activities and stakeholder engagement and also impose it on the other stakeholders. Survey findings indicate that Directors' responses are varied to assess the purpose of the stakeholder engagement, to assess

the impact of the stakeholder engagement and to communicate with the stakeholders. As directors are from the top management level they could set up the rules and regulation for assessing the purpose of stakeholder engagement, assessing the impact of stakeholders. Therefore, their communication process is also differed them the other participants.

Thirdly Engineers' responses varied mostly with the other stakeholders. The reason for this variation is engineers' roles and responsibilities in the project. Engineers are mostly involved with the technical disciplines rather than the management. They create the liaison between the project manager and the technical disciplines. Therefore it is important to manage the engineers from a technical perspective.

Finally the sub contractors' responses mostly varied with other participants. The reason behind this variation is the subcontractor is usually hired by the contractor and in many cases they are assigned to perform the part of the project process or a particular work of the whole project process. Possibly this could be the reason for the variation of subcontractors' responses.

It is also noticeable that except for the Architects, all of the participants were agreed on the stakeholder mapping and stakeholder analysis. During the interview only a few of the participants mentioned about the stakeholder mapping. The survey results also indicate that stakeholder mapping process does not vary with the participant's roles. On the contrary it indicates that it needs to map all the stakeholders in the same way.

Table 6.28 (p. 185) also identified that participants' responses mostly varied with the variable "Impacts of Stakeholder Engagement" which indicates that different participants prospects demands from stakeholder engagement are different. And this variation depends upon their roles. Therefore, variation of the participant's responses indicates that each stakeholder has different expectation and different interest as to the results of the stakeholder engagement. Basically these diverse expectations are need to be mutually compatible and need to be balanced. For that reason, management needs to ensure the control of the diverse expectations of the stakeholders to improve the project performance. Following are some of the outcomes as identified from the ANOVA findings that could be considered to deal with the stakeholders expectations –

- Needs to discuss and communicate with all of the stakeholders to know about their interest and concern regarding the engagement between them,
- Managing stakeholders from their different standpoints and from their involvement with the project outcome,
- Involving whole project team in the stakeholder analysis and mapping process,
- It needs to create a common key message to communicate with different stakeholders,
- Architect needs different consideration to manage them.

Summary

The ANOVA test result shows the different participants' responses about the stakeholder engagement. Empirical investigations have shown that the relationships and interactions between the architecture of systems, their development projects, and the organizational teams involved, should be aligned in order for a company to become successful. It needs to integrate the different attitudes of the participants to make sure of those stakeholders' involvement in the project performance.

7.7 Analysis of Variation of the Companies' Strategic Focuses

From the ANOVA test of Hypothesis 5, 6 and 7 it is identified that stakeholder engagement, companies' sustainability targets and project performance depends on the companies' targeted strategic focuses. Previous studies and interviews considered these strategic focuses as the measurement of project performance which is proved from the ANOVA test. The test also verified the importance of stakeholders' involvement to achieve the strategic focus. Each company has their own strategic goals. Figure 6.3 displays that customer satisfaction (53%) is the first priority of the companies which is followed by quality (16.50%). In most of the organisation the management is interested in improving the project performance to improve the business results or customer satisfaction. Interview participants also considered achieving Quality and effective accomplishment of agreed goals between the internal and external stakeholders.

According to the Project Manager (#2), *"When a construction company targets for achieving sustainability considering Triple Bottom Line (TBL) there is a possibility that companies can inevitably improve their project quality, efficiency and customer satisfaction with the help of the internal and external stakeholders".* Most of the interview participants agreed with the fact that, in sustainability target though different stakeholders and customers impose their

pressure to reduce the cost, but still their vision is for the product which is valued for money, has best quality, efficient and has positive business image. One of the Contractors (#7) mentioned that *"……eventually setting up the goals or sustainability engage and motivate the challenges that lead in the direction of vision by providing broad sectors which emphasis on the reducing the energy consumption, minimize the cost, staying true to your path to sustainability to improve the value of a project".* To achieve any of the strategic focuses a thorough engagement of stakeholders is desired to be important and the project performance can be increased as a result of achieving any of the strategic focuses. Across all the activities engagement with the stakeholders helps to reach Sustainable Living Plan targets, identify issues of concern, guide the strategic objectives and reporting and provide feedback on specific areas of activity (Eskerod and Huemann, 2013). One of the Project Directors mentioned that, *"……sustainability is just doing our business right and improving the project success in a defined and precise way. We also have faith that it is a basis that contributes through the whole supply chain, it gives us a competitive advantage by applying it in achievement our objectives, in branding our product and in marketing and development process."* Testifying the goals in measurable terms and considering the stakeholders responsible for attaining their assigned targets within a definite time frame provides a strategic decision making for what is needed to achieve improvement of the project performance. Figure 7.2 shows the relationship between Stakeholder Engagement, The strategic Focus and Project Performance. Diagram shows the impact of stakeholder engagement on achieving construction sustainability and construction project performance which will ultimately improve the project performance. Therefore, Stakeholder Engagement can help to improve performance:

- Through helping to identify the adjustments between different stakeholders' objectives and sustainability targets,
- Through helping to evaluate the policy and project impacts like the environmental, social and economic impacts on the stakeholders' interest and involvement,
- Through generating a sense of ownership early in the development process,
- Through providing opportunities for learning for both the project team and stakeholders themselves and identifying the conflicts between them,
- Relating the stakeholder's responsibilities with the project's goal and bound it within a time frame to achieve.

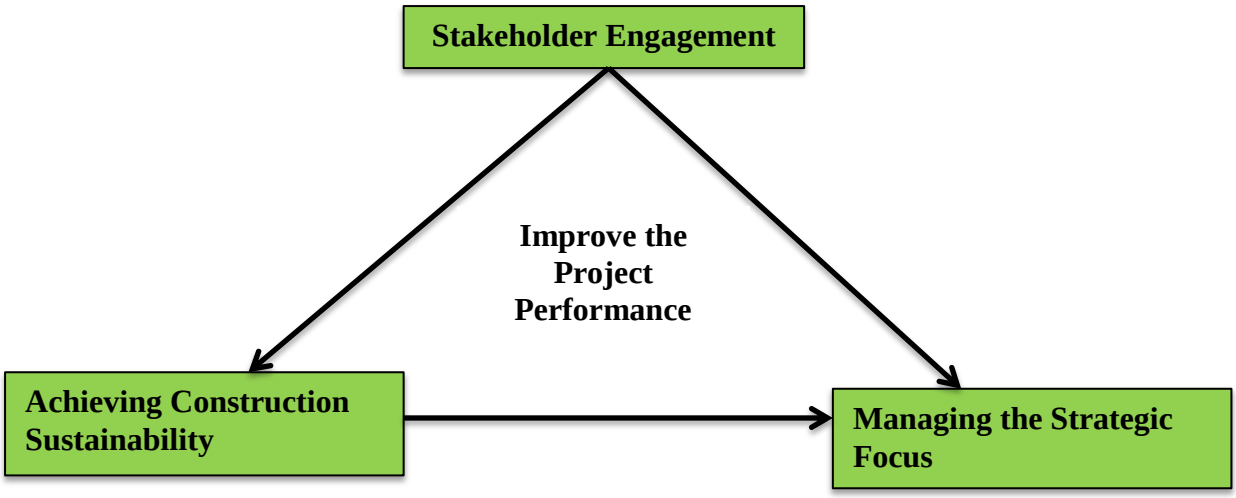


Figure7.2: Relationship between Stakeholder Engagement, The strategic Focus and Project Performance

7.8 Framework for Integrative Process to Improve Project Performance

The strong positive relationship between the stakeholders engagement process, construction sustainability and construction project performance indicates that their interrelationship and dependency on each other. Some of the items of these variables are weakly correlated; some of the measurement steps are suggested (table 7.8, p. 215) to improve the relationship. The interrelationship between the variables stakeholder engagement and construction sustainability indicates that the sustainability target depends on the support and participation of stakeholders and their relationship with the sustainability objectives. Likewise, the interrelationship between the construction sustainability and construction project performance indicates that construction sustainability target is indispensable to the attainment of construction project performance.

The variation in participants' roles indicates that it needs to consider different stakeholders' interests and concerns to engage the stakeholders. The survey findings also identified that each and every company has their own strategic goal and it can be achieved through achieving the company's sustainability target and improving the company's project performance.

Interview participants mentioned that they set some targets with their project objectives to achieve the sustainability target. From the questionnaire survey it is already identified that stakeholder engagement has good impact on the construction sustainability target. This proposed framework considered sustainability target as an initial element which needs to be incorporated into the project objectives. Moreover, from previous literature reviews it is also

identified that achieving the strategic goals like improving project cost; quality and time accelerate to achieve the construction sustainability. Therefore, this framework considered to set up some strategic goals to achieve which are related to the sustainability target. As stakeholders are the main controller of the project and considering the good correlation between the stakeholder engagement and construction sustainability this framework considered the planning for engaging stakeholders to achieve sustainability. From interview and survey it is identified that both the purpose of engaging stakeholders and its impact has good impact on the sustainability target.

This framework considered that after engaging stakeholders it needs to consider the purpose of the engagement and individual impact of the engagement on the sustainability target. Interview and survey findings identified that communication with stakeholders, managing stakeholders risk, managing stakeholders risk, managing stakeholder's performance have good impact on achieving construction sustainability and improving project performance. For this reason the proposed framework considered to make the stakeholder engagement successful it needs to manage good communication with the, manage their risk, need to analyse and mapping the stakeholders and measuring their performance. From section 7.7 identified the stakeholder engagement's impact on the construction sustainability target and managing the strategic focus. Therefore, combining all the process of stakeholder engagement creates the impact on achieving the sustainability and company's strategic focus. Finally considering stakeholders' impact on improving the project performance and from the correlation analysis, this conceptual framework shows all of the combined processes will improve the construction project performance. From both the interview and questionnaire analysis it is identified that it needs to consider the communication flow from upstream to downstream stage. To explore the forth research objective, this research identified some of the drivers and barriers to adopt sustainability. Therefore, findings from the survey identified that these barriers need to take consideration to remove and to accelerate sustainability achievement in construction.

The correlation also recognized the fact that stakeholder's engagement has less impact to evaluate the sustainability outcome and meet the project time objectives. Analysing the findings from the questionnaire survey and interview some of the improvement actions are suggested to improve stakeholder engagement's impact on the construction sustainability and construction project performance. Based on this relationship between the different variables

and interview analysis this research has developed a framework (figure 7.3, p. 235) to show stakeholders' involvement to achieve the project performance. In this framework sustainability target is linked with setting up a strategic goal related to the sustainability target. Once the goal is set it needs to plan on engaging the stakeholders to achieve the sustainability target. Different companies' strategic goals and sustainability targets are different. Bases on that it needs to determine the purpose of engaging stakeholders and it's possible on the sustainability target. To make the engagement process more successful stakeholder engagement process is subdivided into communicating with stakeholder, managing stakeholders, analysing and mapping stakeholder, measuring stakeholder risk and stakeholders performance. All of these processes will combinable assist to achieve the triple bottom line and achieving the strategic focus. Achieving the triple bottom line and company's strategic focus will improve the project performance. In this whole process it needs to consider the possible barriers and needs to take appropriate measures to overcome these barriers. Figure 7.4 is the extend version of figure 7.3 and drawn by combining all of the improvement actions identified from analysing the interview and questionnaire survey. All these improvement actions have been collected from table 7.8 and 7.17 and are integrated into the framework which is essential to engage the stakeholders to improve the construction project performance. All of these recommended improvement actions will possibly engage the stakeholders in a more active way and will also link the sustainability target more dynamically with the project performance. It also includes some of the actions that are necessary to overcome the barriers to implement sustainability in construction. This framework provides the set of concepts that integrates different aspects of the project management and also works as a strategy to keep the stakeholders engaged and focused on improving the project performance. All of the suggested improvement actions will inform the stakeholders to identify the solution of the problems quickly and generate the sense of collaboration to fix them. It will work as an effective strategy to motivate the stakeholders to be more engaged and will fill up the gap in the current trend of stakeholder's contribution in the sustainability practice.

The proposed framework (figure 7.3) will be beneficial and applicable for those involved in the initiation, management and delivery of construction projects. There are seven processes to engage the stakeholders. The first step focuses on the purpose of engaging stakeholders. Because of their variation in roles and responsibilities, after making the plan for engaging stakeholders one needs to consider the reason for engaging the individual stakeholders and

their individual impact to achieve the sustainability target. One needs to communicate with all the project stakeholders from the project initial stage to the project execution stage and through to handover and closure. Because stakeholders have diverse demands and concerns all stakeholders need to analysed and mapped in terms of having sustainability knowledge, demand and manageability. Stakeholders can be major influencers on projects and a failure to consider the risks of disengagement or a lack of engagement could jeopardise the project. Therefore one needs to manage all the stakeholder-related risk and also manage their performance.

However in figure 7.4 all the improvement actions are only applicable for particular cases to improve the process of engaging stakeholders for achieving the sustainability related targets. Initially this framework will help to create the motivation among the all stakeholders (contractor, sub-contractor, builder, engineer, and client) to work together. And all these improvement actions will offer insights and practical ways to engage the stakeholders effectively and to reduce the adverse impact of dysfunctional relationships among the stakeholders. These actions will be very useful for tying together all the project stakeholders, promoting effective communications among them, understanding their different perspectives and issues and, hence, improve the stakeholders' performance. Improvement actions proposed for communication with stakeholders and managing the stakeholders helps both the external, internal, primary and secondary stakeholders to understand the situation, to resolve any differences and to, create an environment where creative ideas and problem solving can flourish. Improvement actions proposed for analysing and mapping the stakeholders like contractors, engineers, architects, developers and builders will focus on relating and analysing their particular demands with sustainability targets. Similarly improvement actions proposed for managing stakeholders risk and measuring stakeholder performance will be applicable for all the project stakeholders from project initiation to project execution/handover/closure stages. These actions will help to improve all project stakeholder's knowledge and skills in terms of making a positive contribution.

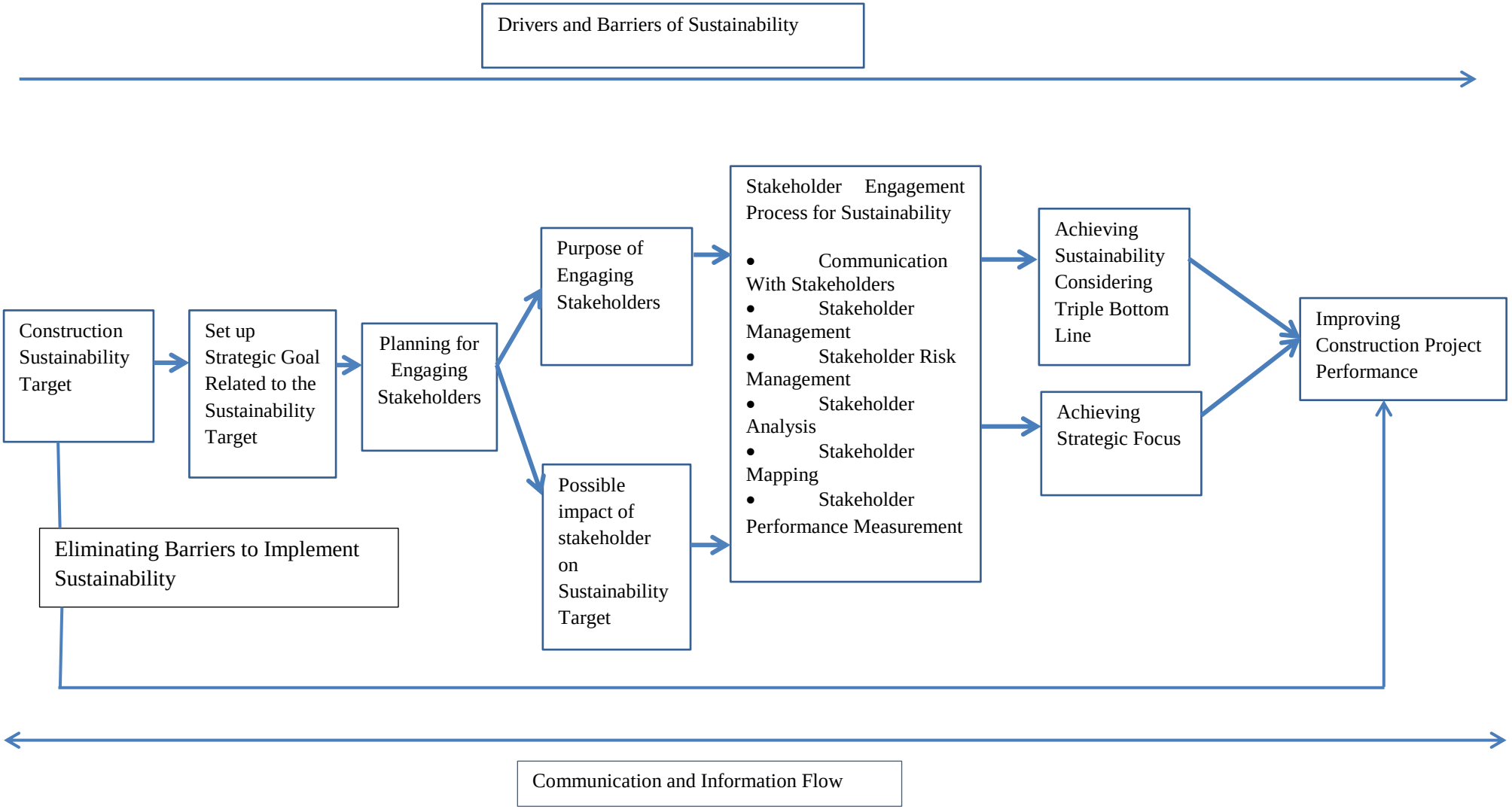


Figure 7.3: Framework for Stakeholder Engagement to achieve the Sustainability related Construction Project Performance

Construction Sustainability Target

Communication and Information Flow

Set up Strategic Goals Related to the Sustainability Target

Planning for Engaging Stakeholders to Achieve the Sustainability Target

Purpose of Engaging Stakeholders

1. Sharing the real time information and making sure of its usage to reduce unnecessary communication,
2. Reducing the project risk and uncertainty to improves the sustainable development,
3. Prioritizing the knowledge of all stakeholders
4. Creating Leadership to deal with the information to reduce excessive communication flow,
5. Giving importance to the whole project team in decision making to manage innovation,
6. Customizing Continuous improvement to reduce time,
7. Considering the Purpose of Stakeholder Engagement as a standard to achieve the sustainability.

Eliminating Barriers to Implement Sustainability

1. Setting policy as maintaining building regulation to achieve sustainability as major project outcome
2. Focus on long term strategy rather than short term during the building development,
3. Changing the organizational cultures,
4. Developing new leadership competencies and mind-sets,
5. Increasing business competitiveness,
6. Creating strategic customer demand plan considering demographic and enterprise cost,
7. Regular co-ordinate with upstream stakeholders with downstream stakeholders to estimate the end-users demand,
8. It needs to introduce new capacity to adapt climate change depends on how people are affected by it,
9. Accountability of waste management in building regulation,
10. Need to create client awareness to protect the ecosystem.
11. Need to embrace with the knowledge management practice create more innovative and make solution of complex system,
12. Educating on sustainability from the academic level,
13. Knowledge must be based on to improve the organisational traditional culture,
14. Implementing activity based coting system,
15. Cost can be reduced by focusing on the strategic focuses like productivity improvement, process improvement and process re-engineering,
16. Raising the Government's initiatives,

Impact of Engaging Stakeholders

1. Having collaborative business agreement at the project initiative to share any circumstances,
2. Considering stakeholders desire, expect or be entitled for a particular level of involvement to share pain and gain,
3. Assessing the impact of stakeholder Engagement at project initial stage.
4. Need to prioritize stakeholders according to their requisite,
5. Creating an integrated project team or supply chain to share pain/gain,
6. Need to manage stakeholder's knowledge and skill could bring new business opportunities.
7. Need to estimate the total project time considering the project resources and constraint,

Communication with Stakeholders

1. Information needs to be central and easily accessible,
2. Need upwards and downwards flow of communication as it leads to a more committed and loyal workforce,
3. Exploring competitor, market data to know the current market trend and let the customers know what they are offering better than that,
4. Understanding problem and Involving the right person in communication process to reduce tome,
5. Regular communication with extended project team supports,
6. Using simple and understandable message for communication,
7. Communicate with the required and exact stakeholders rather than with all,
8. Discussing with stakeholders to take their feedback,
9. Creating Opportunities for clients/customers to provide their feedback.

Analysing Stakeholder

1. Prioritizing stakeholders by balancing their demand and supply, resources capability through sharing market data, sharing information,
2. Prioritizing stakeholders demand according to manageability by their time, effort, or risk estimations rather than prioritizing only by power.
3. Prioritizing stakeholders' demand according to their relationship with the sustainability outcome not only by their power,
4. Analysing stakeholders according to the importance of their demand and their relationship with project activities,
5. All stakeholders need to be equally analysed,
6. Giving Importance to the knowledgeable stakeholders to deal with project cost, risk, sustainability and lead time.

Stakeholder Mapping

1. Stakeholders' relationship with the sustainability objectives needs to be mapped,
2. All possible project stakeholders need to be identified from the project initiation stage,
3. All stakeholders' demands need to be identified from the project initiation stage and need to map them,
4. Map the stakeholder based on their demand manageability considering the cost, time and risk,
5. Map the stakeholder based on their sustainability knowledge.
6. Assessing the risk from the map related to each stakeholders based on their interest and impact on the project,
7. Maintaining a good relationship with the stakeholders to make them understand of the others demand
8. Need to equally consider the requirement and motivation of weak /less important stakeholders and map them,
9. Stakeholder demand and concerns related to the project objectives needs to be mapped.

Stakeholder Management

1. Need to create mutual understanding to support and reduces the project cost,
2. Collaboration with the all stakeholder together to generate new solution and to make a prioritization of their demands mutually,
3. Needs to build specific measures to evaluate the project outcome to ensure that continued and effective involvement of stakeholders,
4. Managing stakeholder relationship to manage the conflicts between them,
5. Creating motivation between the stakeholders to improve their sustainability knowledge,
6. Co-ordinating the stakeholders demands and concerns with the project objectives
7. Managing Stakeholder Relationship,
8. Keeping the relationship channel open for all stakeholders and adapt it as an organisational culture.

Stakeholder Risk Management

1. Adapting stakeholder risk management approach to manage conflicts among the extended project team,
2. Adapting risk management strategy keep the stakeholders prepared to share pain/gain.

Stakeholder Performance Management

1. Need to measure performance to improve the project cost and finding better opportunities,
2. Measure how well a stakeholder is performing against the sustainability objectives,
3. Measuring stakeholder's knowledge and skills to measure their capabilities,
4. Performance needs to be defined and specific,
5. Indicator needs to be coordinated with project objectives,
6. Metrics and the measurement system needs to be identified from the beginning of the project
7. Metrics need to be based on the stakeholder's relationship with the project objectives.

Achieving Sustainability Considering Triple Bottom Line

1. Appropriate information need to be provided to assess the current trends of sustainable development,
2. Accurate project specification and design standard must be inserted into sustainable design requirements,
3. Need to further investigate the concept of lean and its application to the construction project performance especially to meet the project lead time,
4. Measuring the sustainability target helps to meet the project performance

Achieving Strategic Focus

Improving Construction Project Performance

Communication and Information Flow

Figure 7.4: Framework for Improving the Stakeholder Engagement Process to achieve the Sustainability related Construction Project Performance

7.9 Developing a Stakeholder Mapping framework related to achieve Sustainability related target

The impact of stakeholder mapping on construction sustainability (sections 7.3.5, p. 208) and construction project performance (sections 7.5.5, p. 225) identified that stakeholder mapping only shows the relationship between the stakeholders', it does not visualize the stakeholder's relation with the sustainability outcome. It also identified from the correlation that this mapping has less impact to keep balance between the stakeholders' demands and meeting the project time objectives. Therefore based on these findings a stakeholder map is suggested in table 7.28 and stakeholder is prioritized based on their Demand for Sustainable Construction, Manageability considering the project cost, time, and risk and having their Sustainability Knowledge. The aim of this mapping is to involve the stakeholders in the construction sustainability process by managing their demand and sustainability knowledge. This map would be a more effective alternative to manage the stakeholders as it will place the stakeholders in the region based on their sustainability knowledge, their demand and its manageability. Based on their position in the map (Table 7.28) stakeholders are classified into eight different categories which are –

- Low Demand High Manageability
- High Demand Low Manageability
- High Demand High Manageability
- Low Demand Low Manageability
- Low Demand High Sustainability Knowledge
- High Demand Low Sustainability Knowledge
- High Demand High Sustainability Knowledge
- Low Demand Low Sustainability Knowledge

Low Demand High Manageability: This refers to the stakeholders' demand that is easy to manage considering the cost, time, and risk and sustainability knowledge. As these stakeholders have low demand they need to be communicated with and informed regularly to increase their knowledge on sustainability.

High Demand Low Manageability: This refers to those stakeholders whose demand is difficult to manage considering cost, time and risk. As these stakeholders have high demand,

they need to be involved with the project as early as possible. These stakeholders could be risky as there is a possible chance to lose them because of low manageability of their demand. These stakeholders need extra care to motivate them and to make them understand the different possible advantageous aspects of construction sustainability.

	Manageability		Level of Sustainability Knowledge	
	High	*Low*	*High*	*Low*
Low Demand	A - Easy to manage demand, - Need to communicate and informed regularly, - Need to increase knowledge on sustainability	C - Need to communicate and keep relationship with them occasionally, - Don't need to spend too much time with these stakeholders	E - Need to maintain relationship whenever necessary, - Need to communicate regularly to get suggestions from them	G - Need to discuss about the benefit of sustainable development - Easy to manage
High	B - Need to keep satisfy, - Need to maintain a long relationship with them.	D - Difficult to manage demand - Need to involve as early as possible, - Possible chance to loose these stakeholders, - Need extra care to motivate and make them understand	F - Need to keep satisfy regularly, - Easy to manage for their high knowledge, - Risky to manage for high demand, - Needs to maintain good relationship	H - Easy to manage, - Need to communicate regularly, - Need to inform about the advantages of construction sustainability, - Need to maintain long term relationship

Table 7.18: Demand/ Manageability/Sustainability Knowledge Grid of Stakeholder's Relationship with Sustainability Outcome

High Demand High Manageability: It refers to those stakeholders who have high demand and which is easy to manage. There is a need to keep these stakeholders satisfy regularly and need to maintain a long relationship with them. Good relationship will give the opportunities

to share more information about the construction market condition and to collaborate with them.

Low Demand Low Manageability: As these have both low demand and low manageability they need to be communicated with and kept relationship with them occasionally; whenever necessary. These stakeholders don't need to communicate regularly as whenever their demand will increase they will be contacted. Don't need to spend too much time with these stakeholders as there are other stakeholders need to consider and care of.

Low Demand High Sustainability Knowledge: As these stakeholders have high sustainability knowledge they need to be contacted regularly to get suggestions from them. They need to maintain relationship whenever necessary to discuss different issues.

High Demand Low Sustainability Knowledge: Need to communicate with these stakeholders' regularly to increase their knowledge. As they have low knowledge it needs to make the stakeholders inform about the advantages of construction sustainability from economic, environmental and social advantage point of view to improve their sustainability knowledge. Improving the knowledge will make their demand manageable as well. These stakeholders are easy to manage and need to maintain long term relationship with them.

High Demand High Sustainability Knowledge: As these stakeholders have both high demand and high sustainability knowledge they need to keep satisfy regularly to keep relationship with them. As they have good sustainability knowledge it will be easier to manage them and to manage their demand. On the other hand with their sustainability knowledge they could have demands something that is difficult to fulfil. Therefore the company needs to maintain a good relationship with them and need to discuss with them about the different issues and aspects to keep their demand manageable.

Low Demand Low Sustainability Knowledge: There is a possibility of having low demand for sustainability because of having less sustainability knowledge. Because of their low demand they are easy to manage. For this reason these stakeholders need to communicate regularly and there is a need to discuss with them about the benefit of sustainable development from the economic, social and environmental perspective to increase their knowledge and to increase their demand.

Summary

In conclusion, this chapter has put forward some strategies to motivate the stakeholder engagement in the construction sector that will contribute to the knowledge in the area of construction sustainability initiatives in the UK. This chapter also proposed some of the strategic actions that are important to improve the stakeholder engagement to achieve the construction sustainability. It also identifies how much the sustainability drivers and barriers are contributing to improve the sustainability outcome. It is also imperative to note that the evidence from this chapter portrays the current information and implementation trends of the construction sector sustainability that have been practised, with specific emphasis on the stakeholder engagement process. Essentially, the identification of the different strategies to improve the construction sustainability may guide the construction project management to focus on the particular action necessary for the improvement of the project performance in the near future.

Chapter Eight: Conclusions

8.1 Introduction

The aim of this research is to investigate the stakeholder engagement to improve the construction project performance through achieving construction sustainability. The general conclusions made in this research provide answers to general research questions. For more clarity the research question will be repeated. To investigate the research aim, this research poses several questions. To answer this set of questions, the research design and methodology incorporated a systematic study of literature, including the review and validation of the literature findings, which was followed by an extensive data collection, analysis and interpretation. The findings of the literature review, interviews and questionnaire survey, are presented and analysed in Chapter Two, Chapter Five and Chapter Six of this thesis. These findings were then discussed, scrutinized and integrated with one another, reviewed and validated in terms of the current literature and then interview findings. Finally the composite findings, presented in Chapter Seven, formed the basis of an implementation model to use in Construction Sustainability Related Project Performance considering the adaption of Stakeholder Engagement Initiatives. This chapter also outlines the study's contribution to both research and practice. It then concludes with the study limitations and provides suggestions for future research directions that have emerged.

8.2 Research Summary

To achieve the aim of this research specific consideration was given to assess the stakeholder engagement from the construction management point of view of the construction sector in the UK. Based on all the research objectives, analysis and findings a research framework is developed in figure 8.1.

In relation to research question one: *"What is the current trend of UK Construction Sector Implementing Stakeholder Engagement Process in terms of the achieving Construction Sustainability"?* This research evident that stakeholder engagement is not a new phenomenon within all industries and thus implementation methodologies are developing and

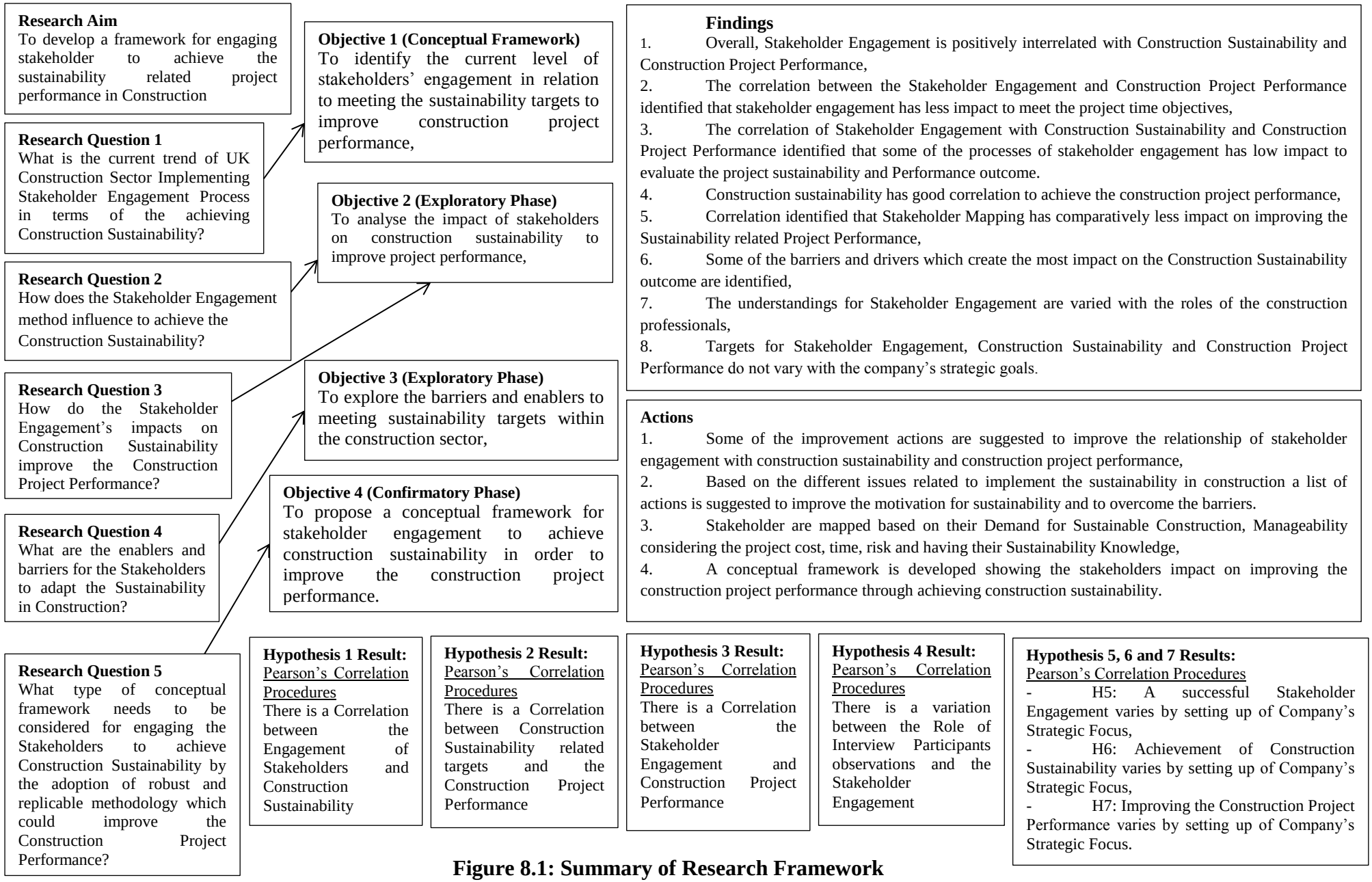


Figure 8.1: Summary of Research Framework

expanding with the diverse experiences and changes. The current stakeholder engagement process in the UK construction sector is extremely dependent on their existing management policies and directives that favour the benefits of the sustainability practice and project performance. From the Govt, public and private sectors different initiatives have been created and targets are set to achieve the level of sustainability in construction. To date, there are a number of approaches to construction sustainability and construction project performance that have been established by the construction professionals throughout the country. However, the initiatives are still relatively new compared to other companies and the empirical research relative to stakeholder engagement and sustainability performance is not extensive; there is much to learn. Underpinned by the conceptual research framework developed for the fifth research objective which states that *"To develop a conceptual framework for stakeholder engagement in order to achieve the construction sustainability and improving the construction project performance"* (figure 7.4, p. 240), a critical look at what others' have done, feedback, results and overall approach to construction sustainability implementation have proven essential. Whilst focusing on the research question, it was found that in order to improve the construction sustainability related project performance it is important to engage the project stakeholders to work on it. Consequently, objective one was set up and interview studies carried out on UK construction sector have confirmed that the approach of stakeholder engagement is practiced to achieve the construction sustainability and should be given special consideration when carrying out the initiatives. This has been a primary focus of the research. As a result, integrative approach of stakeholder engagement is considered to be the important catalyst to achieve the construction sustainability. This research considered stakeholder mapping individually from the stakeholder analysis as the interview participant considered it's important for engaging stakeholders for sustainability purpose as its visualize the stakeholders demand, its manageability and level of sustainability knowledge. Therefore, different stakeholder engagement approaches are –

- Communication With Stakeholders
- Stakeholder Management
- Stakeholder Analysis
- Stakeholder Mapping
- Stakeholder Risk Management
- Stakeholder Performance Measurement

Corresponding to the second research question: "*How does the Stakeholder Engagement method influence to achieve the Construction Sustainability"?* Therefore, important findings revealed from this research are stakeholder engagement is important to achieve the construction sustainability. It is imperative to note that evidence from this research portrays the current information of the construction stakeholder engagement's impact on the construction sustainability that has been practised. This research also showed the stakeholders' impact on construction sustainability through mapping the relationship among stakeholders demand, its manageability and stakeholders' sustainability knowledge. Underpinned by the conceptual framework of this research, particular emphasise is given to achieving the construction sustainability considering the environmental, economic and social perspectives. The second objective is carried out to analyse the role of integrative stakeholder engagement to achieve the sustainability related targets in construction sector.

Corresponding to the third research question: "*How do the Stakeholder Engagement's impacts on Construction Sustainability improve the Construction Project Performance"?* One of the key finding identified from this research is, a systematic engagement of stakeholders impact on achieving the construction sustainability target and improving construction project performance. The findings also revealed that sustainability target itself is correlated with improving the project performance. Therefore, the evidence from these research findings demonstrates that engaging stakeholders make the construction sustainable that improves the construction project performance. The aim of the second objective of this research is to analyse the impact of stakeholders on construction sustainability to improve the project performance.

Corresponding to fourth research question: "*What are the enablers and barriers for the Stakeholders to adopt the Sustainability in Construction"?* This research identifies some of the enablers and disablers that the construction professionals are facing currently to achieve the sustainability related target. Underpinned by the conceptual framework of this research, the drivers and barriers are identified and analysed to overcome the barriers and initiatives the drivers more. Therefore the third objective of this research is established to explore the barriers and enablers to sustainability amongst construction sector.

The first hypothesis test employed Pearson correlation analysis and the study discovered that there are positive association between the stakeholder engagement and the extent to which

this stakeholder engagement is practiced in by the construction professionals in general to achieve the construction sustainability (figure 8.1, section 7.3). This evidence signifies that construction management need to consider that stakeholder engagement is important to achieve the sustainability program. The correlation of these two variables also identified that some of the items between them are poorly correlated. They also need to pay a great deal of attention to the stakeholder engagement, considering them to be the most important to achieve the sustainability target. Though from their item wise relationship some of the items of the variables have low correlation between them (Appendix 1), their composite score have good correlation with each other. This research has identified the purposes of low correlation and suggested some of the improvement actions from the previous literatures and interview findings which are listed in the table 7.8 (p. 215) to make the stakeholder engagement more effective and to improve the construction sustainability.

Secondly the second hypothesis test employed the Pearson correlation to test the relationship between Construction Sustainability related targets and the Construction Project Performance. The evidence signifies that construction management targets for the achievement of construction sustainability to improve the project performance. Though from their item wise correlation some of the items shows the lower correlation between them (Appendix 1, Table A_1.8), their composite score have good correlation with each other. Regarding this low correlation some of the development actions are proposed in the Table 7.9 (p.217) from the previous literature and interview findings that could be taken as sustainability target to improve the project performance.

The third hypothesis test employed the Pearson correlation between the stakeholder engagement and construction project performance. The analysis revealed that there is a positive correlation between the variables. Except for the stakeholder mapping all of the processes of stakeholder engagement have shown good correlation with the construction project performance. To overcome the item wise low correlation between the variables some of the improvement actions (Table 7.17) are proposed from the previous literature and interview findings that could be taken as sustainability target to improve the project performance. This evidence entirely reflects that construction project management practise the stakeholder engagement process to improve the construction project performance.

The self-reported measure of stakeholder engagement importance among the role of the interview participants is analysed via ANOVA test procedure. Hypothesis four was tested and perceived the difference of the variation of the observation of stakeholder engagement among the role of interview participants. The test results revealed that in most of the engagement processes Architects views are different with others which is followed by the contractors. The reason for variations in their views could be the difference in involvement with the project activities, variation in their involvements and understanding of the engagement process. Hypothesis five, six and seven are tested using ANOVA to test the variation of a company's strategic focus with the stakeholder's engagement, construction sustainability and construction project performance. These three hypotheses proved that a company's strategic focus does not vary with the target of stakeholders' engagement and construction project performance. This evidence identifies that construction professionals consider that to target any of the strategic focus, the stakeholder engagement and improvement of construction project performance are equally important.

And finally, corresponding to fifth research question: "*What type of conceptual framework needs to be considered for engaging the Stakeholders to achieve Construction Sustainability by the adoption of robust and replicable methodology which could improve the Construction Project Performance"?* Important finding revealed from this research assess the impact of engaging different project stakeholders to achieve the construction sustainability to improve the project performance which is broken into several systematic paths. A systematic trail is followed to organise the different steps engaging project stakeholders to gather their views and knowledge to achieve the sustainability related project performance. Priority is given to the fourth objective of this research to determine the conceptual framework underpinning this research in order to present an organized process and the relationship of different stages to set the project performance.

Finally at the end of the previous chapter a conceptual framework (figure 7.4, p.240) is developed in order to present the preferred approach in determining the elements of study anticipated, and statistical relationship to expect for this research in relation to the set of research questions. Essentially the function of the fifth objective is to inform the rest of the research design and to help the researcher to assess and refine the research aim, develop realistic and relevant research questions, select appropriate research methods and identify potential validity threats toward the conclusion of the study. In doing so, seven hypothesis

tests were carried out to define the project performance improvement trend perceived by the construction sector.

In regards to this research question, the methodology first developed by the Rockart (1979) has been adopted in order to provide a basis for the investigations. Following from this theory, this research has taken a triangulation process which combined the outcomes emanating from an extensive literature review, interviews with the key informants from the industry and the application of a macro level questionnaire survey in order to grasp the implementation trend. It adopts an integrative approach and has reviewed a large body of literature relevant to stakeholder engagement, construction sustainability and construction project performance concerning many issues the construction management encounters throughout the project process (section 3.4, p.38). Based on this review, implementation of stakeholder engagement to achieve construction sustainability accelerate to improve the construction project performance are analysed (figure 8.1). Most importantly, the conceptual framework is used for this research that has sought to contribute to the area of research and practice.

8.3 Limitation of Study

In recognising the contributions this research makes, it is important, as with any research, to acknowledge the key limitations. In addition, the research model applied in this analysis focuses only on the UK construction sector. As such, the analysis might be happening on the precise micro level. Generalisation from this research could potentially be an issue since it was focused on few of the organisations. Rather than choosing vast ranges of participants for interview this research approached participants mostly from the supply side. It had some limitations in relation to access due to the distance, work flows, contact network, time, participant's willingness and knowledge on the subject and cost.

Overall within the construction organisation there were many concerns about the research process for both the qualitative and quantitative data collections. This is probably due to the lack of experience on the subject areas or understanding about the purpose of research. During the interview if the interviewees are able to review the interview questions from before it can also assure about the relevance and appropriateness of their responses. It might keep them prepared before the interview and they may also have additional clarification

rather than thinking during the interview session that gives greater insight into their perception and reaction.

Obviously, the results will not remain valid if the stakeholders influence is given less priority to improve the project performance in the near future; as the rapid changes are now occurring in the construction business environment. These changes might also affect in the sustainability program attributes. It also might change the way project performance is managed by the stakeholders by changing the project objectives. Moreover, as all of the stakeholder engagement processes in relation to sustainability outcome are identified especially from the previous literature reviews and interview findings; there is a possibility of missing some of the processes due to the new management advancements, new sustainability reviews and objectives whereas new stakeholder engagement steps related to sustainability outcome might be more critical.

8.4 Research Contribution

This research has closed the gap in existing knowledge, with potential contribution to theoretical development and management practice.

8.4.1 Theoretical Contribution

From the theoretical side the research has concentrated on the conceptualisation of the achievement of construction sustainability related project performance through achieving the construction sustainability and improving the project performance which is guided by an extensive review of literature and relevant theoretical construct. The research also concentrated on the practicality of the stakeholder engagement to achieve the construction sustainability and improving the project performance. These features have contributed to the Novelty of the research. Much research has been carried out on construction project and on the different topics on stakeholder engagement, sustainability and construction project performance, however till now no research has focused on the integration of engagement, sustainability and construction project performance in a construction context. This empirical research study developed a Stakeholder Engagement framework in relation to improving sustainability related project performance that justified the conjectures of this research. Most importantly, some of the steps of the stakeholder engagement process are generalised with construction sustainability and construction project performance.

Also, the research has introduced an important measurement and management technique of stakeholder engagement which is used as a fair representation to report the success of the sustainability related project performance program studied herein that could lead to future research in assessing the performance of the construction sustainability program as well for other management studies.

8.4.2 Management Practice

The findings of this research produced valuable information to the construction professionals, in their pursuit of improving the sustainability related project performance. Considering both the tactical and strategic impacts of Stakeholder Engagement, it may guide the construction practitioners to focus on motivating the stakeholders to aid the achievement of sustainability related project performance. However, to date, no reported study has been assessed and no attempt has been made to determine whether all of the proposed process in this research make together significant impact on successfully engaging the project stakeholders. Several statistically significant relationships among Stakeholder Engagement, Construction Sustainability and Construction Project Performance have been identified. These correlations could be useful for the practitioners to analyse the relationship between them and relationship with the sustainability target in details. It also helps the construction practitioners the particular areas that need to be focused on to improve the sustainability target.

These days more and more construction professionals consider achieving sustainability in construction is important to improve the project performance which could also be considered as important for customer satisfaction. Construction sustainability related project performance can be improved by engaging all the accountable stakeholders and managing them to motivate them to achieve the project objectives. In this thesis, the researcher has emphasized the importance of understanding the relationship and interaction among them.

8.5 Direction for Future Research

This research has introduced a new framework how stakeholder engagement can be used to improve construction sustainability which could improve the construction project performance by addressing the different key issues. Cross sectional investigations were reported in this study but a number of questions and issues are remaining unanswered and unidentified. The researcher believes that it is important that future research explores other characteristics of the sustainability outcome such as stakeholder influence on managing the

project value and managing project risk, creating a bridge between the construction supply chain partners to create sustainable procurement process through improving their relationship and others which have not been covered in the present research sample. This will enable much clearer and more robust conclusions to be drawn but will depend upon significant investment in research resources. This should set the impetus in future for construction professionals through generating knowledge by understanding the approach and helping to cope with the existing challenges.

As a result of resources and time limitations, it was not possible to complete several potential lines of investigation related to the study. To fully understand the character of the construction sectors stakeholder relationship and sustainability approach however, further in depth case studies are essential to allow for detailed observation. Future research in this area must endeavour to investigate detailed sustainability related project performance compositions from the construction sector to fully understand the character stakeholder engagement and to increase the precision of the analysis and to enable firmer conclusion to be drawn.

The use of the triangulation method of data sources and data collection enabled the research to be performed without compromise on either the quality of the data or the findings. The robustness of the methodologies that have been adopted in the overall study suggests that the methodology used could be repeated especially by construction project management practitioners to study stakeholder engagement on sustainability performance at other times or in other countries. Therefore, it is significant that an updated stakeholder engagement framework for sustainable construction is carried out to enable accurate scope for future construction project performance improvement through achieving the sustainability in construction.

References

Abidin, N. Z., Yusof, N. and Othman, A. A. E., (2013), Enablers and challenges of a sustainable housing industry in Malaysia, Construction Innovation: Information, Process, Management, Vol. 13, No. 1, pp.10 – 25.

Adams, C. A. and Frost, G. R., (2006), The internet and change in corporate stakeholder engagement and communication strategies on social and environmental performance, Journal of Accounting & Organizational Change, Vol. 2, No. 3, pp.281 – 303.

Adeyeye, K, Osmani, M and Brown, C., (2007), Energy conservation and building design: the environmental legislation push and pull factors, Structural Survey, Structural Survey, Vol. 25, No. 5, pp. 375-390.

Agle, B.R., Mitchell, R.K. and Sonnenfeld, J.A., (1999), Who matters to CEO's? An investigation of stakeholder attributes and salience, corporate performance, and CEO values, Academy of Management Journal, Vol. 42, No. 5, pp. 507-25.

Ahmed, S.M. and Kangari, R., (1995), Analysis of client-satisfaction factors in construction industry, Journal of Management in Engineering, Vol. 11, No. 2, pp. 36-44.

Albert P.C. Chan and Ada P.L. Chan, (2004), Key performance indicators for measuring construction success, Benchmarking: An International Journal, Vol. 11, No 2, pp. 203 – 221.

Alkhaddar, R., Wooder, T., Sertyesilisik, B. and Tunstall, A., (2012), Deep learning approach's effectiveness on sustainability improvement in the UK construction industry, Management of Environmental Quality: An International Journal, Vol. 23, No. 2, pp.126 – 139.

Andriof, J., Waddock, S., Husted, B. and Sutherland Rahman, S., (2002), "Introduction", in Andriof, J., Waddock, S., Husted, B. and Sutherland Rahman, S. (Eds), Unfolding Stakeholder Thinking, Greenleaf Publishing Limited, Sheffield.

Andriof, J., (2001), Patterns of stakeholder partnership building, in Andriof, J. and McIntosh, M. (Eds), Perspectives on Corporate Citizenship, Greenleaf Publishing, Sheffield, pp. 215-38.

Anonymous, (1999), The Malcom Baldrige Award – at a Glance, Journal for Quality and Participation, Vol. 22, No. 1, pp. 5.

Aouad, G, Ozorhon, B and Abbott, C., (2010), Facilitating innovation in construction: Directions and implications for research and policy Construction Innovation, Vol. 10, No. 4, pp. 374-394.

Ardichvili, A. and Jondle, D., (2009), Ethical business cultures: a literature review andimplications for HRD, Human Resource Development Review, Vol. 8, No. 2, pp. 223-44.

Ardichvili, A., (2012), Sustainability or limitless expansion: paradigm shift in HRD practice and teaching, European Journal of Training and Development, Vol. 36, No. 9, pp. 873-887.

Arif, M., Egbu, C., Haleem, A., Kulonda, D. and Khalfan,M., (2009), State of green construction in India: drivers and challenges, Journal of Engineering, Design and Technology, Vol. 7, No. 2, pp.223 – 234.

Arnold, S.J. and Luthra, M.N., (2000), Market entry effects of large format retailers: a stakeholder analysis, International Journal of Retail & Distribution Management, Vol. 28, No. 4/5, pp. 139-54.

Ashley, D.B., Lurie, C.S., and Jaselskis, E.J., (1987), Determinants of Construction Project Success, Project Management Journal, Vol. 18, No.2, pp. 69-79.

Atkinson, A. (1997), A stakeholder approach to strategic performance measurement, Sloan Management Review, Vol. 38 No. 3, pp. 25-37.

Ayuso, S., Rodríguez, M. A., Castro, R. G., and Ariño, M. A., (2011), Does stakeholder engagement promote sustainable innovation orientation. Industrial Management & Data Systems, Vol. 111, No. 9, pp. 1399 – 1417.

Banville, C., Landry, M., Martel, J-M. and Boulaire, C., (1998), A stakeholder approach to MCDA, Systems Research and Behavioral Science, Vol. 15, No. 1, pp. 15-32.

Berger, P. L. and Thomas, L, (1966), The Social Construction of Reality, Garden City, NJ: Anchor Books.

Bhattacharya, N., Lamond, J., Proverbs, D., Hammond, F., (2013), Development of conceptual framework for understanding vulnerability of commercial property values towards flooding, International Journal of Disaster Resilience in the Built Environment, Vol. 4, No. 3, pp.334 – 351

Biedenbach, T. and Müller, R., (2011), Paradigms in Project Management Research: Examples From 15 Years of IRNOP Conferences, International Journal of Managing Projects in Business, Vol.4, No. 1, pp. 82-104.

Bititci, U.S., Carrie, A.S. and McDevitt, L., (1997), Integrated performance measurement systems: a development guide, International Journal of Operations & Production Management, Vol. 17, No. 5, pp. 522-34.

Boesso, G. and Kumar, K, (2009), An investigation of stakeholder prioritization and engagement: who or what really counts, Journal of Accounting & Organizational Change, Vol. 5, No. 1, pp. 62-80.

Bourne, L. and Walker, D. H. T., (2005), Visualising and mapping stakeholder influence, Management Decision, Vol. 43, No. 5, pp. 649-660.

Bourne, L. and Walker, D. H. T., (2008), Project relationship management and the Stakeholder Circle, International Journal of Managing Projects in Business, Vol. 1, No. 1, pp.125 – 130.

Boyatzis, R.E., (1998), Transforming qualitative information: Thematic analysis and code development. Thousand Oaks, London, & New Delhi: SAGE Publications.

Braun, V and Clarke, V., (2006), Using thematic analysis in psychology, Qualitative Research in Psychology, Vol. 3, No. 2, pp. 77-101.

BREEAM, (2013), The World's Leading Design and Assessment Method For Sustainable Building, available at: http://www.breeam.org/page.jsp?id=86 [accessed 19th October, 2013]

Brown, S., Cerulli, C., Wallen, B., Sawyer, J., Clarke, S., Tagg, S., Gibbons, R., Kohn, D. and Dye, A., (2013), Motivating CollectiveCustom Build Focus Group, held at the Royal Institute of British Architects (RIBA) on Tuesday 18th June, 2013.

Bryde D., J., (2007), Is construction different? A comparison of perceptions of project management performance and practices by business sector and project type, Construction Management and Economics, Vol. 26, No. 3, pp. 315–327.

Bryde, D. J. and Robinson, L., (2007), The relationship between total quality management and the focus of project management practices, The TQM Magazine, Vol. 19, No. 1, pp.50 – 61.

Bryman, A., (2008), Social Research Methods, (third edition) Oxford: Oxford University Press, pp. 113-114.

Bryman, A., and Bell, E., (2007), Business Research Methods, 2nd Edition. Oxford: Oxford University Press.

BSHF, (2013), Promoting innovative housing policy and practice, Sustainable Housing in the East Midlands, available at: http://www.bshf.org/home.cfm, [accessed 13th September, 2013]

Burström, T. and Jacobsson, M., (2013), The informal liaison role of project controllers in new product development projects, International Journal of Managing Projects in Business, Vol. 6, No. 3, pp.410 - 424

Burgoyne, J. G., (1994), Stakeholder analysis in Cassel, C. and G. Symon (ed.), Qualitative Methods in Organizational Research: a practical guide, Sage, New Delhi, pp. 187-207.

Burgan BA and Sansom MR., (2006), Sustainable steel construction. Journal of Constructional Steel Research, Vol. 62, No. 11, pp. 1178–1183.

Camaron, S. and Price, D, (2009), Business Research Methods; A Practical Approach, London, Chartered Institute of Personnel and Development.

Carlone, K. and Hill, L.A. (2008), Managing up, Harvard Business Press, Boston, MA. MD.

Carroll, A.B. and Shabana, K.M. (2010), The business case for corporate social responsibility: a review of concepts, research and practices, International Journal of Management Review, Vol. 12, No. 1, pp. 85-105.

Carroll, J. B., (1993), Human cognitive abilities: A survey of factor-analytic studies. New York: Cambridge University Press.

Cassell, C. and Symon, G., (2006), Taking qualitative methods in organization and management research seriously. Qualitative research in organizations and management: an international journal, Vol.1, No.1, pp. 4-12.

Cavagnaro, E. and Curiel, G., (2012), Three Levels of Sustainability, Greenleaf Publishing, Sheffield, pp. 50-55.

Chan, A.P.C. and Chan, A.P.L. (2004), Key performance indicators for measuring construction success, Benchmarking: An International Journal, Vol. 11, No. 2, pp. 203-21.

Chan, I.P.C., Scott, D. and Lam, E.W.M., (2002), Framework of success criteria for design/build projects Journal of Management in Engineering, Vol. 18, No.3, pp. 120–128.

Chapman, C and Ward, S., (2008), Developing and implementing balanced incentive and risk sharing contracts, [in special issue: Stakeholder Management in Construction] Construction Management and Economics, Vol. 26, No. 6, pp. 659-669.

Chinyio, E.A. and Akintoye, A., (2008), Practical approaches for engaging stakeholders: finding from the UK. Construction Management and Economics, Vol. 26, No.6, pp. 591-599.

Choi, E., Kitzie, V. and Shah, C. (2013), A machine learning-based approach to predicting success of questions on social question-answering, iConference 2013 Proceedings, pp. 409-421.

CIC, (2003), Constructing for Sustainability: A Basic Guide for Clients and their Professional Advisors, Construction Industry Council, London.

CIEF (Construction Industry Environmental Forum), (2009), Joint CIEF and CPN seminar held at the Centre for Construction Innovation, CUBE, 113-115 Portland Street, Manchester M1 6DW.

Clarkson, M.B.E., (1995), A stakeholder framework for analyzing and evaluating corporate social performance, Academy of Management Review, Vol. 20, No. 1, pp. 82-117.

Cleland, D.I., (1986), Project stakeholder management, Project Management Journal, Vol. 17, No. 4, pp. 36-44.

Cleland, D.I., (1999), Project Management Strategic Design and Implementation, McGraw-Hill, Singapore, pp. 100-105.

Corbetta, P., (2003), Social Research: Theory, Methods and Techniques. London: Sage Publications.

Corbin, J. and Strauss, A., (2008), Basics of qualitative research, Techniques to developing grounded theory (3rd ed.), Los Angeles, CA: Sage.

Collis, J. and Hussey, R., (2003), Business Research: a practical guide for undergraduate and postgraduate students, second edition, Basingstoke: Palgrave Macmillan.

Constructing Excellence, (2006), UK Construction Industry Key Performance Indicators: Handbook, CE, London.

Cooper, S. M., (2007), Stakeholder performance measurement: general approaches and methods of economic evaluation, Ekonomiaz, Vol. 65, No. 2, pp. 260-281.

Cooper, R. and Burrell, G. (1988), Modernism, Postmodernism and Organizational Analysis: An Introduction, Organization Studies, Vol. 9, No.1, pp. 91-112.

Corporación de Desarrollo Tecnológico, (CDT), (2002), National benchmarking system for the construction industry, Rep., 1st Ed., CDT, Santiago, Chile in Spanish.

Craig C. A. and Allen M. W., (2013), Sustainability information sources: employee knowledge, perceptions, and learning, Journal of Communication Management, Vol. 17, No. 4, pp.292 – 307.

Cramer, J. (2005), Applying international standards and guidelines on corporate social responsibility: an action plan, Environmental Quality Management, Vol. 14, No. 3, pp. 71-9.

Creswell, J.W., (2007), Qualitative Inquiry & Research Design – Choosing Among Five Approaches, SAGE Publications, Thousand Oaks, California, pp.22-23

Cresswell, J. and Plano-Clark, V., (2007), Designing and Conducting Mixed Methods Research, London: Sage.

Crotty, M. (1998), The foundations of social research: Meaning and perspective in the research process, Thousand Oaks, CA: Sage Publications.

Cusumano M.A., (1994), The limits of lean, Sloan Management Review, Summer, pp. 27-33.

Dainty, A. R. J., Briscoe, G. H. and Millett, S. J., (2001), New perspectives on construction supply chain integration, Supply Chain Management: An international Journal, Vol. 6, No. 4, pp. 163 -173.

Dale, A. (2001), At the Edge: Sustainable Development in the 21st Century, University of British Columbia Press, Vancouver.

Dawkins, J., (2004), Corporate Responsibility: The Communication Challenge, Journal of Communication Management, Vol. 9, No. 2, pp.108 – 119.

Denzin, N. K. and Lincoln, Y. S., (2000), Introduction: The Discipline and Practice of Qualitative Research, In Handbook of Qualitative Research, Thousand Oaks: Sage, pp. 1- 29.

DETR (2000), Building a Better Quality of Life: A Strategy for more Sustainable Construction, Department of the Environment, Transport and the Regions, London.

De Villiers, C. and van Staden, C, (2006), Can less environmental disclosure have a legitimising effect? Evidence from Africa, Accounting, Organizations and Society, Vol. 31, No. 8, pp.763-81.

Diyana, A. N., and Abidin, Z., N., (2013), Motivation and Expectation of Developers on Green Construction: A Conceptual View, World Academy of Science, Engineering and Technology 76, availavle at: http://www.waset.org/journals/waset/v76/v76-47.pdf, [accessed 13th September, 2013].

Djeflat, A., (2010), Sustainable knowledge for sustainable development: challenges and opportunities for African development, World Journal of Science, Technology and Sustainable Development, Vol. 7, No. 2, pp.131 – 149.

Dobson, D., W., Sourani, A., Sertyesilisik, B. and Tunstall, A., (2013), Sustainable Construction: Analysis of Its Costs and Benefits, American Journal of Civil Engineering and Architecture, Vol. 1, No. 2, pp. 32-38.

Donaldson T. and Preston L. E., (1995), The Stakeholder Theory of the Corporation: Concepts, Evidence and Implications, Academy of Management Review, Vol. 20, No. 1, pp. 65-91.

Dorweiler, V.P and Yakhou, M., (2005), Scorecard for academic administration performance on the campus, Managerial Auditing Journal, Vol. 20, No. 2, pp. 138-144.

Doloi, H., (2012), Assessing stakeholders' influence on social performance of infrastructure projects, Facilities, Vol. 30, No. 11/12, pp. 531-550.

Dyllick, T. and Hockerts, K. (2002), Beyond the business case for corporate sustainability, Business Strategy and the Environment, Vol. 11, No.2, pp. 130-41.

Easterby-Smith, M., Thorpe, R. and Jackson, P. (2012), Management Research, 4th Edition, London: Sage Publications Ltd, pp. 130 -135.

Egan, J., (1998), Rethinking Construction, DETR, London.

Ehrenfeld, J.R. (2005), The roots of sustainability, MIT Sloan Management Review, Vol. 46, No. 2, pp. 23-5.

Ehnert, I., (2006), Sustainability Issues in Human in Human Resource Management: Linkages, theoretical approaches, and outlines for an emerging field, Paper prepared for 21st EIASM SHRM Workshop, Aston, Birmingham, March 28th-29th, 2006.

El-Gohary, N. M., Osman, H. and Ei-Diraby, T. E., (2006), Stakeholder management for public private partnerships. International Journal of Project Management, Vol. 24, No. 7, pp. 595–604.

Elkington, J., (1994), Towards the sustainable corporation: win-win-win business strategies for sustainable development, California Management Review, Vol. 36, No. 2, pp. 90-100.

Elkington, J., (1998), Cannibals With Forks: The Triple Bottom Line of 21st Century Business, 2nd ed., New Society Publishers, Gabriola Island.

Elkington, J., (2006), Governance for sustainability, Corporate Governance, Vol. 14, No. 6, pp. 522-9.

Epstein, M., (2008), Making Sustainability Work – Best Practices in Managing and Measuring Corporate Social, Environmental and Economic Impacts, Greenleaf Publishing, Sheffield.

Eriksson, P. E., (2010), Improving construction supply chain collaboration and performance: a lean construction pilot project, Supply Chain Management: An International Journal, Vol. 15, No. 5, pp.394 - 403

Espling, U. and Olsson, U., (2004), Part II, Partnering in a railway infrastructure maintenance contract: a case study, Journal of Quality in Maintenance Engineering, Vol. 10, No. 4, pp. 248-53.

Faisal, N., M., Banwet, D.K. and Shankar, R., (2007), Supply chain risk management in SMEs: analysing the barriers, International Journal of Management & Enterprise Development, Vol. 4, No. 5, pp. 588-607.

Feurer, R. and Chaharbaghi, K. (1995), Strategy formulation: a learning methodology, Benchmarking for Quality, Management and Technology, Vol. 2, No. 1, pp. 38-55.

Field, A., (2009), Discovering Statistics Using SPSS: Third Edition. London: Sage.

Fitz-Gibbon, C.T., (1990), Performance Indicators, Multilingual Matters, Clevedon, PA.

Foo, L. M., (2007), Stakeholder engagement in emerging economies: considering the strategic benefits of stakeholder management in a cross-cultural and geopolitical context, Corporate Governance, Vol. 7, No. 4, pp.379 – 387.

Foote, M. and Rouna, W., (2008), Institutionalizing ethics: a synthesis of frameworks and implications for HRD, Human Resource Development Review, Vol. 7, No. 3, pp. 292-308.

Francis JJ, Johnston M, Robertson C, Glidewell L, Entwistle V, Eccles MP, Grimshaw JM, (2010), What is an adequate sample size? Operationalising data saturation for theory-based interview studies, Psychol Health., Vol. 25, No., 10, pp.1229-45.

Freeman, R.E., (1984), Strategic Management: A Stakeholder Approach, Pittman, Marshfield, MA.

Frooman, J., (1999), Stakeholders influence strategies, Academy of Management Review, Vol. 24, No. 2, pp. 191-205.

Garavan, T. and McGuire, D., (2010), Human resource development and society: human resource development's role in embedding corporate social responsibility, sustainability, and ethics in organizations, Advances in Developing Human Resources, Vol. 12, No. 5, pp. 487-507.

Garavan, T.N., Heraty, N., Rock, A. and Dalton, E., (2010), Conceptualizing the behavioural barriers to CSR and CS in organizations: a typology of HRD interventions, Advances in Developing Human Resources, Vol. 12, No. 5, pp. 587-613.

Gareis, R., Huemann, M. and Martinuzzi, A., (2013), Rethinking Project Management with Sustainable Development Principles, Project Management Institute, Newtown Square, PA.

Garsden, B., (1995), Postconstruction Evaluation, J. Constr. Eng. Manage., Vol. 121, No. 1, pp. 37–42.

Garvare, R., and Johansson, P., (2010), Management for sustainability – A stakeholder theory, Total Quality Management, Vol. 21, No. 7, pp. 737-744.

Gerhard T., (2008), Bias: Considerations for research practice. Am. J. Health. Syst. Pharm; Nov 15; Vol. 65, No. 22, pp. 2137-43 [PubMed: 18997149].

Ghalayini, A. and Nobel, J., (1996), The changing basis of performance measurement, International Journal of Operations & Production Management, Vol. 16, No. 8, pp. 63-80.

Ghauri, P. and Gronhaug, K., (2005), Research Methods in Business Studies, Third Edition, Harlow, Essex: Prentice Hall.

Gibb, S., (1994), Inside Corporate Mentoring Schemes: The Development of a Conceptual Framework, Personnel Review, Vol. 23, No. 3, pp.47 – 60.

Gibson, K., (2000), The moral basis of stakeholder theory, Journal of Business Ethics, Vol. 26, No.3, pp. 245-57.

Gibson, G. E., and Hamilton, M. R. (1994), Analysis of pre-project planning effort and success variables for capital facility projects, Rep. Prepared for Construction Industry Institute, University of Texas at Austin, Austin, Tex.

Gladwin, T., Kennelly, J. and Krause, T.S., (1996), Beyond eco-efficiency: towards socially sustainable business, Sustainable Development, Vol. 3, No. 1, pp. 35-43.

Godlee F., (2007), Milestones on the long road to knowledge, BMJ, (Suppl 1):s2–3. [PubMed:17204760], pp. 334.

Graedel, T.E., (2002), Quantitative sustainability in a college or university setting, International journal of sustainability in higher education Vol. 3, No 4, pp. 346-358.

Grbich, C., (2007), Qualitative data analysis: An introduction, Sage: London; Thousand Oaks; New Delhi, pp. 25.

Grunig, J.E. and Grunig, L.A., (1992), Models of public relations and communication, in Grunig, J.E., Dozier, D.M., Ehling, W.P., Grunig, L.A., Pepper, F.C. and White, J. (Eds), Excellence in Communication and Communication Management, Lawrence Erlbaum, Hillsdale, NJ, pp. 285-325.

Gustavsson, T. K. and Gohary, H., (2012), Boundary action in construction projects: new collaborative project practices, International Journal of Managing Projects in Business, Vol. 5, No. 3, pp.364 – 376.

Guest, G., Kathleen M. MacQueen, K. M., and Namey, E. E, (2012), Applied Thematic Analysis, SAGE Publications, Inc , pp. 10 – 11.

Habermas, J., (1970), Toward a rational society: Student protest, science and politics (Jeremy J Shapiro, Trans.), Boston: Beacon press.

Haigh, R. and Sutton, R., (2012), Strategies for the effective engagement of multi-national construction enterprises in post-disaster building and infrastructure projects, International Journal of Disaster Resilience in the Built Environment, Vol. 3, No. 3, pp.270 – 282.

Hair, J and Anderson, R., (2010), Multivariate Data Analysis: A global perspective, 7th ed. New Jersey: Pearson Education.

Hammersley, M. and Atkinson, P., (1983), Ethnography: principles in practice, London: Routledge.

Hart, S.L., (2005), Capitalism at the Crossroads: The Unlimited Business Opportunities in Solving the World's Most Difficult Problems, Wharton School Publishing, Upper Saddle River, NJ.

Harvey, J., (2011), A ratings-based stakeholder analysis for a food production company, including trust and risk implications, Business Strategy Series, Vol. 12, No. 2, pp.98 – 104.

Haponava, T., and Al-Jibouri, S., (2009), Identifying key performance indicators for use in control of pre-project stage process in construction, International Journal of Productivity and Performance Management, Vol. 58, No. 2, pp.160 – 173.

Heidrich, O., Harvey, J. and Tollin, N., (2009), Stakeholder analysis for industrial waste management systems, Waste Management Journal, Vol. 29, No. 2, pp. 965-73.

Hill, R. and Bowen, P.A., (1997), Sustainable construction: principles and a framework for attainment, Construction Management and Economics, Vol. 15, No. 3, pp. 223-39.

Hill, C. W. L., and Jones, T. M., (1992), Stakeholder-agency theory, Journal of Management Stud- ies, Vol. 29, No. 2, pp. 131-154.

HM Government (2011), Carbon Plan, Chapter 1, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47621/1358-the-carbon-plan.pdf [accessed 4th December], pp. 13.

Hughes, D., Williams, T. and Ren, Z., (2012), Differing perspectives on collaboration in construction, Construction Innovation: Information, Process, Management, Vol. 12, No. 3, pp.355 - 368

Hydes, K. and Creech, L., (2000), Reducing mechanical equipment cost: the economics of green design, Building Research & Information28(5/6), Taylor & Francis Ltd. London, pp.403 – 407

Ihugba, B. U., (2012), CSR stakeholder engagement and Nigerian tobacco manufacturing sub-sector, African Journal of Economic and Management Studies, Vol. 3, No. 1, pp.42 – 63.

Ioannou, I. and Serafeim, G., (2011), The consequences of mandatory corporate sustainability reporting, Harvard Business School Working Paper No. 11-100, Harvard University, Boston, MA.

ISEA, (1999), AccountAbility 1000 (AA1000): Standard, Guidelines and Professional Qualification, Institute of Social and Ethical AccountAbility, London, pp. 91.

Jagersma, P. K., (2009), The strategic value of sustainable stakeholder management, Business Strategy Series, VOL. 10, NO. 6, pp. 339-344.

Jickling, B., (2000), Education for sustainability: A seductive idea, but is it enough for my grandchildren? Available at http://www.ec.gc.ca/education/ee_jickling_e.htm (accessed 18th, November, 2013).

Johansson, P., (2008), Implementing stakeholder management: a case study at a micro-enterprise, ISSN 1368-3047, Vol. 12, No. 3, pp. 33-43.

Johnson, M. H., (2000), Functional brain development in infants: Elements of an interactive specialization framework. Child Development, Vol. 71, No. 1, pp. 75–81.

Jones, C. R., (2008), Stakeholder Engagement in Practice, Now is the Time to Act! 12th Congress of the International Radiation Protection Association in Buenos Aires, on October 2008, 19 –24, [available at: http://www.irpa12.org.ar/KL/Stakeholders/Jones_fp.pdf]

Jones, P., Hillier, D. and Comfort, D., (2014), Assurance of the leading UK food retailers' corporate social responsibility/sustainability reports, Corporate Governance, Vol. 14, No. 1, pp.130 - 138

Kadefors, A., (2004), Trust in project relationships – inside the black box, International Journal of Project Management, Vol. 22, No.3, pp. 175-82.

Karlsen, J. T., Græe, K. and Massaoud, M. J., (2008), Building trust in project-stakeholder Relationships Baltic Journal of Management, Vol. 3, No. 1, pp. 7-22.

Karim, J., Somers, T. M. and Bhattacherjee, A., (2007), The Impact of ERP Implementation on Business Process Outcomes: A Factor-Based Study, Journal of Management Information Systems, Vol. 24, No.1, pp. 101-134.

Kaplan, R.S. and Norton, D.P., (2001), Transforming the balanced scorecard from performance measurement to strategic management: Part I, Accounting Horizons, Vol.15, No.1, pp.87-104.

Keegan, D.P., Eiler, R.G. and Jones, C.R., (1989), Are your performance measures obsolete?, Management Accounting, Vol. 70, No. 12, pp. 45-50.

Kidder, L. H. and Judd, C. M., (1986), Research Methods in Social Relations. (5th ed.) New York: Holt, Rinehart & Winston.

Koskela, L., (2000), An Exploration towards a Production Theory and its Application to Construction, Technical Research Center of Finland, Espoo.

Kothari, C.R., (2008), Research methodology: methods and techniques.2nd Ed. New Age International, pp. 3.

Kolk A. and Pinkse, J., (2007), Towards strategic stakeholder management? Integrating perspectives on sustainability challenges such as corporate responses to climate change, Corporate Governance, Vol. 7, No. 4, pp. 370-378.

Kühtz, S., (2007), Adoption of sustainable development schemes and behaviours in Italy: Barriers and solutions – what can educators do?, International Journal of Sustainability in Higher Education, Vol. 8, No. 2, pp.155 - 169

Larson, P.D. and Poist, R.F.m, (2004), Improving response rates to mail surveys: a research note, Transportation Journal, Vol. 43, No. 4, pp. 67-74.

Laszlo, C. and Zhexembayeva, N., (2011), Embedded Sustainability: The Next Big Competitive Advantage, Greenleaf Publications, Sheffield.

Latham, M., (1994), Constructing The Team, Final Report of the Government / Industry Review of Procurement and Contractual Arrangements In The UK Construction Industry HMSO, London, pp. 7.

Lehaney B. A. and Gerald Vinten, G., (1994), Methodology: An Analysis of Its Meaning and Use, Work Study, Vol. 43, No. 3, pp. 5-8.

Lindberg, B.M. and Monaldo, J.M., (2008), Annual industry accounts: advance statistics on GDP by industry for 2007, Survey of Current Business, Bureau of Economic Analysis, US Department of Commerce, Washington, DC, available at: www.bea.gov/scb/pdf/2008/ 05%20May/0508_indy_acct.pdf, [accessed September 20, 2009].

Lisa M., (2008), The Sage Encyclopedia of Qualitative Research Methods, Sage: Thousand Oaks, CA, Vol.2, pp.697-698

Loan-Clarke, J., Boocock, G., Smith, A. and Whittaker, J., (2000), Competence-based management development in small and medium-sized enterprises: a multi-stakeholder analysis, International Journal of Training and Development, Vol. 4, No. 3, pp. 176-95.

Lodhia, S. V., (2012), Risk and management of climate induced disasters in coastal Gujarat in India, Management of Environmental Quality: An International Journal, Vol. 23, No. 1, pp.82 – 100.

Love, P.E.D., Edwards, D.J. and Wood, E., (2011), Loosening the Gordian knot: the role of emotional intelligence in construction, Engineering, Construction and Architectural Management, Vol. 1, No. 18, pp. 50-65.

Love, P.E.D. and Holt, G. D., (2000), Construction business performance measurement: the SPM alternative, Business Process Management Journal, Vol. 6, No. 5, pp.408 – 416.

Love, P.E.D. and Skitmore, M.R., (1996), Approaches to Organisational Effectiveness and Their Application to Construction Organisations, In Thorpe, A., Eds. Proceedings 12th Annual Conference and Annual General Meeting, The Association of Researchers in Construction Management, pp. 378-387, Sheffield Hallam University.

Loosemore, M., (2010), Using multimedia to effectively engage stakeholders in risk management, International Journal of Managing Projects in Business, Vol. 3, No. 2, pp.307 – 327.

Mainardes, E., W., Alves, H. and Raposo, M., (2011), Stakeholder theory: issues to resolve, Management Decision, Vol. 49, No. 2, pp. 226-252.

Mainardes, E. W., Alves H. and Raposo, M., (2012), A model for stakeholder classification and stakeholder relationships, Management Decision, Vol. 50, No. 10, pp.1861 – 1879.

Mallak, L.A., Patzak, G.R. and Kurstedt, H.A., (1991), Satisfying stakeholders for successful project management, Computers & Industrial Engineering, Vol. 21, No. 1-4, pp. 29-433.

Marczyk, G., DeMatteo, D. and Festinger, D., (2005), Essentials of Research Design and Methodology, New Jersey, John Wiley and Sons, Inc.

Matar, M., Georgy, M. and Ibrahim, M., (2008), Sustainable construction management: introduction of the operational context spaces (OCS), Construction Management and Economics, Vol. 26, No. 3, pp. 261-75.

Mathur, V. N., Price, A. D. F., Austin, S. and Moobela, C., (2007), Defining, identifying and mapping stakeholders in the assessment of urban sustainability, International Conference on Whole Life Urban Sustainability and its Assessment.

McMullen, C. A., (2001), Firms Push Sustainability, Waste New, Vol. 6, No. 7, pp. 4.

Meding, J. V., McAllister, K., Oyedele, L. and Kelly, K., (2013), A framework for stakeholder management and corporate culture, Built Environment Project and Asset Management, Vol. 3, No. 1, pp.24 – 41.

Merrilees, B., Getz, D. and O'Brien, D., (2005), Marketing stakeholder analysis: Branding the Brisbane Goodwill Games, European Journal of Marketing, Vol. 39, No. 9/10, pp.1060 – 1077.

Mitchell, R.K., Agle, B.R. and Wood, D.J., (1997), Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts, Academy of Management Review, Vol. 22, No. 4, pp. 853-856.

Mitropoulos, P. and Tatum, C.B., (2000), Management-driven Integration, Journal of Management in Engineering, Vol. 16, No. 1, pp. 48-58.

Mohsini, R. and Davidson, C., (1992), Determinants of performance in the traditional building process, Construction Management and Economics, Vol. 10, No. 4, pp. 343-59.

Moore, D., R. and Dainty, A. R. J., (1999), Integrated project teams' performance in managing unexpected change events, Team Performance Management, Vol. 5, No. 7, pp.212 – 222.

Murray, P. E. and Cotgrave, A. J., (2007), Sustainability literacy: the future paradigm for construction education?, Structural Survey, Vol. 25, No.1, pp.7 – 23.

Mysen, T., (2012), Sustainability as corporate mission and strategy, European Business Review, Vol. 24, No. 6, pp. 496-509.

Nangoli S., Ahimbisibwe A., Namagembe S., Bashir, H., (2013), Social networks: a strategy for enhancing project-stakeholder commitment, Journal of Strategy and Management, Vol. 6 No. 4, pp.399 - 410

Neely, A., Adams, C. and Kenerley, M., (2002), The performance prism: the scorecard for measuring and managing business success, Financial Times, Prentice-Hall, London.

Nesan, L.J. and Holt, G.D., (1999), Empowerment in Construction: The Way Forward for Performance Improvement, Research Studies Press, Baldock.

Nunnaly, J. C. and Bernstein, I. H., (1994), Psychometric Theory, (3rd Edition), New York, McGraw-Hill.

Newcombe, R., (2003), From client to project stakeholders: a stakeholder mapping approach, Construction Management and Economics, Vol. 22, No. (9/10), pp. 762–784.

Odusami, K.T., (2003), Criteria for Measuring Project Performance by Construction Professionals in the Nigerian Construction Industry, Journal of Financial Management of Property and Con struction, Vol. 8, No. 1, pp. 39-47.

Office of Government Commerce (OGC) (2007), Sustainability achieving excellence in construction procurement guide, available at: www.ogc.gov.uk/documents/ CP0016AEGuide11.pdf, (accessed 12 May 2011).

Ogunbiyi, O., Oladapo, A. and Goulding, J., (2014), An empirical study of the impact of lean construction techniques on sustainable construction in the UK, Construction Innovation: Information, Process, Management, Vol. 14, No. 1, pp.88 – 107.

O'Higgins, E. R. E. and Morgan, J. W., (2006), Stakeholder salience and engagement in political organisations: Who and what really counts?, Society and Business Review, Vol. 1, No. 1, pp.62 – 76.

Olander, S. and Landin, A., (2005), Evaluation of stakeholder influence in the implementation of construction projects, International Journal of Project Management, Vol. 23, No. 4, pp. 321.

Olander, S., (2007), Stakeholder impact analysis in construction project management, Construction Management and Economics, Vol. 25, No.3, pp. 277–287.

Olson, L. D, and Wu, D. D, (2010), Kybernetes, A review of enterprise risk management in supply chain, Vol. 39, No. 5, pp. 694-706.

Onkila, T. J., (2009), Corporate Argumentation for Acceptability: Reflections of Environmental Values and Stakeholder Relations in Corporate Environmental Statements. Journal of Business Ethics, Vol. 87, No. 2, pp. 285-289.

Onwueme, I. and Borsari, B., (2007), The sustainability asymptogram: a new philosophical framework for policy, outreach and education in sustainability, Intentional Journal of Sustainability in Higher Education, Vol. 8, No. 1, pp. 44-52.

Opoku, A. and Ahmed, V., (2014), Embracing sustainability practices in UK construction organizations: Challenges facing intra-organizational leadership, Built Environment Project and Asset Management, Vol. 4, No. 1, pp.90 – 107

Oppenheim, A.N., (1992), Questionnaire Design, Interviewing and Attitude Measurement. Pinter Publishers, London.

Orr, D.W., (2004), Earth in mind: On education, environment, and the human prospect (10th ed.), Washington D.C.: Island Press. Pannucci, C. J. and Wilkins, E. G., (2010), Plast Reconstr Surg., Vol. 126, No. 2, pp. 619–625

Paprika, Z. Z., Wimmer, A and Szanto, R., (2008), Managerial decision making and competitiveness: the case of Hungary, Competitiveness Review: An International Business Journal, Vol.18, No. 1-2, pp. 154-167.

Pallant, J. F., (2007), SPSS Survival Manual: A step by Step Guide to Data Analysis Using SPSS for Windows, 3rd Edition, Sydney: Allen and Unwin.

Payne, S.L. and Calton, J.M., (2002), Towards a managerial practice of stakeholder engagement: developing multi-stakeholder learning dialogues, in Andriof, J., Waddock, S., Husted, B. and Sutherland Rahman, S. (Eds), Unfolding Stakeholder Thinking, Greenleaf Publishing Limited, Sheffield.

Persson, U and Olander, S., (2004), Methods to Estimate Stakeholder Views of Sustainability for Construction Projects, Proceedings of the 21th Conference on Passive and Low Energy Architecture, Eindhoven, The Netherlands, 19 – 22 September, pp. - 1 of 6.

Pitt, M., Tucker, M., Riley, M. and Longden, J., (2009), Towards sustainable construction: promotion and best practices, Construction Innovation, Vol. 9, No. 2, pp. 201-24.

PMI Standards Committee, (2000), A Guide to the Project Management Body of Knowledge, Project Management Institute (PMI), USA.

Preble, J. F., (2005), Toward a Comprehensive Model of Stakeholder Management, Business and Society Review, Vol. 110, No. 4, pp. 407-431.

Qu, S., Q. and Dumay, J., (2011), The qualitative research interview, Faculty of Economics and Business, Qualitative Research in Accounting & Management, University of Sydney, Sydney, Australia, Vol. 8, No. 3, pp. 238-264.

Rahman, M.M. and Kumaraswamy, M.M., (2004), Contracting relationship trends and transitions", Journal of Management in Engineering, Vol. 20, No. 4, pp. 147-61.

Remenyi, D., Williams, B., Money, A. and Swartz, E., (1998), Doing research in business and management, an introduction to process and method, London:Sage Publications.

Renukappa, S., Egbu, C., Akintoye, A. and Goulding, J., (2012), A critical reflection on sustainability within the UK industrial sectors, Construction Innovation: Information, Process, Management, Vol. 12, No. 3, pp.317 – 334.

RICS, (2006), RICS View: Draft Strategy for Sustainable Construction 2006, Royal Institute for Chartered Surveyors, Coventry, available at: www.rics.org/Builtenvironment/ Sustainableconstruction/RICSviewDraftStrategyþforSustainableConstruction2006.htm [accessed 13th September, 2013].

Richardson, G.R.A. and J.K. Lynes, (2007), Institutional Motivations and Barriers to theConstruction of Green Buildings on Campus, International Journal of Sustainability, Vol., 8, No. 3, pp. 339–54.

Ries, R., Bilec, M., Gokhan, N.M. and Needy, K.L., (2006), The economic benefits of green buildings: a comprehensive case study, The Engineering Economist, Vol. 51, No. 3, pp. 259-295.

Rimanoczy, I. and Pearson, T., (2010), Role of HR in the new world of sustainability, Industrial and Commercial Training, Vol. 42, No. 1, pp. 11-17.

Rockart, J. F., (1979), Chief Executives Define Their Own Data Needs, Harvard Business Review, pp. 81-92. Romenti, S., (2010), Reputation and stakeholder engagement: an Italian case study, Journal of Communication Management, Vol. 14, No. 4, pp. 306-318.

Rondinelli, D.A. and London, T. (2002), Stakeholder and corporate responsibilities in cross-sectoral environmental collaborations: building value, legitimacy and trust, in Andriof, J., Waddock, S., Husted, B. and Sutherland Rahman, S. (Eds), Unfolding Stakeholder Thinking, Greenleaf Publishing Limited, Sheffield.

Rose, T.M., (2008), The impact of financial incentive mechanisms on motivation in Australian large non-residential building projects, doctoral dissertation, Queensland University of Technology, Brisbane.

Rothbauer, P (2008), "Triangulation." In Given, Lisa (Ed.), "The SAGE Encyclopedia of Qualitative Research Methods." Sage Publications. pp. 892-894.

Rothenberg S., Pil F. K. and Maxwell J., (2001), Lean, green, and the quest for superior environmental performance, Production and Operations Management, Vol.10, No.3, pp. 228-243.

Rowlingson, S. and Cheung, Y.K., (2008), Stakeholder management through empowerment: modeling project success, Construction Management and Economics, Vol. 26, No. 6, pp. 611-623.

Sachs, S. and Ru¨hli, E., (2005), Changing managers' values towards a broader stakeholder orientation.Corporate Governance, Vol. 5, No. 2, pp. 89–98.

Sallinen, L., Inkeri Ruuska, I. and Ahola, T., (2013), How governmental stakeholders influence large projects: the case of nuclear power plant projects, International Journal of Managing Projects in Business, Vol. 6, No. 1, pp.51 – 68.

Sanvido, V., Gobler, F., Parfi tt, K., Guivenis, M., and Coyle, M., (1992), Critical Success Factors for Construction Projects, Journal of Construction Engineering and Management, Vol. 118, No. 1, pp. 94-111.

Sarantakos, Sotirios., (2005), Social research, 3rd ed., Palgrave Macmillan, Basingstoke, pp. 65-70.

Saravanan, V. K., (2011), cost effective and sustainable practices for piling construction in the uae, available at: http://www.dfi.org/update/Dissertation-Saravanan-Sustainability.pdf, [accessed 20th September, 2013].

Saunders, M., Lewis, P. and Thornhill, A., (2009), Research methods for business students, 5th ed., Harlow, Pearson Education.

Saunders, M., Lewis, P. and Thornhill, A., (2012), Research Methods for Business Students, 6Th ed. England, Pearson – Chapter 13, pp. 85-90. Savage, G.T., Nix, T.H., Whitehead, C.J. and Blair, J.D. (1992), Strategies for assessing and managing organizational stakeholders, Academy of Management Executives, Vol. 5, No. 2, pp. 61-75.

Schatzman, L., and Strauss, A. L., (1973), Field research, Englewood Cliffs, N.J.: Prentice-Hall, Inc.

Scofeild, J. H., (2002), Early Performance of a green academic building, Transactions – American Society of Heating Refrigerating and Air Conditioning Engineers, Vol. 108, No. 2, pp. 1214 – 1232.

Sekaran, U., (2003), Research methods for business (4th ed.), Hoboken, NJ: John Wiley & Sons.

Setijono, D., Jens J. and Dahlgaard, J., J., (2007), Selecting Improvement Projects that Add Value to Customers, Asian Journal on Quality, Vol. 8, No. 1, pp.15 – 26.

Shapira, Z. (2011), I've got a theory paper – do you? Conceptual, empirical, and theoretical contributions to knowledge in the organizational sciences, Organization Science, Vol. 22, No. 5, pp. 1312-1321.

Sheskin, D.J., (2000), Handbook of parametric and nonparametric statistical procedures (2nd ed.). New York: CRC Press.

Shotter, J. (1993), Conversational realities, London: Sage Publications.

Siew, R. Y. J., Balatbat, M. C. A. and Carmichael, D., G., (2013), The relationship between sustainability practices and financial performance of construction companies, Smart and Sustainable Built Environment, Vol. 2, No. 1, pp.6 – 27.

Silverman, D., (2005), Doing qualitative research: A practical handbook (2nd ed.), London: Sage.

Sisaye, S., (2013), The development of sustainable practices in complex organizations: Implications and potentials for integration into the accounting curriculum, World Journal of Entrepreneurship, Management and Sustainable Development, Vol. 9, No. 4, pp.223 - 245

Simmons, J. and Lovegrove, I., (2005), Bridging the conceptual divide: lessons from stakeholder analysis, Journal of Organizational Change Management, Vol. 18, No. 5, pp.495 – 513.

Slater, S., (1997), Developing a customer value-based theory of the firm, Journal of the, Academy of Marketing Science, Vol. 25, No. 2, pp. 162-167.

Smith M.J., (1988), Contemporary communication research methods. Belmont, CA: Wadsworth, Inc.

Smith, P.A.C. and Sharicz, C., (2011), The shift needed for sustainability, The Learning Organization, Vol. 18, No. 1, pp. 73-86.

Smith, P. A. C., (2012), The importance of organizational learning for organizational sustainability, Learning Organization, The, Vol. 19, No. 1, pp.4 – 10.

Smith, P. A. C. and Sharicz, C. A., (2013), The bi-modal organization: Balancing autopoiesis and fluid social networks for sustainability, Learning Organization, The, Vol. 20, No. 2, pp.134 – 152

Smyth, H., (2008), The credibility gap in stakeholder management: ethics and evidence of relationship management, Construction Management and Economics, Vol. 26, No. 6, pp. 633-643.

Streeter, A., L E. and Jongh, D, d., (2013), Factors influencing the implementation of clean energy interventions in low-income urban communities in SouthAfrica, Journal of Global Responsibility, Vol. 4, No.1, pp. 76-98.

Sobol, A., (2008), Governance barriers to local sustainable development in Poland, Management of Environmental Quality: An International Journal, Vol. 19, No. 2, pp.194 – 203.

Spitzeck H., and Hansen, E. G., (2010), Stakeholder Governance: How Stakeholders Influence Corporate Decision Making, Corporate Governance, VOL. 10, NO. 4, pp. 378-391.

Sridhar, K., (2012), Corporate conceptions of triple bottom line reporting: an empirical analysis into the signs and symbols driving this fashionable framework, Social Responsibility Journal, Vol. 8, No. 3, pp.312 – 326

Sponge, (2004), Sponge Survey of Sustainability in the Construction Industry, London: Sponge.

Stake, R.E., (1995), The art of case study research: perspectives and practice, London: Sage.

SteelConstruction.info, (2013), Sustainable construction legislation, regulation and drivers, Available at: http://www.steelconstruction.info/Sustainable_construction_legislation,_regulation_and_drivers, [accessed 13th September, 2013].

Strategic Forum for Construction, (2010), Strategic Forum: Targets to 2012, available at: http://www.cic.org.uk/strategicforum/pdf/targets.pdf, [Accessed 14th November, 2010].

Svensson, G., Wood, G. and Callaghan, M., (2010), A corporate model of sustainable business practices: an ethical perspective, Journal of World Business, Vol. 45, No. 4, pp. 336-45.

Tan Y et al., (2010), Sustainable construction practice and contractors' competitiveness: A preliminary study, Habitat International Vol. 35, No. 2, pp. 225-230.

Telegen, J., (2005), Sustainable Design in Massachusetts: Obstacles and Opportunities, available at: http://www.epa.gov/statelocalclimate/documents/pdf/12_8_MA_Sustainable_Design_Obstacles_Opportunities_Telegren.pdf, [accessed 13th September, 2013].

The Sustainable Construction Task Group, (2002), Reputation, Risk and Reward: the Business Case for Sustainability in the UK Property Sector.

Thomas S. Ng, Ekambaram P., and Mohan M., K. M., (2002), A dynamic e-Reporting system for contractorís performance appraisal, Advances in Engineering Software, Vol. 33, No.6, pp. 339-349

Thormark, C. (2006), The effect of material choice on the total energy need and recycling potential of a building, Building and Environment, Vol. 41, No. 8, pp. 1019-1026.

Tuli, F. (2010), The Basis of Distinction Between Qualitative and Quantitative Research in Social Science: Reflection on Ontological, Epistemological and Methodological Perspectives, Ethiop. J. Educ. & Sc., September, Vol. 6, No 1, pp. 97 – 108.

Tuman, J., (2006), Studies in Communications Management: Achieving Project Success through Team Building and Stakeholder Management, In The AMA Handbook of Project Management, ed. P.C. Dinsmore and J. Cabanis-Brewin, 174-183, New York: AMACOM.

Ulmer, R. R., (2001), Effective Crisis Management through Established Stakeholder Relationships: Malden Mills as a Case Study, Management Communication Quarterly, Vol. 14, pp. 590.

Val, C., (2005), Futures dilemmas for marketers: can stakeholder analysis add value?, European Journal of Marketing, Vol. 39, No.9/10, pp.978 – 997.

Vaughan, D., (1992), Theory elaboration: the heuristics of case analysis, In C.C. Ragin & H.S. Becker (eds), What is a case? Exploring the foundations of social inquiry, Cambridge: Cambridge University Press, pp.173-292.

Veleva, V. and Ellenbecker, M., (2001), Indicators of sustainable production: framework and methodology, Journal of Cleaner Production, Vol. 9, No. 6, pp. 519-49.

Vidalakis C, Tookey JE and Sommerville J., (2011a), The logistics of construction supply chains: The builders' merchant perspective. Engineering, Construction and Architectural Management, Vol.18, No.1, pp. 66–80.

von Paumgartten, P., (2003), The business case for high performance green buildings: Sustainability and its financial impact, Journal of Facilities Management, Vol. 2, No. 1, pp.26 – 34

Walley, P., (2013), Stakeholder management: the sociodynamic approach, International Journal of Managing Projects in Business, Vol. 6, No. 3, pp.485 - 504

Ward, S., Curtis, B. and Chapman, C., (1991), Objectives and performance in construction projects, Construction Management and Economics, Vol. 9, No.3, pp. 343-53.

Warren-Myers, G., (2013), Is the valuer the barrier to identifying the value of sustainability?, Journal of Property Investment & Finance, Vol. 31, No. 4, pp.345 - 359

Warhurst, A., (2002), Sustainability Indicators and Sustainability Performance Management. Report to the Project: Mining, Minerals and Sustainable Development (MMSD), International Institute for Environment and Development (IIED), Warwick, England, pp. 14.

Watson, T.J., (1997), Theorizing managerial work: a pragmatic pluralist approach to interdisciplinary research, British Journal of Management, Vol. 8, No. 1, pp. 3-8.

Watzlawick, P. (ed.), (1984), The Invented Reality, London: Norton.

Weber, L., (1997), Viewpoint-some reflections on barriers to efficient use of energy, Ener. Policy, Vol. 25, No. 10, pp. 833-5.

Weinberg, S. L. and Abramowitz, S. K., (2008), Statistics Using SPSS, An Integrative Approach, Cambridge University Press, 2nd Edition, pp. 332.

White, P., (2009), Building a sustainability strategy into the business, Corporate Governance, Vol. 9, No. 4, pp.386 – 394.

Whysall, P., (2000), Addressing ethical issues in retailing: a stakeholder perspective, International Review of Retail, Distribution and Consumer Research, Vol. 10, No.3, pp. 305-18.

Wikstro¨m, P., (2010), Sustainability and organizational activities – three approaches, Sustainable Development, Vol. 18, No. 2, pp. 99-107.

Williams, K. and Lindsay, M., (2005), Oxford Institute for Sustainable Development Working Paper 5: The Extent and Nature of Sustainable Building in England: an Analysis of Progress. Oxford Brookes University: Oxford.

World Commission on Environmental and Development (WCED), (2007), Our common future, available at: www.un-documents.net/ocf-ov.htm (accessed 1 April 2009).

Wright, M., (2009), Gower Handbook of Internal Communication, Gower, Farnham.

Ugwu, O. O., Haupt, T. C., (2005), Key performance indicators for infrastructure sustainability – a comparative study between Hong Kong and South Africa, Journal of Engineering, Design and Technology, Vol. 3, No. 1, pp.30 – 43.

UK Green Building Council (UKGBC) website (2009), Training and education, available at: www.ukgbc.org/site/home (accessed 4 February 2009).

UK SIC, (2003), Standard Industrial Classification of Economic Activities HMSO, London.
Yang, J., Shen, Q., Ho, M., (2009), An overview of previous studies in stakeholder management and its implications for the construction industry, Journal of Facilities Management, Vol. 7, No. 2, pp.159 – 175.

Yang, J., Shen, Q. and Ho, M., (2009), An overview of previous studies in stakeholder management and its implications for the construction industry, Journal of Facilities Management, Vol. 7, No. 2, pp.159 - 175

Yaziji, M., (2004), Turning gadflies into allies, Harvard Business Review, Vol. 82, No. 2, pp. 110-15.

Yin, R.K., (1984), Case Study Research, CA: Sage Publications.

Yin, R.K., (2003), Case Study Research Design and Methods, 3rd Ed., UK: Sage Publications.

Yin, R.K., (2009), Case study research, Design and methods, 4th ed., Thousand Oaks, California, pp. 240.

Yilmaz AK and Flouris T, (2010), Managing corporate sustainability: Risk management process based perspective, African Journal of Business Management, Vol. 4, No. 2, pp. 162-171.

Yu, L., Kim, K., Jung, Y. and Chin, S., (2007), Comparable performance measurement system for construction companies, Journal of Management in Engineering, Vol. 23, No. 3, pp. 131-9.

Zadek, S., Merme, M. and Samans, R., (2005), Mainstreaming Responsible Investment, World Economic Forum, Geneva.

Zeghal, D. and Ahmed, S.A., (1990), Comparison of social responsibility information disclosure used by Canadian firms, Accounting, Auditing and Accountability Journal, Vol. 3, No. 1, pp. 38-53.

Zhang, L. and Fan, W., (2013), Improving performance of construction projects: A project manager's emotional intelligence approach, Engineering, Construction and Architectural Management, Vol. 20, No. 2, pp.195 – 207.

Zhao, Z., Zhao, X., Davidson, K. and Zuo, J. (2012), A corporate social responsibility indicator system for construction enterprises, Journal of Cleaner Production, Vol. 29, No. 30, pp. 277-289.

Zhou, L., Keivani, R. and Kurul, E., (2013), Sustainability performance measurement framework for PFI projects in the UK, Journal of Financial Management of Property and Construction, Vol. 18, No. 3, pp.232 - 250

Zsolnai, L., (2006), Extended stakeholder theory, Society and Business, Vol. 1, No.1, pp. 37-44.

Appendix 1

Table A_ 1.1: Item wise Correlation between Purpose of Stakeholder Engagement and Construction Sustainability [Part I]

		My company employs mechanism to evaluate the outcomes of sustainable development	Application of a Lean technique in construction improves project quality	Application of a Lean technique in construction delivers projects on time	Application of a Lean technique in construction delivers projects to budget	Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use	Sustainable buildings minimise construction waste/pollution
to share individual knowledge	Pearson Correlation	.143*	.228**	.259**	.262**	.282**	.288**	.276**	.215**	.250**
	Sig. (2-tailed)	.031	.001	.000	.000	.000	.000	.000	.001	.000
	N	228	229	228	227	228	228	228	230	230
to enhance communication	Pearson Correlation	.224**	.339**	.376**	.407**	.540**	.471**	.455**	.344**	.370**
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228	228	230	230
for continuous improvement	Pearson Correlation	.143*	.270**	.288**	.329**	.443**	.439**	.341**	.309**	.306**
	Sig. (2-tailed)	.032	.000	.000	.000	.000	.000	.000	.000	.000
	N	225	226	225	224	225	225	225	227	227
to reduce risk and uncertainty	Pearson Correlation	.180**	.302**	.333**	.316**	.567**	.547**	.427**	.308**	.312**
	Sig. (2-tailed)	.006	.000	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	228	229	229	229	231	231
to share challenges	Pearson Correlation	.136*	.284**	.345**	.334**	.420**	.415**	.364**	.298**	.324**
	Sig. (2-tailed)	.041	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	226	227	227	227	229	229
to discuss current issues	Pearson Correlation	.165*	.270**	.295**	.308**	.530**	.505**	.340**	.356**	.305**
	Sig. (2-tailed)	.013	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	226	227	227	227	229	229
to generate innovative ideas	Pearson Correlation	.190**	.244**	.265**	.269**	.345**	.391**	.384**	.216**	.239**
	Sig. (2-tailed)	.004	.000	.000	.000	.000	.000	.000	.001	.000
	N	228	229	228	227	228	228	228	230	230
to generate solution	Pearson Correlation	.074	.336**	.407**	.382**	.452**	.449**	.458**	.335**	.287**
	Sig. (2-tailed)	.263	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228	228	230	230

Table A_ 1.1: Item wise Correlation between Purpose of Stakeholder Engagement and Construction Sustainability [Part II]

		Sustainable buildings maximize re-use of materials	Sustainable construction leads to short/long-term cost reductions	Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Risk management helps to create better value through the management of different threats	Risk management helps to get better understanding of different issues related to environmental//social/ economic/operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product	Construction sustainability target compresses the project time that helps to add value in our project environments	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas
to share individual knowledge	Pearson Correlation	.268**	.121	.172**	.254**	.261**	.201**	.209**	.246**	.236**
	Sig. (2-tailed)	.000	.069	.009	.000	.000	.002	.001	.000	.000
	N	229	228	228	227	229	230	230	230	228
to enhance communication	Pearson Correlation	.415**	.293**	.221**	.394**	.378**	.402**	.272**	.204**	.416**
	Sig. (2-tailed)	.000	.000	.001	.000	.000	.000	.000	.002	.000
	N	229	228	228	227	229	230	230	230	228
for continuous improvement	Pearson Correlation	.343**	.281**	.240**	.309**	.320**	.277**	.264**	.159*	.378**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.016	.000
	N	226	225	226	224	226	227	227	227	225
to reduce risk and uncertainty	Pearson Correlation	.346**	.298**	.248**	.425**	.387**	.419**	.283**	.165*	.475**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.012	.000
	N	230	229	229	228	230	231	231	231	229
to share challenges	Pearson Correlation	.349**	.213**	.221**	.310**	.348**	.361**	.226**	.240**	.378**
	Sig. (2-tailed)	.000	.001	.001	.000	.000	.000	.001	.000	.000
	N	228	227	227	226	228	229	229	229	227
to discuss current issues	Pearson Correlation	.346**	.298**	.339**	.467**	.395**	.360**	.293**	.292**	.440**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	227	227	226	228	229	229	229	227
to generate innovative ideas	Pearson Correlation	.248**	.189**	.165*	.304**	.347**	.245**	.251**	.262**	.321**
	Sig. (2-tailed)	.000	.004	.013	.000	.000	.000	.000	.000	.000
	N	229	228	228	227	229	230	230	230	228
to generate solution	Pearson Correlation	.333**	.246**	.222**	.358**	.391**	.401**	.255**	.241**	.336**
	Sig. (2-tailed)	.000	.000	.001	.000	.000	.000	.000	.000	.000
	N	229	228	228	227	229	230	230	230	228

Table A_ 1.1: Item wise Correlation between Purpose of Stakeholder Engagement and Construction Sustainability [Part III]

		Sustainability target improve the quality of life to aim for getting better project management performance	Waste management helps to achieve acceptable environmental quality	Managing construction waste helps to manage project cost	Managing construction waste helps to achieve better resource management	Reducing construction waste helps to lower the carbon emissions during the construction phase	Managing waste helps to improve productivity	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
to share individual knowledge	Pearson Correlation	.287**	.311**	.218**	.269**	.216**	.242**	.297**	.277**
	Sig. (2-tailed)	.000	.000	.001	.000	.001	.000	.000	.000
	N	229	230	229	224	229	228	228	228
to enhance communication	Pearson Correlation	.387**	.395**	.324**	.305**	.305**	.256**	.427**	.425**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	224	229	228	228	228
for continuous improvement	Pearson Correlation	.405**	.380**	.301**	.263**	.280**	.249**	.364**	.367**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	226	221	226	225	226	225
to reduce risk and uncertainty	Pearson Correlation	.394**	.363**	.297**	.336**	.308**	.244**	.348**	.414**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	230	231	230	225	230	229	229	229
to share challenges	Pearson Correlation	.343**	.341**	.296**	.321**	.282**	.273**	.379**	.358**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	223	228	227	227	227
to discuss current issues	Pearson Correlation	.321**	.390**	.256**	.354**	.232**	.252**	.295**	.295**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	223	228	227	227	227
to generate innovative ideas	Pearson Correlation	.403**	.349**	.230**	.220**	.185**	.239**	.352**	.258**
	Sig. (2-tailed)	.000	.000	.000	.001	.005	.000	.000	.000
	N	229	230	229	224	229	228	228	228
to generate solution	Pearson Correlation	.384**	.354**	.264**	.294**	.220**	.220**	.352**	.437**
	Sig. (2-tailed)	.000	.000	.000	.000	.001	.001	.000	.000
	N	229	230	229	224	229	228	228	228

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_ 1.2: Item wise Correlation between Impacts of Stakeholder Engagement with Construction Sustainability [Part I]

		My company employs mechanism to evaluate the outcomes of sustainable development	Application of a Lean technique in construction improves project quality	Application of a Lean technique in construction delivers projects on time	Application of a Lean technique in construction delivers projects to budget
You engage all people internally	Pearson Correlation	.256**	.251**	.267**	.277**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	229	228	227
In construction there are different stakeholders with different needs	Pearson Correlation	.126	.250**	.300**	.305**
	Sig. (2-tailed)	.056	.000	.000	.000
	N	229	230	229	228
Stakeholder engagement is the process of exchanging information	Pearson Correlation	.162*	.328**	.397**	.364**
	Sig. (2-tailed)	.015	.000	.000	.000
	N	227	228	228	226
You engage with selective people as stakeholders to your project	Pearson Correlation	-.094	-.006	.100	.076
	Sig. (2-tailed)	.158	.928	.132	.254
	N	228	229	228	227
Stakeholder engagement is the process of sharing pain	Pearson Correlation	.139*	.106	.145*	.167*
	Sig. (2-tailed)	.035	.108	.029	.012
	N	229	230	229	228
Stakeholder engagement is the process of creating innovative ideas	Pearson Correlation	.175**	.274**	.298**	.297**
	Sig. (2-tailed)	.008	.000	.000	.000
	N	229	230	229	228
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Pearson Correlation	.186**	.231**	.311**	.272**
	Sig. (2-tailed)	.005	.000	.000	.000
	N	227	228	227	226
Building partnerships is a good approach for involving stakeholders in the engagement process	Pearson Correlation	.180**	.404**	.454**	.403**
	Sig. (2-tailed)	.006	.000	.000	.000
	N	229	230	229	228
A "Stakeholder Register" is a useful tool to analyse the key project stakeholders	Pearson Correlation	.226**	.339**	.325**	.276**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	230	231	230	229
Stakeholder engagement is a powerful mechanism to identify new business opportunities	Pearson Correlation	.214**	.306**	.375**	.333**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	229	230	229	228
Stakeholders are generally very supportive of the need to reduce energy emissions	Pearson Correlation	.223**	.400**	.420**	.388**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	228	229	228	227
Stakeholders are generally very supportive of a carbon management plan	Pearson Correlation	.275**	.402**	.418**	.360**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	229	228	227
Stakeholders are the sources of different project issues	Pearson Correlation	.108	.175**	.218**	.192**

	Sig. (2-tailed)	.102	.008	.001	.004
	N	229	230	229	228
By effectively engaging stakeholders we lower the risk for each relationship	Pearson Correlation	.225**	.336**	.379**	.323**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	229	230	229	228
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Pearson Correlation	.229**	.421**	.459**	.411**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	230	229	228
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	Pearson Correlation	.213**	.376**	.420**	.356**

Table A_ 1.2: Item wise Correlation between Impacts of Stakeholder Engagement with Construction Sustainability [Part II]

		Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use
You engage all people internally	Pearson Correlation	.251**	.232**	.310**	.271**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	228	228	230
In construction there are different stakeholders with different needs	Pearson Correlation	.100	.162*	.390**	.355**
	Sig. (2-tailed)	.132	.009	.000	.000
	N	228	227	229	231
Stakeholder engagement is the process of exchanging information	Pearson Correlation	.506**	.438**	.507**	.362**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	227	227	229
You engage with selective people as stakeholders to your project	Pearson Correlation	.262**	.240**	.111	.075
	Sig. (2-tailed)	.000	.000	.094	.258
	N	228	228	228	230
Stakeholder engagement is the process of sharing pain	Pearson Correlation	.066	.115	.221**	.133*
	Sig. (2-tailed)	.323	.084	.001	.043
	N	229	229	229	231
Stakeholder engagement is the process of creating innovative ideas	Pearson Correlation	.306**	.293**	.432**	.270**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	229	229	231
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Pearson Correlation	.568**	.478**	.437**	.416**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	227	227	227	229
Building partnerships is a good approach for involving stakeholders in the engagement process	Pearson Correlation	.476**	.461**	.417**	.435**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	229	229	231
A "Stakeholder Register" is a useful tool to analyse the key project stakeholders	Pearson Correlation	.380**	.392**	.401**	.318**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	230	230	232
Stakeholder engagement is a powerful mechanism to identify new business opportunities	Pearson Correlation	.185**	.227**	.302**	.229**
	Sig. (2-tailed)	.005	.001	.000	.000
	N	229	229	229	231
Stakeholders are generally very supportive of the need to reduce energy emissions	Pearson Correlation	.210**	.303**	.345**	.419**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	228	228	229	230
Stakeholders are generally very supportive of a carbon management plan	Pearson Correlation	.211**	.308**	.302**	.369**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	228	228	228	230
Stakeholders are the sources of different project issues	Pearson Correlation	.260**	.309**	.346**	.268**
	Sig. (2-tailed)	.000	.000	.000	.000

	N	229	229	229	231
By effectively engaging stakeholders we lower the risk for each relationship	Pearson Correlation	.428**	.436**	.468**	.364**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	229	229	231
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Pearson Correlation	.468**	.486**	.499**	.427**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	229	229	231
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	Pearson Correlation	.490**	.493**	.488**	.390**

Table A_ 1.2: Item wise Correlation between Impacts of Stakeholder Engagement with Construction Sustainability [Part III]

		Sustainable buildings minimise construction waste/pollution	Sustainable buildings maximize re-use of materials	Sustainable construction leads to short/long-term cost reductions	Sustainable construction results in short/ long-term increase in energy/resource efficiencies
You engage all people internally	Pearson Correlation	.265**	.247**	.232**	.154*
	Sig. (2-tailed)	.000	.000	.000	.020
	N	230	229	228	228
In construction there are different stakeholders with different needs	Pearson Correlation	.305**	.362**	.265**	.284**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	229	229
Stakeholder engagement is the process of exchanging information	Pearson Correlation	.350**	.382**	.326**	.342**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	228	227	227
You engage with selective people as stakeholders to your project	Pearson Correlation	.065	.132*	.053	.129
	Sig. (2-tailed)	.325	.046	.423	.052
	N	230	229	228	228
Stakeholder engagement is the process of sharing pain	Pearson Correlation	.175**	.198**	.237**	.121
	Sig. (2-tailed)	.008	.003	.000	.067
	N	231	231	229	229
Stakeholder engagement is the process of creating innovative ideas	Pearson Correlation	.297**	.283**	.189**	.197**
	Sig. (2-tailed)	.000	.000	.004	.003
	N	231	230	229	229
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Pearson Correlation	.353**	.316**	.225**	.293**
	Sig. (2-tailed)	.000	.000	.001	.000
	N	229	228	227	227
Building partnerships is a good approach for involving stakeholders in the engagement process	Pearson Correlation	.389**	.398**	.245**	.234**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	229	229
A "Stakeholder Register" is a useful tool to analyse the key project stakeholders	Pearson Correlation	.313**	.326**	.193**	.257**
	Sig. (2-tailed)	.000	.000	.003	.000
	N	232	231	230	230
Stakeholder engagement is a powerful mechanism to identify new business opportunities	Pearson Correlation	.289**	.287**	.269**	.225**
	Sig. (2-tailed)	.000	.000	.000	.001
	N	231	230	229	229
Stakeholders are generally very supportive of the need to reduce energy emissions	Pearson Correlation	.388**	.365**	.295**	.359**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	229	228	228
Stakeholders are generally very supportive of a carbon management plan	Pearson Correlation	.359**	.362**	.315**	.358**

	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	229	228	228
Stakeholders are the sources of different project issues	Pearson Correlation	.244**	.288**	.189**	.280**
	Sig. (2-tailed)	.000	.000	.004	.000
	N	231	230	229	229
By effectively engaging stakeholders we lower the risk for each relationship	Pearson Correlation	.382**	.366**	.282**	.311**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	229	229
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Pearson Correlation	.395**	.393**	.353**	.316**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	229	229
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	Pearson Correlation	.340**	.360**	.283**	.263**

Table A_ 1.2: Item wise Correlation between Impacts of Stakeholder Engagement with Construction Sustainability [Part IV]

		Risk management helps to create better value through the management of different threats	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product
You engage all people internally	Pearson Correlation	.377**	.316**	.350**	.163*
	Sig. (2-tailed)	.000	.000	.000	.013
	N	227	229	230	230
In construction there are different stakeholders with different needs	Pearson Correlation	.499**	.465**	.452**	.236**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	230	231	231
Stakeholder engagement is the process of exchanging information	Pearson Correlation	.466**	.393**	.380**	.466**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	226	228	229	226
You engage with selective people as stakeholders to your project	Pearson Correlation	.113	.131*	.179**	.021
	Sig. (2-tailed)	.088	.048	.006	.755
	N	227	229	230	230
Stakeholder engagement is the process of sharing pain	Pearson Correlation	.159*	.109	.059	.181**
	Sig. (2-tailed)	.016	.098	.376	.006
	N	228	230	231	231
Stakeholder engagement is the process of creating innovative ideas	Pearson Correlation	.342**	.329**	.251**	.319**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	230	231	231
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Pearson Correlation	.412**	.445**	.407**	.267**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	226	228	229	229
Building partnerships is a good approach for involving stakeholders in the engagement process	Pearson Correlation	.398**	.450**	.434**	.330**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	230	231	231
A "Stakeholder Register" is a useful tool to analyse the key project stakeholders	Pearson Correlation	.453**	.473**	.410**	.302**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	231	232	232
Stakeholder engagement is a powerful mechanism to identify new business opportunities	Pearson Correlation	.252**	.273**	.185**	.210**
	Sig. (2-tailed)	.000	.000	.005	.001
	N	228	230	231	231
Stakeholders are generally very supportive of the need to reduce energy emissions	Pearson Correlation	.341**	.352**	.359**	.340**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	227	229	230	230

Stakeholders are generally very supportive of a carbon management plan	Pearson Correlation	.368**	.375**	.386**	.356**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	227	229	230	230
Stakeholders are the sources of different project issues	Pearson Correlation	.441**	.330**	.303**	.214**
	Sig. (2-tailed)	.000	.000	.000	.001
	N	228	230	231	231
By effectively engaging stakeholders we lower the risk for each relationship	Pearson Correlation	.527**	.495**	.338**	.278**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	230	231	231
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Pearson Correlation	.533**	.544**	.452**	.311**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	230	231	231
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	Pearson Correlation	.439**	.486**	.440**	.301**

Table A_ 1.2: Item wise Correlation between Impacts of Stakeholder Engagement with Construction Sustainability [Part V]

		Construction sustainability target compresses the project time that helps to add value in our project environments	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Sustainability target improve the quality of life to aim for getting better project management performance	Waste management helps to achieve acceptable environmental quality	Managing construction waste helps to manage project cost
You engage all people internally	Pearson Correlation	.331**	.300**	.259**	.248**	.187**
	Sig. (2-tailed)	.000	.000	.000	.000	.005
	N	230	228	229	230	229
In construction there are different stakeholders with different needs	Pearson Correlation	.214**	.490**	.337**	.332**	.276**
	Sig. (2-tailed)	.001	.000	.000	.000	.000
	N	231	229	230	231	230
Stakeholder engagement is the process of exchanging information	Pearson Correlation	.330**	.424**	.407**	.435**	.305**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	229	227	228	229	228
You engage with selective people as stakeholders to your project	Pearson Correlation	.143*	.294**	.223**	.187**	.183**
	Sig. (2-tailed)	.030	.000	.001	.004	.005
	N	230	229	229	230	229
Stakeholder engagement is the process of sharing pain	Pearson Correlation	.319**	.106	.296**	.266**	.133*
	Sig. (2-tailed)	.000	.109	.000	.000	.044
	N	231	229	230	231	230
Stakeholder engagement is the process of creating innovative ideas	Pearson Correlation	.401**	.316**	.457**	.314**	.285**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	231	229	230	231	230
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Pearson Correlation	.212**	.436**	.405**	.344**	.285**
	Sig. (2-tailed)	.001	.000	.000	.000	.000
	N	229	227	228	229	228
Building partnerships is a good approach for involving stakeholders in the engagement process	Pearson Correlation	.279**	.499**	.422**	.461**	.358**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	231	229	230	231	230
A "Stakeholder Register" is a useful tool to analyse the key project stakeholders	Pearson Correlation	.212**	.409**	.366**	.380**	.243**
	Sig. (2-tailed)	.001	.000	.000	.000	.000
	N	232	230	231	232	231
Stakeholder engagement is a powerful mechanism to identify new business opportunities	Pearson Correlation	.277**	.211**	.401**	.248**	.228**
	Sig. (2-tailed)	.000	.001	.000	.000	.000
	N	231	229	230	231	231
Stakeholders are generally very supportive of the need to reduce energy emissions	Pearson Correlation	.329**	.289**	.294**	.287**	.229**
	Sig. (2-tailed)	.000	.000	.000	.000	.000

	N	230	228	229	230	229
Stakeholders are generally very supportive of a carbon management plan	Pearson Correlation	.299**	.291**	.340**	.326**	.199**
	Sig. (2-tailed)	.000	.000	.000	.000	.002
	N	230	228	229	230	229
Stakeholders are the sources of different project issues	Pearson Correlation	.223**	.352**	.288**	.350**	.110
	Sig. (2-tailed)	.001	.000	.000	.000	.097
	N	231	229	230	231	230
By effectively engaging stakeholders we lower the risk for each relationship	Pearson Correlation	.241**	.461**	.383**	.383**	.288**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	231	229	230	231	230
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Pearson Correlation	.534**	.546**	.416**	.421**	.255**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	230	229	230	231	230
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	Pearson Correlation	.271**	.456**	.451**	.405**	.275**

Table A_1.2: Item wise Correlation between Impacts of Stakeholder Engagement with Construction Sustainability [Part VI]

		Managing construction waste helps to achieve better resource management	Reducing construction waste helps to lower the carbon emissions during the construction phase	Managing waste helps to improve productivity	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
You engage all people internally	Pearson Correlation	.213**	.229**	.228**	.275**	.310**
	Sig. (2-tailed)	.001	.000	.001	.000	.000
	N	224	229	228	228	228
In construction there are different stakeholders with different needs	Pearson Correlation	.347**	.317**	.205**	.337**	.430**
	Sig. (2-tailed)	.000	.000	.002	.000	.000
	N	225	230	229	229	229
Stakeholder engagement is the process of exchanging information	Pearson Correlation	.380**	.413**	.265**	.336**	.342**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	223	228	227	227	227
You engage with selective people as stakeholders to your project	Pearson Correlation	.167*	.161*	.109	.196**	.188**
	Sig. (2-tailed)	.012	.015	.100	.003	.004
	N	224	229	228	228	228
Stakeholder engagement is the process of sharing pain	Pearson Correlation	.156*	.179**	.103	.210**	.089
	Sig. (2-tailed)	.019	.006	.119	.001	.178
	N	225	230	229	229	229
Stakeholder engagement is the process of creating innovative ideas	Pearson Correlation	.246**	.280**	.301**	.355**	.276**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	225	230	229	229	229
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Pearson Correlation	.318**	.374**	.250**	.416**	.344**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	223	228	227	227	227
Building partnerships is a good approach for involving stakeholders in the engagement process	Pearson Correlation	.368**	.319**	.332**	.496**	.492**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	225	230	229	229	229
A "Stakeholder Register" is a useful tool to analyse the key project stakeholders	Pearson Correlation	.289**	.263**	.200**	.353**	.373**
	Sig. (2-tailed)	.000	.000	.002	.000	.000
	N	226	231	230	230	230
Stakeholder engagement is a powerful mechanism to identify new business opportunities	Pearson Correlation	.243**	.206**	.245**	.333**	.302**
	Sig. (2-tailed)	.000	.002	.000	.000	.000
	N	225	230	230	229	229
Stakeholders are generally very supportive of the need to reduce energy emissions	Pearson Correlation	.258**	.233**	.319**	.321**	.285**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	224	229	228	228	228
Stakeholders are generally very supportive of a carbon management plan	Pearson Correlation	.287**	.208**	.337**	.309**	.263**

	Sig. (2-tailed)	.000	.002	.000	.000	.000
	N	224	229	228	228	228
Stakeholders are the sources of different project issues	Pearson Correlation	.318**	.179**	.131*	.262**	.363**
	Sig. (2-tailed)	.000	.006	.048	.000	.000
	N	225	230	229	229	229
By effectively engaging stakeholders we lower the risk for each relationship	Pearson Correlation	.353**	.294**	.199**	.357**	.417**
	Sig. (2-tailed)	.000	.000	.002	.000	.000
	N	225	230	229	229	229
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Pearson Correlation	.381**	.387**	.272**	.364**	.441**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	225	230	229	229	229
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	Pearson Correlation	.343**	.390**	.256**	.399**	.470**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.3: Item wise correlation between Communications with Stakeholders with Construction Sustainability [Part I]

		My company have the approach to evaluate the outcomes of sustainable development	Application of a Lean technique in construction improves project quality	Application of a Lean technique in construction delivers projects on time	Application of a Lean technique in construction delivers projects to budget	Sustainable construction manage cost/quality/risk/procurement together to improve project performance
I like to have face-to-face meetings with the particular stakeholders	Pearson Correlation	.252**	.349**	.364**	.358**	.310**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	229	230	229	228	229
I communicate with stakeholders through IT Systems	Pearson Correlation	.170*	.232**	.349**	.325**	.422**
	Sig. (2-tailed)	.010	.000	.000	.000	.000
	N	228	229	228	228	228
I like to communicate with stakeholders privately to discuss issues	Pearson Correlation	.172**	.291**	.388**	.376**	.418**
	Sig. (2-tailed)	.009	.000	.000	.000	.000
	N	229	230	230	228	229
I communicate with stakeholders through formal meeting	Pearson Correlation	.186**	.119	.201**	.225**	.347**
	Sig. (2-tailed)	.005	.072	.002	.001	.000
	N	227	228	227	226	227
Our all stakeholders have a medium to provide feedback to the project	Pearson Correlation	.297**	.251**	.345**	.338**	.386**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	228	229	228	227	228
Communicating with different stakeholder helps to expose different thoughts	Pearson Correlation	.213**	.333**	.374**	.349**	.441**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	229	230	229	228	229
Communicating with stakeholders at the early stages of the design process can provide innovative high-quality solutions at competitive prices	Pearson Correlation	.126	.304**	.344**	.296**	.421**
	Sig. (2-tailed)	.057	.000	.000	.000	.000
	N	228	229	228	227	228
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	Pearson Correlation	.156*	.447**	.482**	.480**	.551**
	Sig. (2-tailed)	.018	.000	.000	.000	.000
	N	229	229	228	227	228
Communication with different stakeholders helps to prioritise their needs	Pearson Correlation	.215**	.383**	.446**	.419**	.521**
	Sig. (2-tailed)	.001	.000	.000	.000	.000
	N	230	231	230	229	230

Table A_1.3: Item wise correlation between Communications with Stakeholders with Construction Sustainability [Part II]

		Measuring sustainability performance helps to highlight opportunities to improve	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use	Sustainable buildings minimise construction waste/pollution	Sustainable buildings maximize re-use of materials	Sustainable construction leads to short/long-term cost reductions
I like to have face-to-face meetings with the particular stakeholders	Pearson Correlation	.300**	.354**	.319**	.285**	.254**	.191**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.004
	N	229	229	231	231	230	229
I communicate with stakeholders through IT Systems	Pearson Correlation	.427**	.307**	.284**	.249**	.264**	.257**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	228	230	230	229	229
I like to communicate with stakeholders privately to discuss issues	Pearson Correlation	.379**	.334**	.264**	.266**	.255**	.184**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.005
	N	229	229	231	231	230	229
I communicate with stakeholders through formal meeting	Pearson Correlation	.271**	.254**	.139*	.202**	.151*	.128
	Sig. (2-tailed)	.000	.000	.035	.002	.022	.053
	N	227	227	229	229	228	227
Our all stakeholders have a medium to provide feedback to the project	Pearson Correlation	.376**	.303**	.272**	.277**	.271**	.157*
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.018
	N	228	228	230	230	229	228
Communicating with different stakeholder helps to expose different thoughts	Pearson Correlation	.462**	.368**	.427**	.373**	.325**	.139*
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.036
	N	229	229	231	231	230	229
Communicating with stakeholders at the early stages of the design process can provide innovative high-quality solutions at competitive prices	Pearson Correlation	.402**	.577**	.293**	.320**	.391**	.251**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	228	230	230	229	228
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	Pearson Correlation	.498**	.472**	.444**	.411**	.409**	.293**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	228	230	230	229	228
Communication with different stakeholders helps to prioritise their needs	Pearson Correlation	.489**	.455**	.352**	.327**	.323**	.214**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.001
	N	230	230	232	232	231	230

Table A_1.3: Item wise correlation between Communications with Stakeholders with Construction Sustainability [Part III]

		Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Risk management helps to create better value through the management of different threats	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product	Construction sustainability target compresses the project time that helps to add value in our project environments
I like to have face-to-face meetings with the particular stakeholders	Pearson Correlation	.201**	.304**	.358**	.391**	.270*	.273**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	228	230	231	231	231
I communicate with stakeholders through IT Systems	Pearson Correlation	.216**	.256**	.292**	.366**	.192**	.230**
	Sig. (2-tailed)	.001	.000	.000	.000	.003	.000
	N	228	227	229	230	230	230
I like to communicate with stakeholders privately to discuss issues	Pearson Correlation	.140*	.256**	.292**	.383**	.180**	.195**
	Sig. (2-tailed)	.035	.000	.000	.000	.006	.003
	N	229	228	230	231	231	231
I communicate with stakeholders through formal meeting	Pearson Correlation	.158*	.252**	.231**	.225**	.138*	.126
	Sig. (2-tailed)	.017	.000	.000	.001	.037	.058
	N	227	226	228	229	229	229
Our all stakeholders have a medium to provide feedback to the project	Pearson Correlation	.213**	.321**	.383**	.368**	.191**	.225**
	Sig. (2-tailed)	.001	.000	.000	.000	.004	.001
	N	229	227	229	230	230	230
Communicating with different stakeholder helps to expose different thoughts	Pearson Correlation	.264**	.445**	.529**	.454**	.294**	.230**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	228	230	231	231	231
Communicating with stakeholders at the early stages of the design process can provide innovative high-quality solutions at competitive prices	Pearson Correlation	.191**	.375**	.443**	.285**	.314**	.241**
	Sig. (2-tailed)	.004	.000	.000	.000	.000	.000
	N	228	227	229	230	230	230
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	Pearson Correlation	.296**	.504**	.539**	.537**	.311**	.297**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	227	229	230	230	230
Communication with different stakeholders helps to prioritise their needs	Pearson Correlation	.285**	.461**	.458**	.472**	.281**	.304**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	230	229	231	232	232	232

Table A_1.3: Item wise correlation between Communications with Stakeholders with Construction Sustainability [Part IV]

		Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Sustainability target improve the quality of life to aim for getting better project management performance	Waste management helps to achieve acceptable environmental quality	Managing construction waste helps to manage project cost	Managing construction waste helps to achieve better resource management
I like to have face-to-face meetings with the particular stakeholders	Pearson Correlation	.326**	.262**	.187**	.222**	.265*
	Sig. (2-tailed)	.000	.000	.004	.001	.000
	N	229	230	231	230	225
I communicate with stakeholders through IT Systems	Pearson Correlation	.363**	.235**	.227**	.249**	.282**
	Sig. (2-tailed)	.000	.000	.001	.000	.000
	N	228	229	230	229	224
I like to communicate with stakeholders privately to discuss issues	Pearson Correlation	.364**	.383**	.200**	.252**	.235**
	Sig. (2-tailed)	.000	.000	.002	.000	.000
	N	229	230	231	230	225
I communicate with stakeholders through formal meeting	Pearson Correlation	.241**	.271**	.144*	.130*	.185**
	Sig. (2-tailed)	.000	.000	.029	.049	.006
	N	227	229	229	228	223
Our all stakeholders have a medium to provide feedback to the project	Pearson Correlation	.351**	.332**	.219**	.241**	.270**
	Sig. (2-tailed)	.000	.000	.001	.000	.000
	N	228	229	230	229	224
Communicating with different stakeholder helps to expose different thoughts	Pearson Correlation	.465**	.401**	.340**	.325**	.318**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	229	230	231	230	225
Communicating with stakeholders at the early stages of the design process can provide innovative high-quality solutions at competitive prices	Pearson Correlation	.363**	.461**	.431**	.287**	.290**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	228	229	230	229	224
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	Pearson Correlation	.489**	.363**	.386**	.321**	.352**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	228	229	230	229	224
Communication with different stakeholders helps to prioritise their needs	Pearson Correlation	.459**	.422**	.368**	.309**	.284**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	230	231	232	231	226

Table A_1.3: Item wise correlation between Communications with Stakeholders with Construction Sustainability [Part V]

		Reducing construction waste helps to lower the carbon emissions during the construction phase	Managing waste helps to improve productivity	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
I like to have face-to-face meetings with the particular stakeholders	Pearson Correlation	.192**	.177**	.277**	.289**
	Sig. (2-tailed)	.003	.007	.000	.000
	N	230	229	229	229
I communicate with stakeholders through IT Systems	Pearson Correlation	.255**	.149*	.218**	.275**
	Sig. (2-tailed)	.000	.025	.001	.000
	N	229	228	228	228
I like to communicate with stakeholders privately to discuss issues	Pearson Correlation	.260**	.130*	.238**	.373**
	Sig. (2-tailed)	.000	.049	.000	.000
	N	230	229	229	229
I communicate with stakeholders through formal meeting	Pearson Correlation	.183**	.150*	.139*	.239**
	Sig. (2-tailed)	.006	.024	.036	.000
	N	228	227	227	227
Our all stakeholders have a medium to provide feedback to the project	Pearson Correlation	.221**	.239**	.321**	.298**
	Sig. (2-tailed)	.001	.000	.000	.000
	N	229	228	228	228
Communicating with different stakeholder helps to expose different thoughts	Pearson Correlation	.279**	.238**	.453**	.464**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	229	229	229
Communicating with stakeholders at the early stages of the design process can provide innovative high-quality solutions at competitive prices	Pearson Correlation	.258**	.281**	.246**	.335**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	228	228	228
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	Pearson Correlation	.314**	.233**	.461**	.482**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	228	228	228
Communication with different stakeholders helps to prioritise their needs	Pearson Correlation	.392**	.264**	.346**	.413**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	230	230

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.4: Item wise correlation between Stakeholder Analyses with Construction Sustainability [Part I]

		Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use
Stakeholder identification helps to find out who has unique knowledge related to any aspect of the project	Pearson Correlation	.455**	.385**	.399**	.445**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	228	228	230
Project managers should identify the stakeholders as early as possible in the project life cycle	Pearson Correlation	.498**	.377**	.346**	.406**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	229	229	231
The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	Pearson Correlation	.530**	.432**	.410**	.380**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	229	230	231
I prioritize stakeholders according to their responsibilities to the project	Pearson Correlation	.454**	.404**	.412**	.410**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	230	230	232
I prioritize stakeholders according to their impact to the project	Pearson Correlation	.419**	.391**	.353**	.391**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	230	230	232
I prioritize stakeholders according to how urgent they see the project interest in	Pearson Correlation	.292**	.321**	.397**	.248**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	226	226	226	228
I prioritize stakeholders according to their power to influence the project outcome	Pearson Correlation	.370**	.286**	.156*	.243**
	Sig. (2-tailed)	.000	.000	.018	.000
	N	229	229	229	231
Internal Stakeholders are prioritized above external stakeholders	Pearson Correlation	.118	.091	.105	.150*
	Sig. (2-tailed)	.074	.168	.111	.022
	N	230	230	230	232
I prioritize stakeholders demand for the project	Pearson Correlation	.230**	.195**	.221**	.231**
	Sig. (2-tailed)	.000	.003	.001	.000
	N	227	227	227	229
Stakeholder analysis helps to evaluate different stakeholders power	Pearson Correlation	.380**	.349**	.333**	.390**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	228	228	230
In order to ensure the quality of the decision-making processes, stakeholder analysis is useful	Pearson Correlation	.478**	.382**	.393**	.324**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	230	230	232
Stakeholder analysis is useful to find innovative solutions to problems	Pearson Correlation	.330**	.319**	.476**	.346**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	227	227	227	229

Table A_1.4: Item wise correlation between Stakeholder Analyses with Construction Sustainability [Part II]

		Sustainable buildings minimise construction waste/pollution	Sustainable buildings maximize re-use of materials	Sustainable construction leads to short/long-term cost reductions	Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Risk management helps to create better value through the management of different threats
Stakeholder identification helps to find out who has unique knowledge related to any aspect of the project	Pearson Correlation	.425**	.441**	.317**	.279**	.521**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	230	229	228	228	227
Project managers should identify the stakeholders as early as possible in the project life cycle	Pearson Correlation	.393**	.418**	.311**	.328**	.413**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	231	230	229	229	228
The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	Pearson Correlation	.361**	.369**	.333**	.286**	.513**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	231	230	229	229	228
I prioritize stakeholders according to their responsibilities to the project	Pearson Correlation	.406**	.378**	.281**	.249**	.474**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	232	231	230	230	229
I prioritize stakeholders according to their impact to the project	Pearson Correlation	.359**	.342**	.291**	.214**	.398**
	Sig. (2-tailed)	.000	.000	.000	.001	.000
	N	232	231	230	230	229
I prioritize stakeholders according to how urgent they see the project interest in	Pearson Correlation	.230**	.257**	.279**	.264**	.281**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	228	227	226	226	225
I prioritize stakeholders according to their power to influence the project outcome	Pearson Correlation	.223**	.226**	.211**	.136*	.228**
	Sig. (2-tailed)	.001	.001	.001	.040	.001
	N	231	230	229	229	228
Internal Stakeholders are prioritized above external stakeholders	Pearson Correlation	.128	.101	.136*	.177**	.114
	Sig. (2-tailed)	.052	.125	.039	.007	.085
	N	232	231	230	230	229
I prioritize stakeholders demand for the project	Pearson Correlation	.227**	.292**	.270**	.304**	.257**
	Sig. (2-tailed)	.001	.000	.000	.000	.000
	N	229	228	227	227	226
Stakeholder analysis helps to evaluate different stakeholders power	Pearson Correlation	.410**	.406**	.392**	.387**	.436**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	230	229	228	228	227
In order to ensure the quality of the decision-making processes, stakeholder analysis is useful	Pearson Correlation	.332**	.356**	.267**	.314**	.420**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	232	231	230	230	229
Stakeholder analysis is useful to find innovative solutions to problems	Pearson Correlation	.318**	.336**	.253**	.287**	.331**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	229	228	227	227	226

Table A_1.4: Item wise correlation between Stakeholder Analyses with Construction Sustainability [Part III]

		Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product	Construction sustainability target compresses the project time that helps to add value in our project environments
Stakeholder identification helps to find out who has unique knowledge related to any aspect of the project	Pearson Correlation	.484**	.427**	.360**	.325**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	230	230	230
Project managers should identify the stakeholders as early as possible in the project life cycle	Pearson Correlation	.416**	.384**	.248**	.221**
	Sig. (2-tailed)	.000	.000	.000	.001
	N	230	231	231	231
The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	Pearson Correlation	.447**	.366**	.241**	.186**
	Sig. (2-tailed)	.000	.000	.000	.005
	N	230	231	231	231
I prioritize stakeholders according to their responsibilities to the project	Pearson Correlation	.340**	.335**	.284**	.330**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	232	232	232
I prioritize stakeholders according to their impact to the project	Pearson Correlation	.391**	.423**	.264**	.246**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	232	232	232
I prioritize stakeholders according to how urgent they see the project interest in	Pearson Correlation	.263**	.247**	.254**	.364**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	227	228	228	228
I prioritize stakeholders according to their power to influence the project outcome	Pearson Correlation	.307**	.268**	.077	.216**
	Sig. (2-tailed)	.000	.000	.244	.001
	N	230	231	231	231
Internal Stakeholders are prioritized above external stakeholders	Pearson Correlation	.126	.043	.062	.119
	Sig. (2-tailed)	.055	.513	.351	.071
	N	231	232	232	232
I prioritize stakeholders demand for the project	Pearson Correlation	.246**	.135*	.219**	.253**
	Sig. (2-tailed)	.000	.041	.001	.000
	N	228	229	229	229
Stakeholder analysis helps to evaluate different stakeholders power	Pearson Correlation	.434**	.369**	.306**	.287**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	230	230	230
In order to ensure the quality of the decision-making processes, stakeholder analysis is useful	Pearson Correlation	.374**	.390**	.245**	.213**
	Sig. (2-tailed)	.000	.000	.000	.001
	N	231	232	232	232
Stakeholder analysis is useful to find innovative solutions to problems	Pearson Correlation	.337**	.251**	.249**	.299**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	229	229	229

Table A_1.4: Item wise correlation between Stakeholder Analyses with Construction Sustainability [Part IV]

		Reducing construction waste helps to lower the carbon emissions during the construction phase	Managing waste helps to improve productivity	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
Stakeholder identification helps to find out who has unique knowledge related to any aspect of the project	Pearson Correlation	.361**	.335**	.422**	.321**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	228	228	228
Project managers should identify the stakeholders as early as possible in the project life cycle	Pearson Correlation	.345**	.131*	.316**	.331**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	230	229	229	229
The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	Pearson Correlation	.346**	.222**	.338**	.405**
	Sig. (2-tailed)	.000	.001	.000	.000
	N	230	229	229	229
I prioritize stakeholders according to their responsibilities to the project	Pearson Correlation	.331**	.268**	.348**	.343**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	230	230
I prioritize stakeholders according to their impact to the project	Pearson Correlation	.388**	.267**	.377**	.367**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	230	230
I prioritize stakeholders according to how urgent they see the project interest in	Pearson Correlation	.296**	.240**	.235**	.160*
	Sig. (2-tailed)	.000	.000	.000	.016
	N	227	226	226	226
I prioritize stakeholders according to their power to influence the project outcome	Pearson Correlation	.217**	.150*	.304**	.252**
	Sig. (2-tailed)	.001	.023	.000	.000
	N	230	229	229	229
Internal Stakeholders are prioritized above external stakeholders	Pearson Correlation	.047	.029	.084	.050
	Sig. (2-tailed)	.474	.658	.203	.447
	N	231	230	230	230
I prioritize stakeholders demand for the project	Pearson Correlation	.206**	.152*	.192**	.159*
	Sig. (2-tailed)	.002	.022	.004	.016
	N	228	227	227	227
Stakeholder analysis helps to evaluate different stakeholders power	Pearson Correlation	.400**	.313**	.408**	.426**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	229	228	228	228
In order to ensure the quality of the decision-making processes, stakeholder analysis is useful	Pearson Correlation	.424**	.323**	.404**	.348**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	231	230	230	230
Stakeholder analysis is useful to find innovative solutions to problems	Pearson Correlation	.350**	.301**	.405**	.270**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	228	227	227	227

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.5: Item wise correlation between Stakeholder Mapping and Construction Sustainability [Part I]

		My company have the approach to evaluate the outcomes of sustainable development	Application of a Lean technique in construction improves project quality	Application of a Lean technique in construction delivers projects on time	Application of a Lean technique in construction delivers projects to budget	Sustainable construction manage cost/quality/risk/ procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve	Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use
Stakeholder mapping is a simple technique to make sure anyone important in the planning the project is not missed out	Pearson Correlation	.181**	.218**	.253**	.258**	.242**	.277**	.296**	.209**
	Sig. (2-tailed)	.006	.001	.000	.000	.000	.000	.000	.001
	N	228	229	228	227	228	228	228	230
Stakeholder mapping helps to find out the relationship between the stakeholders	Pearson Correlation	.160*	.240**	.264**	.286**	.344**	.352**	.412**	.285**
	Sig. (2-tailed)	.016	.000	.000	.000	.000	.000	.000	.000
	N	225	226	225	224	225	225	225	227
Stakeholder mapping helps to find out the stakeholders relationship with the project activities	Pearson Correlation	.186**	.286**	.343**	.369**	.484**	.468**	.423**	.385**
	Sig. (2-tailed)	.005	.000	.000	.000	.000	.000	.000	.000
	N	225	226	225	224	225	225	225	227
Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	Pearson Correlation	.149*	.309**	.369**	.372**	.452**	.448**	.492**	.396**
	Sig. (2-tailed)	.026	.000	.000	.000	.000	.000	.000	.000
	N	224	225	224	223	224	225	224	226
Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project	Pearson Correlation	.048	.241**	.268**	.314**	.359**	.318**	.443**	.322**
	Sig. (2-tailed)	.476	.000	.000	.000	.000	.000	.000	.000
	N	226	227	227	225	226	226	226	228
Stakeholder mapping is a simple technique to make sure anyone important in the implementing the project is not missed out	Pearson Correlation	.177**	.293**	.332**	.345**	.423**	.373**	.419**	.337**
	Sig. (2-tailed)	.007	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228	228	230

Table A_1.5: Item wise correlation between Stakeholder Mapping and Construction Sustainability [Part II]

		Sustainable buildings minimise construction waste/ pollution	Sustainable buildings maximize re-use of materials	Sustainable construction leads to short/long-term cost reductions	Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Risk management helps to create better value through the management of different threats	Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product
Stakeholder mapping is a simple technique to make sure anyone important in the planning the project is not missed out	Pearson Correlation	.205**	.243**	.233**	.206**	.309**	.318**	.280**	.137*
	Sig. (2-tailed)	.002	.000	.000	.002	.000	.000	.000	.037
	N	230	229	228	228	227	229	230	230
Stakeholder mapping helps to find out the relationship between the stakeholders	Pearson Correlation	.264**	.288**	.227**	.269**	.378**	.423**	.366**	.266**
	Sig. (2-tailed)	.000	.000	.001	.000	.000	.000	.000	.000
	N	227	226	225	225	224	226	227	227
Stakeholder mapping helps to find out the stakeholders relationship with the project activities	Pearson Correlation	.368**	.375**	.280**	.312**	.432**	.471**	.427**	.274**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	226	225	225	224	226	227	227
Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	Pearson Correlation	.346**	.411**	.312**	.340**	.453**	.393**	.409**	.361**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	225	224	224	223	226	226	226
Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project	Pearson Correlation	.303**	.360**	.295**	.334**	.376**	.295**	.271**	.216**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.001
	N	228	227	226	226	225	227	228	228
Stakeholder mapping is a simple technique to make sure anyone important in the implementing the project is not missed out	Pearson Correlation	.351**	.392**	.329**	.341**	.395**	.350**	.363**	.296**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	230	229	228	228	227	229	230	230

Table A_1.5: Item wise correlation between Stakeholder Mapping and Construction Sustainability [Part III]

		Construction sustainability target compresses the project time that helps to add value in our project environments	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Sustainability target improve the quality of life to aim for getting better project management performance	Waste management helps to achieve acceptable environmental quality	Managing construction waste helps to achieve better resource management	Reducing construction waste helps to lower the carbon emissions during the construction phase	Managing waste helps to improve productivity	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
Stakeholder mapping is a simple technique to make sure anyone important in the planning the project is not missed out	Pearson Correlation	.273**	.364**	.250**	.296**	.159*	.209**	.211**	.148*	.234**	.267**
	Sig. (2-tailed)	.000	.000	.000	.000	.016	.002	.001	.025	.000	.000
	N	230	228	230	230	229	224	229	228	228	229
Stakeholder mapping helps to find out the relationship between the stakeholders	Pearson Correlation	.238**	.392**	.338**	.377**	.205**	.294**	.271**	.190**	.309**	.291**
	Sig. (2-tailed)	.000	.000	.000	.000	.002	.000	.000	.004	.000	.000
	N	227	225	227	227	226	221	226	225	225	226
Stakeholder mapping helps to find out the stakeholders relationship with the project activities	Pearson Correlation	.302**	.485**	.350**	.389**	.258**	.328**	.296**	.235**	.373**	.363**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	226	227	227	226	221	226	225	225	226
Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	Pearson Correlation	.334**	.458**	.411**	.476**	.278**	.363**	.313**	.243**	.363**	.351**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	224	226	226	225	220	225	224	224	225
Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project	Pearson Correlation	.265**	.368**	.288**	.322**	.207**	.275**	.328**	.168*	.286**	.279**
	Sig. (2-tailed)	.000	.000	.000	.000	.002	.000	.000	.011	.000	.000
	N	228	226	228	228	227	222	227	226	226	227
Stakeholder mapping is a simple technique to make sure anyone important in the implementing the project is not missed out	Pearson Correlation	.343**	.474**	.362**	.391**	.252**	.304**	.284**	.177**	.334**	.262**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.007	.000	.000
	N	230	228	230	230	229	224	229	228	228	229

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.6: Item wise correlation between Stakeholder Management and Construction Sustainability [Part I]

		My company have the approach to evaluate the outcomes of sustainable development	Application of a Lean technique in construction improves project quality	Application of a Lean technique in construction delivers projects on time	Application of a Lean technique in construction delivers projects to budget	Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve
Stakeholder management is an effective approach for Stakeholders Engagement	Pearson Correlation	.199**	.388**	.442**	.369**	.270**	.323**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000
	N	229	230	229	228	229	229
Stakeholder management helps to deal with conflicting among stakeholders views	Pearson Correlation	.192**	.305**	.359**	.336**	.428**	.457**
	Sig. (2-tailed)	.004	.000	.000	.000	.000	.000
	N	227	228	227	226	227	228
Stakeholder management can assist in reducing the risk	Pearson Correlation	.265**	.401**	.438**	.427**	.539**	.563**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	227	228	227	226	227	227
When stakeholders are managed properly they will be more motivated to the project	Pearson Correlation	.154*	.285**	.398**	.417**	.521**	.452**
	Sig. (2-tailed)	.021	.000	.000	.000	.000	.000
	N	226	227	226	225	226	226
Stakeholder management system promotes learning from past experiences	Pearson Correlation	.296**	.295**	.300**	.309**	.446**	.401**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228
On the job training in key areas is important for all contractors	Pearson Correlation	.159*	.327**	.360**	.356**	.522**	.473**
	Sig. (2-tailed)	.017	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228
Stakeholder management is important for project success as it involves external	Pearson Correlation	.209**	.327**	.383**	.340**	.512**	.490**
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228
Stakeholders need academic training to improve their sustainability knowledge	Pearson Correlation	.194**	.267**	.274**	.263**	.225**	.218**
	Sig. (2-tailed)	.003	.000	.000	.000	.001	.001
	N	227	228	227	226	227	227
Developing good relationship with stakeholders makes it easier to manage them	Pearson Correlation	.148*	.275**	.369**	.331**	.535**	.501**
	Sig. (2-tailed)	.026	.000	.000	.000	.000	.000
	N	227	228	227	226	227	227

Table A_1.6: Item wise correlation between Stakeholder Management and Construction Sustainability [Part II]

		Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use	Sustainable buildings minimise construction waste/pollution	Sustainable buildings maximize re-use of materials	Sustainable construction leads to short/long-term cost reductions	Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Risk management helps to create better value through the management of different threats
Stakeholder management is an effective approach for Stakeholders Engagement	Pearson Correlation	.435**	.400**	.384**	.370**	.286**	.273**	.406**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	229	231	231	230	229	229	228
Stakeholder management helps to deal with conflicting among stakeholders views	Pearson Correlation	.406**	.370**	.394**	.431**	.362**	.330**	.506**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	227	229	229	228	227	227	226
Stakeholder management can assist in reducing the risk	Pearson Correlation	.528**	.416**	.450**	.512**	.441**	.407**	.515**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	227	229	229	228	227	227	226
When stakeholders are managed properly they will be more motivated to the project	Pearson Correlation	.435**	.354**	.374**	.411**	.373**	.405**	.420**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	226	228	228	227	226	226	225
Stakeholder management system promotes learning from past experiences	Pearson Correlation	.397**	.294**	.311**	.319**	.237**	.227**	.479**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.001	.000
	N	228	230	230	229	228	229	227
On the job training in key areas is important for all contractors	Pearson Correlation	.353**	.420**	.393**	.441**	.322**	.306**	.451**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	228	230	230	229	228	228	227
Stakeholder management is important for project success as it involves external	Pearson Correlation	.568**	.412**	.417**	.425**	.309**	.239**	.454**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	228	230	230	229	228	228	227
Stakeholders need academic training to improve their sustainability knowledge	Pearson Correlation	.215**	.225**	.299**	.288**	.253**	.251**	.280**
	Sig. (2-tailed)	.001	.001	.000	.000	.000	.000	.000
	N	227	229	229	228	227	227	226
Developing good relationship with stakeholders makes it easier to manage them	Pearson Correlation	.391**	.354**	.285**	.372**	.316**	.267**	.441**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	227	229	229	228	227	227	226

Table A_1.6: Item wise correlation between Stakeholder Management and Construction Sustainability [Part III]

		Risk management helps to get better understanding of different issues related to environmental/Social/ economic/operational/strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product	Construction sustainability target compresses the project time that helps to add value in our project environments	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Sustainability target improve the quality of life to aim for getting better project management performance	Waste management helps to achieve acceptable environmental quality
Stakeholder management is an effective approach for Stakeholders Engagement	Pearson Correlation	.302**	.386**	.307**	.266**	.339**	.259**	.398**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	230	231	231	231	229	230	231
Stakeholder management helps to deal with conflicting among stakeholders views	Pearson Correlation	.466**	.411**	.298**	.184**	.388**	.401**	.444**
	Sig. (2-tailed)	.000	.000	.000	.005	.000	.000	.000
	N	229	229	229	229	227	228	229
Stakeholder management can assist in reducing the risk	Pearson Correlation	.534**	.449**	.365**	.345**	.488**	.474**	.496**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	228	229	229	229	227	228	229
When stakeholders are managed properly they will be more motivated to the project	Pearson Correlation	.480**	.454**	.254**	.260**	.454**	.370**	.480**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	227	228	228	228	226	227	228
Stakeholder management system promotes learning from past experiences	Pearson Correlation	.388**	.369**	.345**	.357**	.425**	.390**	.330**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	229	230	230	230	228	229	230
On the job training in key areas is important for all contractors	Pearson Correlation	.360**	.403**	.378**	.327**	.488**	.308**	.395**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	229	230	230	230	228	229	230
Stakeholder management is important for project success as it involves external	Pearson Correlation	.422**	.421**	.348**	.296**	.449**	.379**	.387**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	229	230	230	230	228	229	230
Stakeholders need academic training to improve their sustainability knowledge	Pearson Correlation	.260**	.159*	.293**	.308**	.257**	.324**	.330**
	Sig. (2-tailed)	.000	.016	.000	.000	.000	.000	.000
	N	228	229	229	229	227	228	229
Developing good relationship with stakeholders makes it easier to manage them	Pearson Correlation	.416**	.444**	.240**	.247**	.570**	.292**	.351**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	228	229	229	229	227	228	229

Table A_1.6: Item wise correlation between Stakeholder Management and Construction Sustainability [Part IV]

		Managing construction waste helps to manage project cost	Managing construction waste helps to achieve better resource management	Reducing construction waste helps to lower the carbon emissions during the construction phase	Managing waste helps to improve productivity	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
Stakeholder management is an effective approach for Stakeholders Engagement	Pearson Correlation	.234**	.292**	.347**	.233**	.366**	.377**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	230	225	230	229	229	229
Stakeholder management helps to deal with conflicting among stakeholders views	Pearson Correlation	.392**	.403**	.358**	.345**	.364**	.395**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	223	228	227	227	227
Stakeholder management can assist in reducing the risk	Pearson Correlation	.383**	.379**	.360**	.371**	.399**	.508**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	223	228	227	227	227
When stakeholders are managed properly they will be more motivated to the project	Pearson Correlation	.383**	.322**	.331**	.222**	.401**	.389**
	Sig. (2-tailed)	.000	.000	.000	.001	.000	.000
	N	227	222	227	226	226	226
Stakeholder management system promotes learning from past experiences	Pearson Correlation	.244**	.295**	.304**	.327**	.364**	.306**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	224	229	228	228	228
On the job training in key areas is important for all contractors	Pearson Correlation	.282**	.327**	.417**	.276**	.474**	.275**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	224	229	228	228	228
Stakeholder management is important for project success as it involves external	Pearson Correlation	.264**	.271**	.387**	.276**	.422**	.368**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	224	229	228	228	228
Stakeholders need academic training to improve their sustainability knowledge	Pearson Correlation	.255**	.255**	.276**	.251**	.207**	.201**
	Sig. (2-tailed)	.000	.000	.000	.000	.002	.002
	N	228	223	228	227	227	227
Developing good relationship with stakeholders makes it easier to manage them	Pearson Correlation	.300**	.284**	.339**	.214**	.381**	.343**
	Sig. (2-tailed)	.000	.000	.000	.001	.000	.000
	N	228	223	228	227	227	227

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.7: Item wise correlation between Stakeholder Performance Management and Construction Sustainability [Part I]

		My company have the approach to evaluate the outcomes of sustainable development	Application of a Lean technique in construction improves project quality	Application of a Lean technique in construction delivers projects on time	Application of a Lean technique in construction delivers projects to budget	Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Measuring sustainability performance helps to highlight opportunities to improve
It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	Pearson Correlation	.211**	.254**	.251**	.155*	.179**	.329**
	Sig. (2-tailed)	.001	.000	.000	.019	.007	.000
	N	227	228	227	227	227	227
It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	Pearson Correlation	.231**	.388**	.383**	.325**	.542**	.569**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	Pearson Correlation	.150*	.254**	.309**	.298**	.442**	.537**
	Sig. (2-tailed)	.024	.000	.000	.000	.000	.000
	N	228	229	228	228	228	228
Evaluating individual performance assists in finding out the individuals qualities which is important	Pearson Correlation	.180**	.258**	.343**	.375**	.392**	.476**
	Sig. (2-tailed)	.007	.000	.000	.000	.000	.000
	N	225	226	225	224	225	225
KPIs need to measure the stakeholders capabilities to operate and enhance the different processes	Pearson Correlation	.174**	.221**	.253**	.272**	.385**	.374**
	Sig. (2-tailed)	.009	.001	.000	.000	.000	.000
	N	227	228	227	226	227	227
Measuring stakeholder performance helps to improve project performance	Pearson Correlation	.341**	.338**	.380**	.359**	.395**	.469**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	229	228	227	228	228
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated objectives	Pearson Correlation	.231**	.296**	.358**	.338**	.397**	.498**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	230	231	231	230	231	233

Table A_1.7: Item wise correlation between Stakeholder Performance Management and Construction Sustainability [Part II]

		Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Sustainable buildings minimise energy use	Sustainable buildings minimise construction waste/pollution	Sustainable buildings maximize re-use of materials	Sustainable construction leads to short/long-term cost reductions	Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Risk management helps to create better value through the management of different threats
It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	Pearson Correlation	.352**	.260**	.263**	.261**	.188**	.136*	.325**
	Sig. (2-tailed)	.000	.000	.000	.000	.004	.041	.000
	N	227	229	229	228	228	227	226
It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	Pearson Correlation	.428**	.377**	.358**	.335**	.298**	.283**	.464**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	228	230	230	229	228	228	227
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	Pearson Correlation	.346**	.274**	.313**	.377**	.315**	.247**	.444**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	228	230	230	229	229	228	227
Evaluating individual performance assists in finding out the individuals qualities which is important	Pearson Correlation	.438**	.392**	.403**	.409**	.360**	.345**	.550**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	226	227	227	226	225	225	224
KPIs need to measure the stakeholders capabilities to operate and enhance the different processes	Pearson Correlation	.292**	.250**	.343**	.381**	.217**	.175**	.384**
	Sig. (2-tailed)	.000	.000	.000	.000	.001	.008	.000
	N	227	229	229	228	227	227	226
Measuring stakeholder performance helps to improve project performance	Pearson Correlation	.392**	.425**	.430**	.438**	.336**	.301**	.438**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	228	230	230	229	228	228	227
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated objectives	Pearson Correlation	.379**	.338**	.357**	.381**	.311**	.219**	.352**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.001	.000
	N	229	231	231	230	229	229	228

Table A_1.7: Item wise correlation between Stakeholder Performance Management and Construction Sustainability [Part III]

		Risk management helps to get better understanding of different issues related to environmental//social/ economic/operational/ strategic issues	Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product	Construction sustainability target compresses the project time that helps to add value in our project environments	Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Sustainability target improve the quality of life to aim for getting better project management performance
It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	Pearson Correlation	.346**	.338**	.304**	.232**	.238**	.198**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.003
	N	228	229	229	229	227	228
It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	Pearson Correlation	.498**	.431**	.356**	.248**	.450**	.342**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	230	230	230	228	229
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	Pearson Correlation	.438**	.391**	.247**	.303**	.471**	.370**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	230	230	230	228	229
Evaluating individual performance assists in finding out the individuals qualities which is important	Pearson Correlation	.408**	.422**	.305**	.333**	.470**	.362**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	226	227	227	227	225	226
KPIs need to measure the stakeholders capabilities to operate and enhance the different processes	Pearson Correlation	.322**	.295**	.254**	.289**	.379**	.365**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	228	229	229	229	227	228
Measuring stakeholder performance helps to improve project performance	Pearson Correlation	.404**	.392**	.378**	.348**	.511**	.346**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	229	230	230	230	228	229
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated objectives	Pearson Correlation	.390**	.466**	.332**	.320**	.471**	.356**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	230	231	231	231	229	230

Table A_1.7: Item wise correlation between Stakeholder Performance Management and Construction Sustainability [Part IV]

		Waste management helps to achieve acceptable environmental quality	Managing construction waste helps to manage project cost	Managing construction waste helps to achieve better resource management	Reducing construction waste helps to lower the carbon emissions during the construction phase	Managing waste helps to improve productivity	We focus on safety as an aspect of achieving social sustainability in construction	It is important to provide local employment as an aspect of our construction activity
It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	Pearson Correlation	.254**	.130	.210**	.261**	.218**	.306**	.116
	Sig. (2-tailed)	.000	.050	.002	.000	.001	.000	.082
	N	229	228	223	228	227	227	227
It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	Pearson Correlation	.385**	.275**	.329**	.344**	.295**	.395**	.318**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	230	229	224	229	228	228	228
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	Pearson Correlation	.380**	.358**	.344**	.266**	.309**	.372**	.302**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	230	229	224	229	228	228	228
Evaluating individual performance assists in finding out the individuals qualities which is important	Pearson Correlation	.427**	.343**	.389**	.380**	.330**	.427**	.369**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	227	226	221	226	225	225	225
KPIs need to measure the stakeholders capabilities to operate and enhance the different processes	Pearson Correlation	.357**	.255**	.309**	.271**	.265**	.325**	.246**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	229	228	223	228	227	227	227
Measuring stakeholder performance helps to improve project performance	Pearson Correlation	.409**	.301**	.439**	.355**	.336**	.373**	.323**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	230	229	224	229	228	228	228
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated objectives	Pearson Correlation	.315**	.281**	.314**	.290**	.295**	.326**	.301**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	231	230	225	230	229	229	229

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.8: Item wise correlation between Construction Sustainability and Construction Project Performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Generally customers of our project are satisfied with the outcome	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process
My company have the approach to evaluate the outcomes of sustainable development	Pearson Correlation	.218**	.293**	.276**	.293**	.083	.065	.332**	.158*	.187**	.286**	.120	.259**	.271**	.220**
	Sig. (2-tailed)	.001	.000	.000	.000	.210	.327	.000	.016	.005	.000	.071	.000	.000	.001
	N	228	230	228	230	228	230	229	230	229	227	229	229	230	229
Application of a Lean technique in construction improves project quality	Pearson Correlation	.068	.173**	.345**	.271**	.264**	.227**	.283**	.243**	.297**	.320**	.338**	.345**	.323**	.268**
	Sig. (2-tailed)	.308	.009	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	229	230	228	230	229	230	229	227	229	229	230	229
Application of a Lean technique in construction delivers projects on time	Pearson Correlation	.013	.109	.295**	.236**	.145*	.151*	.234**	.159*	.208**	.308**	.245**	.295**	.240**	.181**
	Sig. (2-tailed)	.850	.100	.000	.000	.029	.022	.000	.016	.001	.000	.000	.000	.000	.006
	N	229	230	229	231	229	231	230	231	230	228	230	230	231	230
Application of a Lean technique in construction delivers projects to budget	Pearson Correlation	.079	.208**	.356**	.304**	.308**	.216**	.218**	.230**	.285**	.358**	.377**	.347**	.322**	.249**
	Sig. (2-tailed)	.234	.002	.000	.000	.000	.001	.001	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
Sustainable construction manage cost/quality/risk/procurement together to improve project performance	Pearson Correlation	.193**	.358**	.546**	.488**	.576**	.493**	.354**	.435**	.457**	.512**	.554**	.446**	.416**	.526**
	Sig. (2-tailed)	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229

Table A_1.8: Item wise correlation between Construction Sustainability and Construction Project Performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Generally customers of our project are satisfied with the outcome	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process
Measuring sustainability performance helps to highlight opportunities to improve	Pearson Correlation	.229**	.370**	.479**	.458**	.456**	.485**	.414**	.448**	.464**	.448**	.499**	.413**	.475**	.495**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
Collaborating with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	Pearson Correlation	.240**	.328**	.375**	.401**	.429**	.405**	.438**	.434**	.404**	.365**	.359**	.307**	.384**	.433**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
Sustainable buildings minimise energy use	Pearson Correlation	.139*	.233**	.381**	.436**	.348**	.321**	.327**	.313**	.318**	.306**	.362**	.307**	.311**	.305**
	Sig. (2-tailed)	.035	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	230	231	230	232	230	232	231	232	231	229	231	231	232	231
Sustainable buildings minimise construction waste/pollution	Pearson Correlation	.103	.181**	.357**	.366**	.378**	.254**	.268**	.219**	.293**	.286**	.348**	.324**	.276**	.287**
	Sig. (2-tailed)	.119	.006	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000
	N	230	231	230	232	230	232	231	232	231	229	231	231	232	231
Sustainable buildings maximize re-use of materials	Pearson Correlation	.094	.201**	.343**	.368**	.371**	.265**	.241**	.253**	.304**	.322**	.369**	.340**	.372**	.316**
	Sig. (2-tailed)	.158	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	231	230	231	230	231	230	228	230	230	231	230
Sustainable construction leads to short/long-term cost reductions	Pearson Correlation	.070	.110	.272**	.278**	.341**	.254**	.246**	.208**	.207**	.310**	.307**	.249**	.282**	.261**
	Sig. (2-tailed)	.295	.097	.000	.000	.000	.000	.000	.001	.002	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
Sustainable construction results in short/ long-term increase in energy/resource efficiencies	Pearson Correlation	.021	.095	.334**	.250**	.284**	.211**	.267**	.162*	.219**	.257**	.297**	.320**	.233**	.236**
	Sig. (2-tailed)	.756	.152	.000	.000	.000	.001	.000	.014	.001	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	230

Table A_1.8: Item wise correlation between Construction Sustainability and Construction Project Performance [Part III]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Generally customers of our project are satisfied with the outcome	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process
Risk management helps to create better value through the management of different threats	Pearson Correlation	.116	.197**	.394**	.395**	.385**	.361**	.400**	.307**	.308**	.387**	.369**	.390**	.386**	.385**
	Sig. (2-tailed)	.082	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
Risk management helps to get better understanding of different issues related to environmental	Pearson Correlation	.157*	.247**	.451**	.429**	.353**	.392**	.388**	.365**	.306**	.363**	.375**	.360**	.355**	.348**
	Sig. (2-tailed)	.018	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	231	229	231	230	231	230	228	230	230	231	230
Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	Pearson Correlation	.192**	.322**	.531**	.550**	.441**	.430**	.443**	.354**	.353**	.438**	.439**	.490**	.440**	.404**
	Sig. (2-tailed)	.004	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	230	231	230	232	230	232	231	232	231	229	231	231	232	231
Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product	Pearson Correlation	.154*	.178**	.323**	.311**	.298**	.226**	.306**	.175**	.223**	.243**	.225**	.279**	.230**	.234**
	Sig. (2-tailed)	.020	.007	.000	.000	.000	.001	.000	.008	.001	.000	.001	.000	.000	.000
	N	230	231	230	232	230	232	231	232	231	229	231	231	232	231
Construction sustainability target compresses the project time that helps to add value in our project environments	Pearson Correlation	.250**	.315**	.309**	.339**	.305**	.282**	.345**	.214**	.342**	.327**	.258**	.314**	.348**	.311**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000
	N	230	231	230	232	230	232	231	232	231	229	231	231	232	231

Table A_1.8: Item wise correlation between Construction Sustainability and Construction Project Performance [Part IV]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Generally customers of our project are satisfied with the outcome	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process
Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	Pearson Correlation	.132*	.308**	.518**	.492**	.473**	.436**	.428**	.418**	.424**	.435**	.490**	.433**	.481**	.462**
	Sig. (2-tailed)	.047	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
Sustainability target improve the quality of life to aim for getting better project management performance	Pearson Correlation	.114	.241**	.363**	.343**	.346**	.251**	.280**	.237**	.264**	.313**	.365**	.332**	.275**	.345**
	Sig. (2-tailed)	.085	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	231	229	231	230	231	230	228	230	230	231	230
Waste management helps to achieve acceptable environmental quality	Pearson Correlation	.090	.203**	.360**	.368**	.378**	.287**	.300**	.301**	.289**	.358**	.366**	.320**	.387**	.323**
	Sig. (2-tailed)	.175	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	230	231	230	232	230	232	231	232	231	229	231	231	232	231
Managing construction waste helps to manage project cost	Pearson Correlation	.160*	.297**	.324**	.325**	.358**	.310**	.216**	.262**	.412**	.380**	.365**	.295**	.264**	.284**
	Sig. (2-tailed)	.016	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	231	229	231	230	231	230	228	230	230	231	230
Managing construction waste helps to achieve better resource management	Pearson Correlation	.196**	.270**	.406**	.329**	.340**	.319**	.301**	.330**	.393**	.348**	.384**	.296**	.352**	.322**
	Sig. (2-tailed)	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	225	226	225	227	225	227	226	227	226	224	226	226	227	226
Reducing construction waste helps to lower the carbon emissions during the construction phase	Pearson Correlation	.181**	.247**	.342**	.437**	.402**	.366**	.327**	.341**	.378**	.381**	.337**	.261**	.350**	.336**
	Sig. (2-tailed)	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	231	229	231	230	231	230	228	230	230	231	230

Table A_1.8: Item wise correlation between Construction Sustainability and Construction Project Performance [Part V]

		Generally our projects are successful to meet the time objectives	We are usually good at deliverin g projects within budget	We usually meet our environmen tal sustainabilit y goals on project	Our projects usually result in tangible benefits for the organisation	Generally customer s of our project are satisfied with the outcome	Project specificat ions are usually met by the time of handover	We usually meet our econo mic sustain ability goals on project	Our key stakehold ers are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	We usually meet our social sustain ability goals on project s	We usually employ an effectiv e project manag ement process
Managing waste helps to improve productivity	Pearson Correlation	.176**	.189**	.358**	.368**	.258**	.198**	.275**	.211**	.329**	.385**	.287**	.325**	.308**	.283**
	Sig. (2-tailed)	.008	.004	.000	.000	.000	.003	.000	.001	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
We focus on safety as an aspect of achieving social sustainability in construction	Pearson Correlation	.206**	.304**	.431**	.495**	.463**	.355**	.407**	.365**	.445**	.459**	.440**	.462**	.448**	.362**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
It is important to provide local employment as an aspect of our construction activity	Pearson Correlation	.106	.247**	.404**	.414**	.374**	.287**	.241**	.339**	.338**	.297**	.453**	.459**	.378**	.342**
	Sig. (2-tailed)	.109	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.9: Item wise correlation between Purposes of Stakeholder Engagement with Construction Project Performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Generally customers of our project are satisfied with the outcome	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process	Overall, we are very successful at projects
to share individual knowledge	Pearson Correlation	.203**	.210**	.367**	.249**	.227**	.207**	.215**	.289**	.401**	.270**	.272**	.287**	.243**	.239**
	Sig. (2-tailed)	.002	.001	.000	.000	.001	.002	.003	.000	.000	.000	.000	.000	.000	.000
	N	227	228	228	229	227	229	228	229	228	226	228	228	229	228
to enhance communication	Pearson Correlation	.159*	.309**	.437**	.392**	.427**	.394**	.380**	.427**	.376**	.312**	.441**	.374**	.415**	.443**
	Sig. (2-tailed)	.016	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	228	229	227	229	228	229	228	226	228	228	229	228
for continuous improvement	Pearson Correlation	.152*	.263**	.396**	.357**	.398**	.354**	.304**	.376**	.347**	.328**	.460**	.320**	.348**	.352**
	Sig. (2-tailed)	.023	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	224	225	225	226	224	226	225	226	225	223	225	225	226	225
to reduce risk and uncertainty	Pearson Correlation	.271**	.421**	.492**	.427**	.546**	.510**	.427**	.400**	.381**	.360**	.524**	.401**	.431**	.508**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	229	230	228	230	229	230	229	227	229	229	230	229
to share challenges	Pearson Correlation	.298**	.349**	.443**	.362**	.382**	.383**	.348**	.344**	.455**	.289**	.392**	.386**	.357**	.363**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	227	228	226	228	227	228	227	225	227	227	228	227

Table A_1.9: Item wise correlation between Purposes of Stakeholder Engagement with Construction Project Performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Generally customers of our project are satisfied with the outcome	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process	Overall, we are very successful at projects
to discuss current issues	Pearson Correlation	.120	.258**	.392**	.367**	.418**	.437**	.293**	.347**	.373**	.358**	.414**	.312**	.378**	.414**
	Sig. (2-tailed)	.073	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	227	228	226	228	227	228	227	225	227	227	228	227
to generate innovative ideas	Pearson Correlation	.247**	.299**	.308**	.308**	.373**	.258**	.317**	.353**	.384**	.354**	.341**	.277**	.294**	.355**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	228	229	227	229	228	229	228	226	228	228	229	228
to generate solution	Pearson Correlation	.193**	.286**	.374**	.373**	.434**	.360**	.241**	.335**	.396**	.360**	.473**	.328**	.315**	.395**
	Sig. (2-tailed)	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	228	229	227	229	228	229	228	226	228	228	229	228
	N	226	227	227	228	226	228	227	228	227	225	227	227	228	227

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.10: Item wise correlation between Impact of Stakeholder Engagement and Construction Project Performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
You engage all people internally	Pearson Correlation	.187**	.172**	.218**	.280**	.251**	.215**	.269**	.279**	.281**	.228**	.267**	.201**	.273**	.244**
	Sig. (2-tailed)	.005	.009	.001	.000	.000	.001	.000	.000	.000	.001	.000	.002	.000	.000
	N	227	228	227	229	227	229	228	229	228	228	226	228	229	228
In construction there are different stakeholders with different needs	Pearson Correlation	.277**	.444**	.490**	.472**	.564**	.541**	.332**	.452**	.456**	.605**	.507**	.388**	.395**	.557**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229
Stakeholder engagement is the process of exchanging information	Pearson Correlation	.204**	.310**	.432**	.390**	.447**	.406**	.339**	.422**	.425**	.433**	.378**	.374**	.389**	.439**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	227	228	226	228	227	228	227	227	225	227	228	227
You engage with selective people as stakeholders to your project	Pearson Correlation	.124	.251**	.288**	.224**	.313**	.241**	.175**	.287**	.386**	.342**	.320**	.306**	.278**	.322**
	Sig. (2-tailed)	.062	.000	.000	.001	.000	.000	.008	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	228	226	228	229	228

Table A_1.10: Item wise correlation between Impact of Stakeholder Engagement and Construction Project Performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
Stakeholder engagement is the process of sharing pain	Pearson Correlation	.229**	.154*	.136*	.163*	.188**	.112	.204**	.175**	.213**	.178**	.151*	.133*	.206**	.161*
	Sig. (2-tailed)	.000	.020	.040	.013	.004	.091	.002	.008	.001	.007	.022	.045	.002	.015
	N	228	229	228	230	229	230	229	230	229	229	227	229	230	229
Stakeholder engagement is the process of creating innovative ideas	Pearson Correlation	.250**	.303**	.330**	.350**	.393**	.299**	.388**	.321**	.398**	.363**	.392**	.305**	.326**	.336**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229
Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	Pearson Correlation	.206**	.316**	.468**	.431**	.495**	.483**	.394**	.459**	.456**	.517**	.382**	.378**	.333**	.471**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	226	228	226	228	227	228	227	227	225	227	228	227
Building partnerships is a good approach for involving stakeholders in the engagement process	Pearson Correlation	.182**	.334**	.431**	.406**	.370**	.373**	.383**	.383**	.384**	.438**	.340**	.405**	.360**	.433**
	Sig. (2-tailed)	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229
A "Stakeholder Register" is a useful tool to analyze the key project stakeholders	Pearson Correlation	.048	.194**	.286**	.297**	.270**	.239**	.289**	.226**	.268**	.267**	.293**	.260**	.278**	.269**
	Sig. (2-tailed)	.472	.003	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000
	N	229	230	229	231	229	231	230	231	230	230	228	230	231	230

Table A_1.10: Item wise correlation between Impact of Stakeholder Engagement and Construction Project Performance [Part III]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
Stakeholder engagement is a powerful mechanism to identify new business opportunities	Pearson Correlation	.156*	.181**	.239**	.190**	.192**	.144*	.236**	.193**	.296**	.154*	.247**	.250**	.302**	.209**
	Sig. (2-tailed)	.018	.006	.000	.004	.004	.029	.000	.003	.000	.020	.000	.000	.000	.002
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229
Stakeholders are generally very supportive of the need to reduce energy emissions	Pearson Correlation	.108	.184**	.302**	.258**	.235**	.202**	.258**	.191**	.293**	.298**	.307**	.269**	.220**	.268**
	Sig. (2-tailed)	.106	.005	.000	.000	.000	.002	.000	.004	.000	.000	.000	.000	.001	.000
	N	227	228	227	229	227	229	228	229	228	228	226	228	229	228
Stakeholders are generally very supportive of a carbon management plan	Pearson Correlation	.061	.144*	.238**	.180**	.170*	.151*	.268**	.133*	.201**	.258**	.253**	.251**	.198**	.236**
	Sig. (2-tailed)	.360	.030	.000	.006	.010	.022	.000	.044	.002	.000	.000	.000	.003	.000
	N	227	228	227	229	227	229	228	229	228	228	226	228	229	228
Stakeholders are the sources of different project issues	Pearson Correlation	.037	.075	.263**	.270**	.234**	.190**	.221**	.202**	.206**	.300**	.247**	.255**	.267**	.210**
	Sig. (2-tailed)	.580	.260	.000	.000	.000	.004	.001	.002	.002	.000	.000	.000	.000	.001
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229

Table A_1.10: Item wise correlation between Impact of Stakeholder Engagement and Construction Project Performance [Part IV]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
By effectively engaging stakeholders we lower the risk for each relationship	Pearson Correlation	.091	.262**	.267**	.323**	.394**	.326**	.315**	.342**	.343**	.304**	.271**	.280**	.304**	.294**
	Sig. (2-tailed)	.172	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229
Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	Pearson Correlation	.127	.244**	.357**	.368**	.354**	.347**	.400**	.352**	.302**	.389**	.344**	.302**	.368**	.345**
	Sig. (2-tailed)	.056	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229
Stakeholder engagement is a powerful mechanism to facilitate collaborative working	Pearson Correlation	.214**	.352**	.408**	.381**	.420**	.400**	.447**	.413**	.398**	.461**	.325**	.414**	.442**	.442**
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	226	228	226	228	227	228	227	227	225	227	228	227
Engaging stakeholders helps to improve the productivity	Pearson Correlation	.115	.236**	.240**	.290**	.258**	.230**	.284**	.221**	.268**	.308**	.281**	.338**	.229**	.261**
	Sig. (2-tailed)	.085	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000
	N	226	227	226	228	226	228	227	228	227	227	225	227	228	227

Table A_1.10: Item wise correlation between Impact of Stakeholder Engagement and Construction Project Performance [Part V]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
The project manager needs to analyse how the project itself influences the needs	Pearson Correlation	.116	.278**	.368**	.380**	.396**	.378**	.293**	.325**	.273**	.372**	.261**	.308**	.263**	.335**
	Sig. (2-tailed)	.082	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	228	226	228	229	228
It is better to engage with a small number of key stakeholders rather than with all	Pearson Correlation	.149*	.157*	.274**	.230**	.176**	.182**	.136*	.152*	.208**	.274**	.214**	.256**	.210**	.259**
	Sig. (2-tailed)	.024	.018	.000	.000	.008	.006	.040	.021	.002	.000	.001	.000	.001	.000
	N	228	229	228	230	228	230	229	230	229	229	227	229	230	229

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.11: Item wise correlation between Communication with Stakeholders and Construction Project performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
I like to have face-to-face meetings with the particular stakeholders	Pearson Correlation	.158*	.235**	.380**	.320**	.306**	.315**	.331**	.285**	.245**	.269**	.338**	.374**	.256**	.375**
	Sig. (2-tailed)	.017	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
I communicate with stakeholders through IT Systems	Pearson Correlation	.183**	.323**	.418**	.391**	.435**	.413**	.359**	.374**	.329**	.274**	.400**	.292**	.384**	.424**
	Sig. (2-tailed)	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
I like to communicate with stakeholders privately to discuss issues	Pearson Correlation	.177**	.319**	.394**	.410**	.442**	.388**	.317**	.389**	.378**	.272**	.398**	.289**	.298**	.423**
	Sig. (2-tailed)	.008	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	229	230	228	230	229	230	229	227	229	229	230	229
I communicate with stakeholders through formal meeting	Pearson Correlation	.121	.244**	.268**	.272**	.271**	.173**	.243**	.188**	.142*	.211**	.234**	.199**	.205**	.198**
	Sig. (2-tailed)	.069	.000	.000	.000	.000	.009	.000	.004	.032	.001	.000	.003	.002	.003
	N	226	227	226	228	226	228	227	228	227	225	227	227	228	227
Our all Stakeholders have a medium to provide feedback to the project	Pearson Correlation	.180**	.283**	.355**	.331**	.345**	.339**	.291**	.316**	.333**	.292**	.351**	.331**	.325**	.335**
	Sig. (2-tailed)	.007	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228

Table A_1.11: Item wise correlation between Communication with Stakeholders and Construction Project performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
Communicating with different stakeholder helps to expose different thoughts	Pearson Correlation	.169*	.310**	.431**	.437**	.426**	.431**	.391**	.388**	.377**	.368**	.415**	.422**	.349**	.394**
	Sig. (2-tailed)	.011	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
Communicating with stakeholders at the early stages of the design process can provide innovative	Pearson Correlation	.124	.209**	.262**	.231**	.277**	.258**	.258**	.259**	.247**	.253**	.280**	.260**	.239**	.279**
	Sig. (2-tailed)	.063	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	229	227	229	227	229	228	229	228	226	228	228	229	228
Keeping stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	Pearson Correlation	.158*	.412**	.493**	.445**	.491**	.419**	.418**	.396**	.411**	.427**	.536**	.485**	.347**	.446**
	Sig. (2-tailed)	.017	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
Communication with different stakeholders helps to prioritise their needs	Pearson Correlation	.158*	.303**	.406**	.416**	.468**	.406**	.408**	.418**	.375**	.362**	.428**	.381**	.338**	.406**
	Sig. (2-tailed)	.016	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	229	230	229	231	229	231	230	231	230	228	230	230	231	230

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.12: Item wise correlation between Stakeholder Analyses and Construction Project Performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
Stakeholder identification helps to find out who has unique knowledge related to any aspect of the project	Pearson Correlation	.217**	.277**	.281**	.342**	.418**	.372**	.318**	.324**	.337**	.384**	.332**	.278**	.267**	.311**
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	227	228	229	227	229	228	229	228	226	228	228	229	228
Project managers should identify the stakeholders as early as possible in the project life cycle	Pearson Correlation	.439**	.400**	.329**	.346**	.455**	.439**	.326**	.300**	.278**	.305**	.467**	.360**	.342**	.382**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	230	228	229	230	228	230	229	230	229	227	229	229	230	229
The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	Pearson Correlation	.146*	.349**	.212**	.336**	.342**	.340**	.168*	.292**	.294**	.309**	.417**	.328**	.227**	.349**
	Sig. (2-tailed)	.027	.000	.001	.000	.000	.000	.011	.000	.000	.000	.000	.000	.001	.000
	N	228	228	229	230	228	230	229	230	229	227	229	229	230	229
I prioritize stakeholders according to their responsibilities to the project	Pearson Correlation	.277**	.270**	.170**	.311**	.301**	.299**	.209**	.226**	.230**	.308**	.391**	.318**	.174**	.277**
	Sig. (2-tailed)	.000	.000	.010	.000	.000	.000	.001	.001	.000	.000	.000	.000	.008	.000
	N	230	229	230	231	229	231	230	231	230	228	230	230	231	230
I prioritize stakeholders according to their impact to the project	Pearson Correlation	.128	.251**	.209**	.350**	.369**	.346**	.195**	.325**	.279**	.294**	.424**	.304**	.266**	.329**
	Sig. (2-tailed)	.052	.000	.001	.000	.000	.000	.003	.000	.000	.000	.000	.000	.000	.000
	N	229	229	230	231	229	231	230	231	230	228	230	230	231	230

Table A_1.12: Item wise correlation between Stakeholder Analyses and Construction Project Performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects my projects	We usually employ an effective project management process	Overall, we are very successful at projects
I prioritize stakeholders according to how urgent they see the project interest in	Pearson Correlation	.108	.185**	.149*	.166*	.168*	.194**	.177**	.168*	.172**	.218**	.205**	.184**	.187**	.209**
	Sig. (2-tailed)	.106	.005	.025	.012	.012	.003	.007	.011	.010	.001	.002	.005	.005	.002
	N	225	225	226	227	225	227	226	227	226	224	226	226	227	226
I prioritize stakeholders according to their power to influence the project outcome	Pearson Correlation	.052	.250**	.183**	.211**	.263**	.242**	.158*	.208**	.202**	.212**	.333**	.220**	.172**	.198**
	Sig. (2-tailed)	.431	.000	.005	.001	.000	.000	.017	.002	.002	.001	.000	.001	.009	.003
	N	228	228	229	230	228	230	229	230	229	227	229	229	230	229
Internal Stakeholders are prioritized above external stakeholders	Pearson Correlation	.092	.113	.077	.064	.108	.047	.111	.085	.120	.148*	.115	.060	.057	.086
	Sig. (2-tailed)	.167	.089	.242	.335	.103	.482	.093	.200	.070	.026	.082	.367	.392	.195
	N	229	229	230	231	229	231	230	231	230	228	230	230	231	230
I prioritize stakeholders demand for the project	Pearson Correlation	.064	.131*	.124	.093	.176**	.117	.130	.109	.107	.152*	.189**	.168*	.093	.081
	Sig. (2-tailed)	.336	.048	.062	.159	.008	.079	.050	.100	.107	.022	.004	.011	.161	.225
	N	226	227	227	228	226	228	227	228	227	225	227	227	228	227
Stakeholder analysis helps to evaluate different stakeholders power	Pearson Correlation	.060	.307**	.147*	.280**	.261**	.230**	.241**	.214**	.220**	.303**	.338**	.323**	.248**	.274**
	Sig. (2-tailed)	.365	.000	.026	.000	.000	.000	.000	.001	.001	.000	.000	.000	.000	.000
	N	227	227	228	229	227	229	228	229	229	227	229	228	229	228

Table A_1.13: Item wise correlation between Stakeholder Mapping and Construction Project Performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process	Overall, we are very successful at projects
Stakeholder mapping is a simple technique to make sure anyone important in the planning the project is not missed out	Pearson Correlation	.036	.124	.182**	.169*	.158*	.156*	.190**	.155*	.225**	.309**	.150*	.204**	.230**	.164*
	Sig. (2-tailed)	.587	.062	.006	.011	.017	.018	.004	.019	.001	.000	.023	.002	.000	.013
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
Stakeholder mapping helps to find out the relationship between the stakeholders	Pearson Correlation	.138*	.259**	.353**	.301**	.322**	.292**	.346**	.324**	.327**	.340**	.295**	.303**	.295**	.298**
	Sig. (2-tailed)	.040	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	224	225	224	226	224	226	225	226	225	223	225	225	226	225
Stakeholder mapping helps to find out the stakeholders relationship with the project activities	Pearson Correlation	.173**	.324**	.451**	.393**	.396**	.356**	.392**	.389**	.391**	.417**	.417**	.385**	.393**	.393**
	Sig. (2-tailed)	.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	224	225	224	226	224	226	225	226	225	223	225	225	226	225
Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	Pearson Correlation	.208**	.308**	.396**	.358**	.377**	.337**	.333**	.293**	.360**	.451**	.416**	.376**	.308**	.388**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	223	225	223	225	223	225	224	225	224	222	224	224	225	224

Table A_1.13: Item wise correlation between Stakeholder Mapping and Construction Project Performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process	Overall, we are very successful at projects
Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project	Pearson Correlation	.106	.219**	.301**	.236**	.317**	.288**	.228**	.215**	.275**	.342**	.341**	.285**	.288**	.303**
	Sig. (2-tailed)	.114	.001	.000	.000	.000	.000	.001	.001	.000	.000	.000	.000	.000	.000
	N	225	226	226	227	225	227	226	227	226	224	226	226	227	226
Stakeholder mapping is a simple technique to make sure anyone important in the implementing the project is not missed out	Pearson Correlation	.169*	.279**	.383**	.305**	.400**	.346**	.340**	.272**	.361**	.393**	.380**	.345**	.343**	.359**
	Sig. (2-tailed)	.011	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.14: Item wise correlation between Stakeholder Management and Construction Project Performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process	Overall, we are very successful at projects
Stakeholder management is an effective approach for Stakeholders Engagement	Pearson Correlation	.245**	.112	.148*	.208**	.245**	.221**	.272**	.255**	.278**	.258**	.185**	.288**	.255**	.211**
	Sig. (2-tailed)	.000	.090	.026	.002	.000	.001	.000	.000	.000	.000	.005	.000	.000	.001
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229
Stakeholder management helps to deal with conflicting among stakeholders views	Pearson Correlation	.110	.182**	.306**	.242**	.271**	.276**	.260**	.263**	.293**	.317**	.303**	.316**	.255**	.270**
	Sig. (2-tailed)	.098	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	226	228	226	228	227	228	227	225	227	227	228	227
Stakeholder management can assist in reducing the risk	Pearson Correlation	.129	.252**	.359**	.348**	.355**	.337**	.298**	.352**	.320**	.348**	.383**	.393**	.369**	.395**
	Sig. (2-tailed)	.054	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	228	226	228	226	228	227	228	227	225	227	227	228	227
When stakeholders are managed properly they will be more motivated to the project	Pearson Correlation	.175**	.307**	.389**	.378**	.453**	.390**	.256**	.350**	.367**	.413**	.518**	.404**	.371**	.440**
	Sig. (2-tailed)	.008	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	225	227	225	227	225	227	226	227	226	224	226	226	227	226
Stakeholder management system promotes learning from past experiences	Pearson Correlation	.299**	.366**	.497**	.469**	.480**	.419**	.408**	.363**	.479**	.417**	.417**	.452**	.514**	.488**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	229

Table A_1.14: Item wise correlation between Stakeholder Management and Construction Project Performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process	Overall, we are very successful at projects
On the job training in key areas is important for all contractors	Pearson Correlation	.247**	.306**	.417**	.420**	.529**	.481**	.378**	.406**	.433**	.360**	.489**	.366**	.421**	.460**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
Stakeholder management is important for project success as it involves external	Pearson Correlation	.123	.292**	.337**	.435**	.462**	.403**	.431**	.386**	.400**	.428**	.404**	.383**	.339**	.381**
	Sig. (2-tailed)	.064	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
Developing good relationship with stakeholders makes it easier to manage them	Pearson Correlation	.181**	.306**	.412**	.446**	.488**	.471**	.351**	.415**	.415**	.405**	.537**	.375**	.438**	.499**
	Sig. (2-tailed)	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	226	228	226	228	227	228	227	225	227	227	228	227
Stakeholders need academic training to improve their sustainability knowledge	Pearson Correlation	.060	.129	.156*	.221**	.207**	.175**	.185**	.213**	.210**	.189**	.191**	.198**	.200**	.226**
	Sig. (2-tailed)	.366	.052	.019	.001	.002	.008	.005	.001	.001	.004	.004	.003	.002	.001
	N	226	227	226	228	226	228	227	228	227	225	227	227	228	227

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A_1.15: Item wise correlation between impact of Stakeholder Performance Measurement and Construction Project Performance [Part I]

		Generally our projects are successful to meet the time objectives	We are usually good at delivering projects within budget	We usually meet our environmental sustainability goals on project	Our projects usually result in tangible benefits for the organisation	Our Project specifications are usually met by the time of handover	Project specifications are usually met by the time of handover	We usually meet our economic sustainability goals on project	Our key stakeholders are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainability goals on projects	We usually employ an effective project management process	Overall, we are very successful at projects
It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	Pearson Correlation	.277**	.231**	.196**	.290**	.259**	.261**	.322**	.282**	.273**	.227**	.180**	.125	.274**	.243**
	Sig. (2-tailed)	.000	.000	.003	.000	.000	.000	.000	.000	.000	.001	.007	.061	.000	.000
	N	226	227	226	228	226	228	227	228	227	225	227	227	228	227
It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	Pearson Correlation	.206**	.327**	.397**	.358**	.438**	.429**	.353**	.373**	.402**	.380**	.405**	.256**	.333**	.430**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	Pearson Correlation	.163*	.302**	.401**	.317**	.401**	.387**	.302**	.323**	.409**	.410**	.416**	.351**	.343**	.402**
	Sig. (2-tailed)	.014	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
Evaluating individual performance assists in finding out the individuals qualities which is important	Pearson Correlation	.217**	.301**	.386**	.446**	.448**	.391**	.351**	.357**	.434**	.411**	.474**	.394**	.400**	.413**
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	224	225	224	226	224	226	225	226	225	223	225	225	226	225

Table A_1.15: Item wise correlation between impact of Stakeholder Performance Measurement and Construction Project Performance [Part II]

		Generally our projects are successful to meet the time objectives	We are usually good at deliveri ng project s within budget	We usually meet our environm ental sustainab ility goals on project	Our projects usually result in tangible benefits for the organisatio n	Our Project specifi cations are usually met by the time of handov er	Project specifi cations are usually met by the time of handov er	We usually meet our economic sustainab ility goals on project	Our key stakehold ers are usually happy with the way our projects are managed	Project team members are usually happy working on projects	There are clearly identified in tangible benefits from the projects we carry out	End users are usually happy with the results from our projects	We usually meet our social sustainabilit y goals on projects	We usually employ an effective project managem ent process	Overall, we are very successfu l at projects
KPIs need to measure the stakeholders capabilities to operate and enhance the different processes	Pearson Correlation	.181**	.248**	.342**	.308**	.352**	.294**	.346**	.301**	.308**	.354**	.396**	.364**	.361**	.361**
	Sig. (2-tailed)	.006	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	226	227	226	228	226	228	227	228	227	225	227	227	228	227
Measuring stakeholder performance helps to improve project performance	Pearson Correlation	.197**	.238**	.325**	.412**	.345**	.290**	.375**	.324**	.324**	.330**	.370**	.310**	.358**	.377**
	Sig. (2-tailed)	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	227	228	227	229	227	229	228	229	228	226	228	228	229	228
A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated objectives	Pearson Correlation	.229**	.317**	.367**	.351**	.389**	.400**	.398**	.338**	.365**	.444**	.394**	.301**	.303**	.368**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	228	229	228	230	228	230	229	230	229	227	229	229	230	229

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed)

Appendix 2

Table A_2.1: Multiple Comparison test of Purpose of Stakeholder Engagement test with the Role of the Participants [Part I]

Multiple Comparisons

Dependent Variable: Purpose of Stakeholder Engagement

LSD

(I) Which of the following best describes your role on projects?			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Owner	Director	2.82099	4.69987	.549	-6.4411	12.0831
		Architect	-21.83333*	7.85470	.006	-37.3126	-6.3540
		Designer	.16667	7.85470	.983	-15.3126	15.6460
		Contractor	.30460	4.76370	.949	-9.0833	9.6925
		Subcontractor	-2.88889	5.23646	.582	-13.2084	7.4306
		Builder	-7.26190	6.18004	.241	-19.4410	4.9171
		Engineer	-3.06410	5.48244	.577	-13.8684	7.7402
		Consultant	-1.13333	5.17059	.827	-11.3231	9.0564
		Other	4.38406	5.09218	.390	-5.6511	14.4193
	Director	Owner	-2.82099	4.69987	.549	-12.0831	6.4411
		Architect	-24.65432*	6.53102	.000	-37.5250	-11.7836
		Designer	-2.65432	6.53102	.685	-15.5250	10.2164
		Contractor	-2.51639	1.91071	.189	-6.2818	1.2491
		Subcontractor	-5.70988*	2.89456	.050	-11.4142	-.0055
		Builder	-10.08289*	4.37617	.022	-18.7070	-1.4587
		Engineer	-5.88509	3.31890	.078	-12.4257	.6555
		Consultant	-3.95432	2.77362	.155	-9.4203	1.5117
		Other	1.56307	2.62455	.552	-3.6091	6.7353
	Architect	Owner	21.83333*	7.85470	.006	6.3540	37.3126
		Director	24.65432*	6.53102	.000	11.7836	37.5250
		Designer	22.00000*	9.06982	.016	4.1260	39.8740
		Contractor	22.13793*	6.57710	.001	9.1764	35.0995
		Subcontractor	18.94444*	6.92719	.007	5.2930	32.5959
		Builder	14.57143	7.66540	.059	-.5348	29.6777
		Engineer	18.76923*	7.11495	.009	4.7477	32.7907
		Consultant	20.70000*	6.87753	.003	7.1464	34.2536
		Other	26.21739*	6.81878	.000	12.7796	39.6552
	Designer	Owner	-.16667	7.85470	.983	-15.6460	15.3126
		Director	2.65432	6.53102	.685	-10.2164	15.5250
		Architect	-22.00000*	9.06982	.016	-39.8740	-4.1260
		Contractor	.13793	6.57710	.983	-12.8236	13.0995
		Subcontractor	-3.05556	6.92719	.660	-16.7070	10.5959
		Builder	-7.42857	7.66540	.334	-22.5348	7.6777
		Engineer	-3.23077	7.11495	.650	-17.2523	10.7907
		Consultant	-1.30000	6.87753	.850	-14.8536	12.2536
		Other	4.21739	6.81878	.537	-9.2204	17.6552
	Contractor	Owner	-.30460	4.76370	.949	-9.6925	9.0833
		Director	2.51639	1.91071	.189	-1.2491	6.2818
		Architect	-22.13793*	6.57710	.001	-35.0995	-9.1764
		Designer	-.13793	6.57710	.983	-13.0995	12.8236
		Subcontractor	-3.19349	2.99710	.288	-9.0999	2.7129
		Builder	-7.56650	4.44465	.090	-16.3256	1.1926
		Engineer	-3.36870	3.40869	.324	-10.0862	3.3488
		Consultant	-1.43793	2.88047	.618	-7.1145	4.2386
		Other	4.07946	2.73722	.138	-1.3148	9.4737
	Subcontractor	Owner	2.88889	5.23646	.582	-7.4306	13.2084
		Director	5.70988*	2.89456	.050	.0055	11.4142
		Architect	-18.94444*	6.92719	.007	-32.5959	-5.2930
		Designer	3.05556	6.92719	.660	-10.5959	16.7070
		Contractor	3.19349	2.99710	.288	-2.7129	9.0999
		Builder	-4.37302	4.94799	.378	-14.1241	5.3780
		Engineer	-.17521	4.04313	.965	-8.1430	7.7926
		Consultant	1.75556	3.60898	.627	-5.3567	8.8678
		Other	7.27295*	3.49572	.039	.3839	14.1620
	Builder	Owner	7.26190	6.18004	.241	-4.9171	19.4410
		Director	10.08289*	4.37617	.022	1.4587	18.7070
		Architect	-14.57143	7.66540	.059	-29.6777	.5348
		Designer	7.42857	7.66540	.334	-7.6777	22.5348
		Contractor	7.56650	4.44465	.090	-1.1926	16.3256
		Subcontractor	4.37302	4.94799	.378	-5.3780	14.1241
		Engineer	4.19780	5.20761	.421	-6.0649	14.4605
		Consultant	6.12857	4.87823	.210	-3.4850	15.7421
		Other	11.64596*	4.79504	.016	2.1963	21.0956

Table A_2.1: Multiple Comparison test of Purpose of Stakeholder Engagement test with the Role of the Participants [Part II]

Multiple Comparisons

Dependent Variable: Purpose of Stakeholder Engagement

LSD

(I) Which of the following best describes your role on projects?			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Engineer	Owner	3.19231	2.68085	.973	-5.3766	11.7613
		Director	4.16144	1.62290	.241	-1.0259	9.3488
		Architect	-5.97436	3.47913	.785	-17.0949	5.1462
		Designer	.69231	3.47913	1.000	-10.4282	11.8129
		Contractor	2.14845	1.66949	.956	-3.1878	7.4847
		Subcontractor	2.85897	1.97704	.911	-3.4604	9.1783
		Builder	1.54945	2.54646	1.000	-6.5900	9.6889
		Consultant	.99231	1.93514	1.000	-5.1931	7.1777
		Other	4.12709	1.88477	.467	-1.8973	10.1515
	Consultant	Owner	2.20000	2.52836	.997	-5.8815	10.2815
		Director	3.16914	1.35627	.370	-1.1660	7.5043
		Architect	-6.96667	3.36303	.550	-17.7161	3.7828
		Designer	-.30000	3.36303	1.000	-11.0495	10.4495
		Contractor	1.15614	1.41168	.998	-3.3561	5.6684
		Subcontractor	1.86667	1.76475	.988	-3.7741	7.5074
		Builder	.55714	2.38540	1.000	-7.0674	8.1817
		Engineer	-.99231	1.93514	1.000	-7.1777	5.1931
		Other	3.13478	1.66073	.677	-2.1735	8.4431
	Other	Owner	-.93478	2.49002	1.000	-8.8938	7.0242
		Director	.03435	1.28337	1.000	-4.0678	4.1365
		Architect	-10.10145	3.33430	.080	-20.7591	.5562
		Designer	-3.43478	3.33430	.990	-14.0924	7.2228
		Contractor	-1.97864	1.34180	.901	-6.2675	2.3102
		Subcontractor	-1.26812	1.70936	.999	-6.7319	4.1956
		Builder	-2.57764	2.34472	.984	-10.0722	4.9169
		Engineer	-4.12709	1.88477	.467	-10.1515	1.8973
		Other	26.21739*	6.81878	.000	12.7796	39.6552
LSD	Owner	Director	.96914	2.29818	.674	-3.5600	5.4983
		Architect	-9.16667*	3.84086	.018	-16.7361	-1.5973
		Designer	-2.50000	3.84086	.516	-10.0694	5.0694
		Contractor	-1.04386	2.33131	.655	-5.6383	3.5506
		Subcontractor	-.33333	2.56057	.897	-5.3796	4.7129
		Builder	-1.64286	3.02197	.587	-7.5984	4.3127
		Engineer	-3.19231	2.68085	.235	-8.4756	2.0910
		Consultant	-2.20000	2.52836	.385	-7.1828	2.7828
		Other	.93478	2.49002	.708	-3.9724	5.8420
	Director	Owner	-.96914	2.29818	.674	-5.4983	3.5600
		Architect	-10.13580*	3.19359	.002	-16.4296	-3.8420
		Designer	-3.46914	3.19359	.279	-9.7629	2.8247
		Contractor	-2.01300*	.93908	.033	-3.8637	-.1623
		Subcontractor	-1.30247	1.41541	.358	-4.0919	1.4870
		Builder	-2.61199	2.13990	.224	-6.8292	1.6052
		Engineer	-4.16144*	1.62290	.011	-7.3598	-.9631
		Consultant	-3.16914*	1.35627	.020	-5.8420	-.4963
		Other	-.03435	1.28337	.979	-2.5636	2.4949
	Architect	Owner	9.16667*	3.84086	.018	1.5973	16.7361
		Director	10.13580*	3.19359	.002	3.8420	16.4296
		Designer	6.66667	4.43504	.134	-2.0737	15.4070
		Contractor	8.12281*	3.21751	.012	1.7819	14.4637
		Subcontractor	8.83333*	3.38732	.010	2.1578	15.5089
		Builder	7.52381*	3.74829	.046	.1368	14.9108
		Engineer	5.97436	3.47913	.087	-.8822	12.8309
		Consultant	6.96667*	3.36303	.039	.3389	13.5944
		Other	10.10145*	3.33430	.003	3.5304	16.6725
	Designer	Owner	2.50000	3.84086	.516	-5.0694	10.0694
		Director	3.46914	3.19359	.279	-2.8247	9.7629
		Architect	-6.66667	4.43504	.134	-15.4070	2.0737
		Contractor	1.45614	3.21751	.651	-4.8848	7.7971
		Subcontractor	2.16667	3.38732	.523	-4.5089	8.8422
		Builder	.85714	3.74829	.819	-6.5298	8.2441
		Engineer	-.69231	3.47913	.842	-7.5488	6.1642
		Consultant	.30000	3.36303	.929	-6.3277	6.9277
		Other	3.43478	3.33430	.304	-3.1363	10.0059

Table A_2.1: Multiple Comparison test of Purpose of Stakeholder Engagement test with the Role of the Participants [Part III]

Multiple Comparisons

Dependent Variable: Purpose of Stakeholder Engagement

LSD

(I) Which of the following best describes your role on projects?			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
LSD	Contractor	Owner	1.04386	2.33131	.655	-3.5506	5.6383
		Director	2.01300*	.93908	.033	.1623	3.8637
		Architect	-8.12281*	3.21751	.012	-14.4637	-1.7819
		Designer	-1.45614	3.21751	.651	-7.7971	4.8848
		Subcontractor	.71053	1.46859	.629	-2.1837	3.6048
		Builder	-.59900	2.17544	.783	-4.8863	3.6883
		Engineer	-2.14845	1.66949	.199	-5.4386	1.1417
		Consultant	-1.15614	1.41168	.414	-3.9382	1.6259
		Other	1.97864	1.34180	.142	-.6657	4.6230
	Subcontractor	Owner	.33333	2.56057	.897	-4.7129	5.3796
		Director	1.30247	1.41541	.358	-1.4870	4.0919
		Architect	-8.83333*	3.38732	.010	-15.5089	-2.1578
		Designer	-2.16667	3.38732	.523	-8.8422	4.5089
		Contractor	-.71053	1.46859	.629	-3.6048	2.1837
		Builder	-1.30952	2.41951	.589	-6.0778	3.4587
		Engineer	-2.85897	1.97704	.150	-6.7552	1.0373
		Consultant	-1.86667	1.76475	.291	-5.3446	1.6112
		Other	1.26812	1.70936	.459	-2.1006	4.6369
	Builder	Owner	1.64286	3.02197	.587	-4.3127	7.5984
		Director	2.61199	2.13990	.224	-1.6052	6.8292
		Architect	-7.52381*	3.74829	.046	-14.9108	-.1368
		Designer	-.85714	3.74829	.819	-8.2441	6.5298
		Contractor	.59900	2.17544	.783	-3.6883	4.8863
		Subcontractor	1.30952	2.41951	.589	-3.4587	6.0778
		Engineer	-1.54945	2.54646	.543	-6.5679	3.4690
		Consultant	-.55714	2.38540	.816	-5.2582	4.1439
		Owner	1.04386	2.33131	.655	-3.5506	5.6383
	Engineer	Owner	3.19231	2.68085	.235	-2.0910	8.4756
		Director	4.16144*	1.62290	.011	.9631	7.3598
		Architect	-5.97436	3.47913	.087	-12.8309	.8822
		Designer	.69231	3.47913	.842	-6.1642	7.5488
		Contractor	2.14845	1.66949	.199	-1.1417	5.4386
		Subcontractor	2.85897	1.97704	.150	-1.0373	6.7552
		Builder	1.54945	2.54646	.543	-3.4690	6.5679
		Consultant	.99231	1.93514	.609	-2.8214	4.8060
		Other	4.12709*	1.88477	.030	.4127	7.8415
	Consultant	Owner	2.20000	2.52836	.385	-2.7828	7.1828
		Director	3.16914*	1.35627	.020	.4963	5.8420
		Architect	-6.96667*	3.36303	.039	-13.5944	-.3389
		Designer	-.30000	3.36303	.929	-6.9277	6.3277
		Contractor	1.15614	1.41168	.414	-1.6259	3.9382
		Subcontractor	1.86667	1.76475	.291	-1.6112	5.3446
		Builder	.55714	2.38540	.816	-4.1439	5.2582
		Engineer	-.99231	1.93514	.609	-4.8060	2.8214
		Other	3.13478	1.66073	.060	-.1381	6.4077
	Other	Owner	-.93478	2.49002	.708	-5.8420	3.9724
		Director	.03435	1.28337	.979	-2.4949	2.5636
		Architect	-10.10145*	3.33430	.003	-16.6725	-3.5304
		Designer	-3.43478	3.33430	.304	-10.0059	3.1363
		Contractor	-1.97864	1.34180	.142	-4.6230	.6657
		Subcontractor	-1.26812	1.70936	.459	-4.6369	2.1006
		Builder	-2.57764	2.34472	.273	-7.1985	2.0432
		Engineer	-4.12709*	1.88477	.030	-7.8415	-.4127
		Consultant	-3.13478	1.66073	.060	-6.4077	.1381

*. The mean difference is significant at the 0.05 level.

Table A_2.2: Multiple Comparison test of Impact of Stakeholder Engagement test with the Role of the Participants [Part I]

Multiple Comparisons

Dependent Variable: Impacts of Stakeholder Engagement

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	2.82099	4.69987	.549	-6.4411	12.0831
	Architect	-21.83333*	7.85470	.006	-37.3126	-6.3540
	Designer	.16667	7.85470	.983	-15.3126	15.6460
	Contractor	.30460	4.76370	.949	-9.0833	9.6925
	Subcontractor	-2.88889	5.23646	.582	-13.2084	7.4306
	Builder	-7.26190	6.18004	.241	-19.4410	4.9171
	Engineer	-3.06410	5.48244	.577	-13.8684	7.7402
	Consultant	-1.13333	5.17059	.827	-11.3231	9.0564
	Other	4.38406	5.09218	.390	-5.6511	14.4193
Director	Owner	-2.82099	4.69987	.549	-12.0831	6.4411
	Architect	-24.65432*	6.53102	.000	-37.5250	-11.7836
	Designer	-2.65432	6.53102	.685	-15.5250	10.2164
	Contractor	-2.51639	1.91071	.189	-6.2818	1.2491
	Subcontractor	-5.70988*	2.89456	.050	-11.4142	-.0055
	Builder	-10.08289*	4.37617	.022	-18.7070	-1.4587
	Engineer	-5.88509	3.31890	.078	-12.4257	.6555
	Consultant	-3.95432	2.77362	.155	-9.4203	1.5117
	Other	1.56307	2.62455	.552	-3.6091	6.7353
Architect	Owner	21.83333*	7.85470	.006	6.3540	37.3126
	Director	24.65432*	6.53102	.000	11.7836	37.5250
	Designer	22.00000*	9.06982	.016	4.1260	39.8740
	Contractor	22.13793*	6.57710	.001	9.1764	35.0995
	Subcontractor	18.94444*	6.92719	.007	5.2930	32.5959
	Builder	14.57143	7.66540	.059	-.5348	29.6777
	Engineer	18.76923*	7.11495	.009	4.7477	32.7907
	Consultant	20.70000*	6.87753	.003	7.1464	34.2536
	Other	26.21739*	6.81878	.000	12.7796	39.6552
Designer	Owner	-.16667	7.85470	.983	-15.6460	15.3126
	Director	2.65432	6.53102	.685	-10.2164	15.5250
	Architect	-22.00000*	9.06982	.016	-39.8740	-4.1260
	Contractor	.13793	6.57710	.983	-12.8236	13.0995
	Subcontractor	-3.05556	6.92719	.660	-16.7070	10.5959
	Builder	-7.42857	7.66540	.334	-22.5348	7.6777
	Engineer	-3.23077	7.11495	.650	-17.2523	10.7907
	Consultant	-1.30000	6.87753	.850	-14.8536	12.2536
	Other	4.21739	6.81878	.537	-9.2204	17.6552
Contractor	Owner	-.30460	4.76370	.949	-9.6925	9.0833
	Director	2.51639	1.91071	.189	-1.2491	6.2818
	Architect	-22.13793*	6.57710	.001	-35.0995	-9.1764
	Designer	-.13793	6.57710	.983	-13.0995	12.8236
	Subcontractor	-3.19349	2.99710	.288	-9.0999	2.7129
	Builder	-7.56650	4.44465	.090	-16.3256	1.1926
	Engineer	-3.36870	3.40869	.324	-10.0862	3.3488
	Consultant	-1.43793	2.88047	.618	-7.1145	4.2386
	Other	4.07946	2.73722	.138	-1.3148	9.4737
Subcontractor	Owner	2.88889	5.23646	.582	-7.4306	13.2084
	Director	5.70988*	2.89456	.050	.0055	11.4142
	Architect	-18.94444*	6.92719	.007	-32.5959	-5.2930
	Designer	3.05556	6.92719	.660	-10.5959	16.7070
	Contractor	3.19349	2.99710	.288	-2.7129	9.0999
	Builder	-4.37302	4.94799	.378	-14.1241	5.3780
	Engineer	-.17521	4.04313	.965	-8.1430	7.7926
	Consultant	1.75556	3.60898	.627	-5.3567	8.8678
	Other	7.27295*	3.49572	.039	.3839	14.1620
Builder	Owner	7.26190	6.18004	.241	-4.9171	19.4410
	Director	10.08289*	4.37617	.022	1.4587	18.7070
	Architect	-14.57143	7.66540	.059	-29.6777	.5348
	Designer	7.42857	7.66540	.334	-7.6777	22.5348
	Contractor	7.56650	4.44465	.090	-1.1926	16.3256
	Subcontractor	4.37302	4.94799	.378	-5.3780	14.1241
	Engineer	4.19780	5.20761	.421	-6.0649	14.4605
	Consultant	6.12857	4.87823	.210	-3.4850	15.7421
	Other	11.64596*	4.79504	.016	2.1963	21.0956

Table A_2.2: Multiple Comparison test of Impact of Stakeholder Engagement test with the Role of the Participants [Part II]

Multiple Comparisons

Dependent Variable: Impacts of Stakeholder Engagement

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	3.06410	5.48244	.577	-7.7402	13.8684
	Director	5.88509	3.31890	.078	-.6555	12.4257
	Architect	-18.76923*	7.11495	.009	-32.7907	-4.7477
	Designer	3.23077	7.11495	.650	-10.7907	17.2523
	Contractor	3.36870	3.40869	.324	-3.3488	10.0862
	Subcontractor	.17521	4.04313	.965	-7.7926	8.1430
	Builder	-4.19780	5.20761	.421	-14.4605	6.0649
	Consultant	1.93077	3.95744	.626	-5.8682	9.7297
	Other	7.44816	3.85443	.055	-.1478	15.0441
Consultant	Owner	1.13333	5.17059	.827	-9.0564	11.3231
	Director	3.95432	2.77362	.155	-1.5117	9.4203
	Architect	-20.70000*	6.87753	.003	-34.2536	-7.1464
	Designer	1.30000	6.87753	.850	-12.2536	14.8536
	Contractor	1.43793	2.88047	.618	-4.2386	7.1145
	Subcontractor	-1.75556	3.60898	.627	-8.8678	5.3567
	Builder	-6.12857	4.87823	.210	-15.7421	3.4850
	Engineer	-1.93077	3.95744	.626	-9.7297	5.8682
	Other	5.51739	3.39625	.106	-1.1756	12.2104
Other	Owner	-4.38406	5.09218	.390	-14.4193	5.6511
	Director	-1.56307	2.62455	.552	-6.7353	3.6091
	Architect	-26.21739*	6.81878	.000	-39.6552	-12.7796
	Designer	-4.21739	6.81878	.537	-17.6552	9.2204
	Contractor	-4.07946	2.73722	.138	-9.4737	1.3148
	Subcontractor	-7.27295*	3.49572	.039	-14.1620	-.3839
	Builder	-11.64596*	4.79504	.016	-21.0956	-2.1963
	Engineer	-7.44816	3.85443	.055	-15.0441	.1478
	Consultant	-5.51739	3.39625	.106	-12.2104	1.1756

*. The mean difference is significant at the 0.05 level.

Table A_2.3: Multiple Comparison test of Communication with Stakeholders with Participants Role [Part I]

Multiple Comparisons

Dependent Variable: Communication with Stakeholders

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	1.06790	2.54147	.675	-3.9406	6.0764
	Architect	-10.83333*	4.24745	.011	-19.2038	-2.4629
	Designer	-.50000	4.24745	.906	-8.8705	7.8705
	Contractor	.43678	2.57599	.866	-4.6397	5.5133
	Subcontractor	-1.66667	2.83163	.557	-7.2470	3.9137
	Builder	-1.02381	3.34187	.760	-7.6097	5.5620
	Engineer	-1.39744	2.96464	.638	-7.2399	4.4450
	Consultant	.33333	2.79601	.905	-5.1768	5.8435
	Other	2.52899	2.75361	.359	-2.8976	7.9555
Director	Owner	-1.06790	2.54147	.675	-6.0764	3.9406
	Architect	-11.90123*	3.53167	.001	-18.8611	-4.9414
	Designer	-1.56790	3.53167	.658	-8.5278	5.3920
	Contractor	-.63112	1.03322	.542	-2.6673	1.4051
	Subcontractor	-2.73457	1.56524	.082	-5.8192	.3501
	Builder	-2.09171	2.36643	.378	-6.7552	2.5718
	Engineer	-2.46534	1.79470	.171	-6.0022	1.0715
	Consultant	-.73457	1.49984	.625	-3.6903	2.2212
	Other	1.46108	1.41923	.304	-1.3358	4.2580
Architect	Owner	10.83333*	4.24745	.011	2.4629	19.2038
	Director	11.90123*	3.53167	.001	4.9414	18.8611
	Designer	10.33333*	4.90453	.036	.6679	19.9987
	Contractor	11.27011*	3.55659	.002	4.2611	18.2791
	Subcontractor	9.16667*	3.74590	.015	1.7846	16.5487
	Builder	9.80952*	4.14509	.019	1.6408	17.9783
	Engineer	9.43590*	3.84743	.015	1.8537	17.0181
	Consultant	11.16667*	3.71904	.003	3.8375	18.4958
	Other	13.36232*	3.68727	.000	6.0958	20.6289
Designer	Owner	.50000	4.24745	.906	-7.8705	8.8705
	Director	1.56790	3.53167	.658	-5.3920	8.5278
	Architect	-10.33333*	4.90453	.036	-19.9987	-.6679
	Contractor	.93678	3.55659	.792	-6.0722	7.9458
	Subcontractor	-1.16667	3.74590	.756	-8.5487	6.2154
	Builder	-.52381	4.14509	.900	-8.6926	7.6449
	Engineer	-.89744	3.84743	.816	-8.4796	6.6847
	Consultant	.83333	3.71904	.823	-6.4958	8.1625
	Other	3.02899	3.68727	.412	-4.2375	10.2955
Contractor	Owner	-.43678	2.57599	.866	-5.5133	4.6397
	Director	.63112	1.03322	.542	-1.4051	2.6673
	Architect	-11.27011*	3.55659	.002	-18.2791	-4.2611
	Designer	-.93678	3.55659	.792	-7.9458	6.0722
	Subcontractor	-2.10345	1.62069	.196	-5.2974	1.0905
	Builder	-1.46059	2.40346	.544	-6.1971	3.2759
	Engineer	-1.83422	1.84326	.321	-5.4667	1.7983
	Consultant	-.10345	1.55762	.947	-3.1731	2.9662
	Other	2.09220	1.48016	.159	-.8248	5.0092
Subcontractor	Owner	1.66667	2.83163	.557	-3.9137	7.2470
	Director	2.73457	1.56524	.082	-.3501	5.8192
	Architect	-9.16667*	3.74590	.015	-16.5487	-1.7846
	Designer	1.16667	3.74590	.756	-6.2154	8.5487
	Contractor	2.10345	1.62069	.196	-1.0905	5.2974
	Builder	.64286	2.67564	.810	-4.6300	5.9158
	Engineer	.26923	2.18633	.902	-4.0394	4.5779
	Consultant	2.00000	1.95157	.307	-1.8460	5.8460
	Other	4.19565*	1.89032	.027	.4704	7.9209
Builder	Owner	1.02381	3.34187	.760	-5.5620	7.6097
	Director	2.09171	2.36643	.378	-2.5718	6.7552
	Architect	-9.80952*	4.14509	.019	-17.9783	-1.6408
	Designer	.52381	4.14509	.900	-7.6449	8.6926
	Contractor	1.46059	2.40346	.544	-3.2759	6.1971
	Subcontractor	-.64286	2.67564	.810	-5.9158	4.6300
	Engineer	-.37363	2.81603	.895	-5.9232	5.1759
	Consultant	1.35714	2.63792	.607	-3.8414	6.5557
	Other	3.55280	2.59293	.172	-1.5571	8.6627

Table A_2.3: Multiple Comparison test of Communication with Stakeholders with Participants Role [Part II]

Multiple Comparisons

Dependent Variable: Communication with Stakeholders
LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	3.06410	5.48244	.577	-7.7402	13.8684
	Director	5.88509	3.31890	.078	-.6555	12.4257
	Architect	-18.76923*	7.11495	.009	-32.7907	-4.7477
	Designer	3.23077	7.11495	.650	-10.7907	17.2523
	Contractor	3.36870	3.40869	.324	-3.3488	10.0862
	Subcontractor	.17521	4.04313	.965	-7.7926	8.1430
	Builder	-4.19780	5.20761	.421	-14.4605	6.0649
	Consultant	1.93077	3.95744	.626	-5.8682	9.7297
	Other	7.44816	3.85443	.055	-.1478	15.0441
Consultant	Owner	1.13333	5.17059	.827	-9.0564	11.3231
	Director	3.95432	2.77362	.155	-1.5117	9.4203
	Architect	-20.70000*	6.87753	.003	-34.2536	-7.1464
	Designer	1.30000	6.87753	.850	-12.2536	14.8536
	Contractor	1.43793	2.88047	.618	-4.2386	7.1145
	Subcontractor	-1.75556	3.60898	.627	-8.8678	5.3567
	Builder	-6.12857	4.87823	.210	-15.7421	3.4850
	Engineer	-1.93077	3.95744	.626	-9.7297	5.8682
	Other	5.51739	3.39625	.106	-1.1756	12.2104
Other	Owner	-2.52899	2.75361	.359	-7.9555	2.8976
	Director	-1.46108	1.41923	.304	-4.2580	1.3358
	Architect	-13.36232*	3.68727	.000	-20.6289	-6.0958
	Designer	-3.02899	3.68727	.412	-10.2955	4.2375
	Contractor	-2.09220	1.48016	.159	-5.0092	.8248
	Subcontractor	-4.19565*	1.89032	.027	-7.9209	-.4704
	Builder	-3.55280	2.59293	.172	-8.6627	1.5571
	Engineer	-3.92642	2.08429	.061	-8.0340	.1811
	Consultant	-2.19565	1.83653	.233	-5.8149	1.4236

*. The mean difference is significant at the 0.05 level.

Table A_2.4: Multiple Comparison test of Stakeholder Analysis with Participants Role [Part I]

Multiple Comparisons

Dependent Variable: Stakeholder Analysis

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	-.31481	3.14443	.920	-6.5116	5.8819
	Architect	-13.16667*	5.25515	.013	-23.5230	-2.8103
	Designer	-2.50000	5.25515	.635	-12.8564	7.8564
	Contractor	-.33908	3.18714	.915	-6.6200	5.9418
	Subcontractor	-2.55556	3.50343	.466	-9.4598	4.3487
	Builder	-.59524	4.13473	.886	-8.7436	7.5531
	Engineer	-2.62821	3.66800	.474	-9.8568	4.6004
	Consultant	-.01667	3.45936	.996	-6.8341	6.8007
	Other	-.16667	3.40690	.961	-6.8807	6.5473
Director	Owner	.31481	3.14443	.920	-5.8819	6.5116
	Architect	-12.85185*	4.36955	.004	-21.4630	-4.2407
	Designer	-2.18519	4.36955	.618	-10.7963	6.4259
	Contractor	-.02427	1.27835	.985	-2.5435	2.4950
	Subcontractor	-2.24074	1.93660	.248	-6.0572	1.5757
	Builder	-.28042	2.92786	.924	-6.0504	5.4895
	Engineer	-2.31339	2.22050	.299	-6.6893	2.0626
	Consultant	.29815	1.85568	.873	-3.3589	3.9552
	Other	.14815	1.75594	.933	-3.3123	3.6086
Architect	Owner	13.16667*	5.25515	.013	2.8103	23.5230
	Director	12.85185*	4.36955	.004	4.2407	21.4630
	Designer	10.66667	6.06812	.080	-1.2918	22.6252
	Contractor	12.82759*	4.40038	.004	4.1557	21.4995
	Subcontractor	10.61111*	4.63461	.023	1.4777	19.7446
	Builder	12.57143*	5.12850	.015	2.4647	22.6782
	Engineer	10.53846*	4.76023	.028	1.1574	19.9195
	Consultant	13.15000*	4.60138	.005	4.0820	22.2180
	Other	13.00000*	4.56207	.005	4.0095	21.9905
Designer	Owner	2.50000	5.25515	.635	-7.8564	12.8564
	Director	2.18519	4.36955	.618	-6.4259	10.7963
	Architect	-10.66667	6.06812	.080	-22.6252	1.2918
	Contractor	2.16092	4.40038	.624	-6.5109	10.8328
	Subcontractor	-.05556	4.63461	.990	-9.1890	9.0779
	Builder	1.90476	5.12850	.711	-8.2020	12.0115
	Engineer	-.12821	4.76023	.979	-9.5092	9.2528
	Consultant	2.48333	4.60138	.590	-6.5846	11.5513
	Other	2.33333	4.56207	.610	-6.6572	11.3238
Contractor	Owner	.33908	3.18714	.915	-5.9418	6.6200
	Director	.02427	1.27835	.985	-2.4950	2.5435
	Architect	-12.82759*	4.40038	.004	-21.4995	-4.1557
	Designer	-2.16092	4.40038	.624	-10.8328	6.5109
	Subcontractor	-2.21648	2.00520	.270	-6.1681	1.7352
	Builder	-.25616	2.97368	.931	-6.1164	5.6041
	Engineer	-2.28912	2.28057	.317	-6.7835	2.2052
	Consultant	.32241	1.92716	.867	-3.4755	4.1203
	Other	.17241	1.83132	.925	-3.4366	3.7814
Subcontractor	Owner	2.55556	3.50343	.466	-4.3487	9.4598
	Director	2.24074	1.93660	.248	-1.5757	6.0572
	Architect	-10.61111*	4.63461	.023	-19.7446	-1.4777
	Designer	.05556	4.63461	.990	-9.0779	9.1890
	Contractor	2.21648	2.00520	.270	-1.7352	6.1681
	Builder	1.96032	3.31043	.554	-4.5636	8.4842
	Engineer	-.07265	2.70504	.979	-5.4035	5.2582
	Consultant	2.53889	2.41457	.294	-2.2195	7.2973
	Other	2.38889	2.33879	.308	-2.2202	6.9980
Builder	Owner	.59524	4.13473	.886	-7.5531	8.7436
	Director	.28042	2.92786	.924	-5.4895	6.0504
	Architect	-12.57143*	5.12850	.015	-22.6782	-2.4647
	Designer	-1.90476	5.12850	.711	-12.0115	8.2020
	Contractor	.25616	2.97368	.931	-5.6041	6.1164
	Subcontractor	-1.96032	3.31043	.554	-8.4842	4.5636
	Engineer	-2.03297	3.48413	.560	-8.8992	4.8332
	Consultant	.57857	3.26376	.859	-5.8533	7.0105
	Director	-.31481	3.14443	.920	-6.5116	5.8819

Table A_2.4: Multiple Comparison test of Stakeholder Analysis with Participants Role [Part II]

Multiple Comparisons

Dependent Variable: Stakeholder Analysis

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	2.62821	3.66800	.474	-4.6004	9.8568
	Director	2.31339	2.22050	.299	-2.0626	6.6893
	Architect	-10.53846*	4.76023	.028	-19.9195	-1.1574
	Designer	.12821	4.76023	.979	-9.2528	9.5092
	Contractor	2.28912	2.28057	.317	-2.2052	6.7835
	Subcontractor	.07265	2.70504	.979	-5.2582	5.4035
	Builder	2.03297	3.48413	.560	-4.8332	8.8992
	Consultant	2.61154	2.64771	.325	-2.6063	7.8294
	Other	2.46154	2.57879	.341	-2.6205	7.5436
Consultant	Owner	.01667	3.45936	.996	-6.8007	6.8341
	Director	-.29815	1.85568	.873	-3.9552	3.3589
	Architect	-13.15000*	4.60138	.005	-22.2180	-4.0820
	Designer	-2.48333	4.60138	.590	-11.5513	6.5846
	Contractor	-.32241	1.92716	.867	-4.1203	3.4755
	Subcontractor	-2.53889	2.41457	.294	-7.2973	2.2195
	Builder	-.57857	3.26376	.859	-7.0105	5.8533
	Engineer	-2.61154	2.64771	.325	-7.8294	2.6063
	Other	-.15000	2.27225	.947	-4.6279	4.3279
Other	Owner	.16667	3.40690	.961	-6.5473	6.8807
	Director	-.14815	1.75594	.933	-3.6086	3.3123
	Architect	-13.00000*	4.56207	.005	-21.9905	-4.0095
	Designer	-2.33333	4.56207	.610	-11.3238	6.6572
	Contractor	-.17241	1.83132	.925	-3.7814	3.4366
	Subcontractor	-2.38889	2.33879	.308	-6.9980	2.2202
	Builder	-.42857	3.20810	.894	-6.7508	5.8937
	Engineer	-2.46154	2.57879	.341	-7.5436	2.6205
	Consultant	.15000	2.27225	.947	-4.3279	4.6279

*. The mean difference is significant at the 0.05 level.

Table A_2.5: Multiple Comparison test of Stakeholder Mapping with Participants Role[Part I]

Multiple Comparisons

Dependent Variable: Stakeholder Mapping

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	-1.64167	2.17892	.452	-5.9359	2.6526
	Architect	-10.16667*	3.63997	.006	-17.3403	-2.9930
	Designer	-3.16667	3.63997	.385	-10.3403	4.0070
	Contractor	-2.41228	2.20938	.276	-6.7665	1.9420
	Subcontractor	-3.00000	2.42665	.218	-7.7825	1.7825
	Builder	-3.45238	2.86392	.229	-9.0966	2.1918
	Engineer	-3.62821	2.54064	.155	-8.6353	1.3789
	Consultant	-1.56667	2.39612	.514	-6.2890	3.1556
	Other	-1.90580	2.35979	.420	-6.5565	2.7449
Director	Owner	1.64167	2.17892	.452	-2.6526	5.9359
	Architect	-8.52500*	3.02724	.005	-14.4911	-2.5589
	Designer	-1.52500	3.02724	.615	-7.4911	4.4411
	Contractor	-.77061	.89226	.389	-2.5291	.9879
	Subcontractor	-1.35833	1.34290	.313	-4.0049	1.2883
	Builder	-1.81071	2.02898	.373	-5.8094	2.1880
	Engineer	-1.98654	1.53935	.198	-5.0203	1.0472
	Consultant	.07500	1.28692	.954	-2.4613	2.6113
	Other	-.26413	1.21793	.829	-2.6644	2.1362
Architect	Owner	10.16667*	3.63997	.006	2.9930	17.3403
	Director	8.52500*	3.02724	.005	2.5589	14.4911
	Designer	7.00000	4.20308	.097	-1.2835	15.2835
	Contractor	7.75439*	3.04923	.012	1.7449	13.7638
	Subcontractor	7.16667*	3.21015	.027	.8401	13.4933
	Builder	6.71429	3.55225	.060	-.2865	13.7151
	Engineer	6.53846*	3.29717	.049	.0404	13.0365
	Consultant	8.60000*	3.18714	.008	2.3188	14.8812
	Other	8.26087*	3.15991	.010	2.0333	14.4884
Designer	Owner	3.16667	3.63997	.385	-4.0070	10.3403
	Director	1.52500	3.02724	.615	-4.4411	7.4911
	Architect	-7.00000	4.20308	.097	-15.2835	1.2835
	Contractor	.75439	3.04923	.805	-5.2551	6.7638
	Subcontractor	.16667	3.21015	.959	-6.1599	6.4933
	Builder	-.28571	3.55225	.936	-7.2865	6.7151
	Engineer	-.46154	3.29717	.889	-6.9596	6.0365
	Consultant	1.60000	3.18714	.616	-4.6812	7.8812
	Other	1.26087	3.15991	.690	-4.9667	7.4884
Contractor	Owner	2.41228	2.20938	.276	-1.9420	6.7665
	Director	.77061	.89226	.389	-.9879	2.5291
	Architect	-7.75439*	3.04923	.012	-13.7638	-1.7449
	Designer	-.75439	3.04923	.805	-6.7638	5.2551
	Subcontractor	-.58772	1.39178	.673	-3.3306	2.1552
	Builder	-1.04010	2.06166	.614	-5.1032	3.0230
	Engineer	-1.21592	1.58217	.443	-4.3341	1.9022
	Consultant	.84561	1.33785	.528	-1.7910	3.4822
	Other	.50648	1.27162	.691	-1.9996	3.0126
Subcontractor	Owner	3.00000	2.42665	.218	-1.7825	7.7825
	Director	1.35833	1.34290	.313	-1.2883	4.0049
	Architect	-7.16667*	3.21015	.027	-13.4933	-.8401
	Designer	-.16667	3.21015	.959	-6.4933	6.1599
	Contractor	.58772	1.39178	.673	-2.1552	3.3306
	Builder	-.45238	2.29297	.844	-4.9714	4.0666
	Engineer	-.62821	1.87364	.738	-4.3208	3.0644
	Consultant	1.43333	1.67245	.392	-1.8627	4.7294
	Other	1.09420	1.61996	.500	-2.0984	4.2868
Builder	Owner	3.45238	2.86392	.229	-2.1918	9.0966
	Director	1.81071	2.02898	.373	-2.1880	5.8094
	Architect	-6.71429	3.55225	.060	-13.7151	.2865
	Designer	.28571	3.55225	.936	-6.7151	7.2865
	Contractor	1.04010	2.06166	.614	-3.0230	5.1032
	Subcontractor	.45238	2.29297	.844	-4.0666	4.9714
	Engineer	-.17582	2.41328	.942	-4.9319	4.5803
	Consultant	1.88571	2.26064	.405	-2.5696	6.3410
	Other	1.54658	2.22209	.487	-2.8327	5.9259

Table A_2.5: Multiple Comparison test of Stakeholder Mapping with Participants Role [Part II]

Multiple Comparisons

Dependent Variable: Stakeholder Mapping

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	3.62821	2.54064	.155	-1.3789	8.6353
	Director	1.98654	1.53935	.198	-1.0472	5.0203
	Architect	-6.53846*	3.29717	.049	-13.0365	-.0404
	Designer	.46154	3.29717	.889	-6.0365	6.9596
	Contractor	1.21592	1.58217	.443	-1.9022	4.3341
	Subcontractor	.62821	1.87364	.738	-3.0644	4.3208
	Builder	.17582	2.41328	.942	-4.5803	4.9319
	Consultant	2.06154	1.83393	.262	-1.5528	5.6759
	Other	1.72241	1.78619	.336	-1.7978	5.2427
Consultant	Owner	1.56667	2.39612	.514	-3.1556	6.2890
	Director	-.07500	1.28692	.954	-2.6113	2.4613
	Architect	-8.60000*	3.18714	.008	-14.8812	-2.3188
	Designer	-1.60000	3.18714	.616	-7.8812	4.6812
	Contractor	-.84561	1.33785	.528	-3.4822	1.7910
	Subcontractor	-1.43333	1.67245	.392	-4.7294	1.8627
	Builder	-1.88571	2.26064	.405	-6.3410	2.5696
	Engineer	-2.06154	1.83393	.262	-5.6759	1.5528
	Other	-.33913	1.57387	.830	-3.4409	2.7627
Other	Owner	1.90580	2.35979	.420	-2.7449	6.5565
	Director	.26413	1.21793	.829	-2.1362	2.6644
	Architect	-8.26087*	3.15991	.010	-14.4884	-2.0333
	Designer	-1.26087	3.15991	.690	-7.4884	4.9667
	Contractor	-.50648	1.27162	.691	-3.0126	1.9996
	Subcontractor	-1.09420	1.61996	.500	-4.2868	2.0984
	Builder	-1.54658	2.22209	.487	-5.9259	2.8327
	Engineer	-1.72241	1.78619	.336	-5.2427	1.7978
	Consultant	.33913	1.57387	.830	-2.7627	3.4409

*. The mean difference is significant at the 0.05 level.

Table A_2.6: Multiple Comparison test of Stakeholder Management with Participants Role [Part I]

Multiple Comparisons

Dependent Variable: Stakeholder Management

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	3.09072	2.44474	.207	-1.7273	7.9087
	Architect	-8.16667*	4.08223	.047	-16.2117	-.1216
	Designer	1.16667	4.08223	.775	-6.8784	9.2117
	Contractor	1.90805	2.47578	.442	-2.9711	6.7872
	Subcontractor	.21930	2.70352	.935	-5.1087	5.5473
	Builder	.02381	3.21188	.994	-6.3060	6.3536
	Engineer	-1.44872	2.84932	.612	-7.0640	4.1666
	Consultant	1.41667	2.68725	.599	-3.8793	6.7126
	Other	2.12319	2.64650	.423	-3.0924	7.3388
Director	Owner	-3.09072	2.44474	.207	-7.9087	1.7273
	Architect	-11.25738*	3.39582	.001	-17.9497	-4.5650
	Designer	-1.92405	3.39582	.572	-8.6164	4.7683
	Contractor	-1.18267	.99826	.237	-3.1500	.7847
	Subcontractor	-2.87142	1.47515	.053	-5.7786	.0357
	Builder	-3.06691	2.27666	.179	-7.5537	1.4198
	Engineer	-4.53944*	1.72791	.009	-7.9447	-1.1341
	Consultant	-1.67405	1.44511	.248	-4.5220	1.1739
	Other	-.96753	1.36784	.480	-3.6632	1.7281
Architect	Owner	8.16667*	4.08223	.047	.1216	16.2117
	Director	11.25738*	3.39582	.001	4.5650	17.9497
	Designer	9.33333*	4.71375	.049	.0437	18.6230
	Contractor	10.07471*	3.41824	.004	3.3382	16.8112
	Subcontractor	8.38596*	3.58663	.020	1.3176	15.4543
	Builder	8.19048*	3.98385	.041	.3393	16.0417
	Engineer	6.71795	3.69777	.071	-.5695	14.0054
	Consultant	9.58333*	3.57438	.008	2.5391	16.6276
	Other	10.28986*	3.54384	.004	3.3058	17.2739
Designer	Owner	-1.16667	4.08223	.775	-9.2117	6.8784
	Director	1.92405	3.39582	.572	-4.7683	8.6164
	Architect	-9.33333*	4.71375	.049	-18.6230	-.0437
	Contractor	.74138	3.41824	.828	-5.9951	7.4779
	Subcontractor	-.94737	3.58663	.792	-8.0157	6.1210
	Builder	-1.14286	3.98385	.774	-8.9941	6.7083
	Engineer	-2.61538	3.69777	.480	-9.9028	4.6720
	Consultant	.25000	3.57438	.944	-6.7942	7.2942
	Other	.95652	3.54384	.787	-6.0275	7.9406
Contractor	Owner	-1.90805	2.47578	.442	-6.7872	2.9711
	Director	1.18267	.99826	.237	-.7847	3.1500
	Architect	-10.07471*	3.41824	.004	-16.8112	-3.3382
	Designer	-.74138	3.41824	.828	-7.4779	5.9951
	Subcontractor	-1.68875	1.52604	.270	-4.6962	1.3187
	Builder	-1.88424	2.30997	.416	-6.4366	2.6681
	Engineer	-3.35676	1.77156	.059	-6.8481	.1345
	Consultant	-.49138	1.49703	.743	-3.4417	2.4589
	Other	.21514	1.42258	.880	-2.5884	3.0187
Subcontractor	Owner	-.21930	2.70352	.935	-5.5473	5.1087
	Director	2.87142	1.47515	.053	-.0357	5.7786
	Architect	-8.38596*	3.58663	.020	-15.4543	-1.3176
	Designer	.94737	3.58663	.792	-6.1210	8.0157
	Contractor	1.68875	1.52604	.270	-1.3187	4.6962
	Builder	-.19549	2.55254	.939	-5.2259	4.8350
	Engineer	-1.66802	2.07797	.423	-5.7632	2.4272
	Consultant	1.19737	1.84949	.518	-2.4475	4.8423
	Other	1.90389	1.78977	.289	-1.6233	5.4311
Builder	Owner	-.02381	3.21188	.994	-6.3536	6.3060
	Director	3.06691	2.27666	.179	-1.4198	7.5537
	Architect	-8.19048*	3.98385	.041	-16.0417	-.3393
	Designer	1.14286	3.98385	.774	-6.7083	8.9941
	Contractor	1.88424	2.30997	.416	-2.6681	6.4366
	Subcontractor	.19549	2.55254	.939	-4.8350	5.2259
	Engineer	-1.47253	2.70649	.587	-6.8064	3.8613
	Consultant	1.39286	2.53531	.583	-3.6036	6.3893
	Other	2.09938	2.49207	.400	-2.8119	7.0106

Table A_2.6: Multiple Comparison test of Stakeholder Management with Participants Role [Part II]

Multiple Comparisons

Dependent Variable: Stakeholder Management

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	1.44872	2.84932	.612	-4.1666	7.0640
	Director	4.53944*	1.72791	.009	1.1341	7.9447
	Architect	-6.71795	3.69777	.071	-14.0054	.5695
	Designer	2.61538	3.69777	.480	-4.6720	9.9028
	Contractor	3.35676	1.77156	.059	-.1345	6.8481
	Subcontractor	1.66802	2.07797	.423	-2.4272	5.7632
	Builder	1.47253	2.70649	.587	-3.8613	6.8064
	Consultant	2.86538	2.05676	.165	-1.1880	6.9187
	Other	3.57191	2.00322	.076	-.3759	7.5198
Consultant	Owner	-1.41667	2.68725	.599	-6.7126	3.8793
	Director	1.67405	1.44511	.248	-1.1739	4.5220
	Architect	-9.58333*	3.57438	.008	-16.6276	-2.5391
	Designer	-.25000	3.57438	.944	-7.2942	6.7942
	Contractor	.49138	1.49703	.743	-2.4589	3.4417
	Subcontractor	-1.19737	1.84949	.518	-4.8423	2.4475
	Builder	-1.39286	2.53531	.583	-6.3893	3.6036
	Engineer	-2.86538	2.05676	.165	-6.9187	1.1880
	Other	.70652	1.76509	.689	-2.7720	4.1851
Other	Owner	-2.12319	2.64650	.423	-7.3388	3.0924
	Director	.96753	1.36784	.480	-1.7281	3.6632
	Architect	-10.28986*	3.54384	.004	-17.2739	-3.3058
	Designer	-.95652	3.54384	.787	-7.9406	6.0275
	Contractor	-.21514	1.42258	.880	-3.0187	2.5884
	Subcontractor	-1.90389	1.78977	.289	-5.4311	1.6233
	Builder	-2.09938	2.49207	.400	-7.0106	2.8119
	Engineer	-3.57191	2.00322	.076	-7.5198	.3759
	Consultant	-.70652	1.76509	.689	-4.1851	2.7720

*. The mean difference is significant at the 0.05 level.

Table A_2.7: Multiple Comparison test of Stakeholder Performance Measurement with Participants Role [Part I]

Multiple Comparisons

Dependent Variable: Stakeholder Performance Measurement

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	.35443	2.21119	.873	-4.0033	4.7122
	Architect	-11.00000*	3.69225	.003	-18.2765	-3.7235
	Designer	-3.00000	3.69225	.417	-10.2765	4.2765
	Contractor	-1.63793	2.23927	.465	-6.0510	2.7751
	Subcontractor	-1.47368	2.44525	.547	-6.2927	3.3453
	Builder	-2.71429	2.90505	.351	-8.4394	3.0109
	Engineer	-2.00000	2.57713	.439	-7.0789	3.0789
	Consultant	-.35000	2.43054	.886	-5.1400	4.4400
	Other	.60870	2.39368	.800	-4.1087	5.3261
Director	Owner	-.35443	2.21119	.873	-4.7122	4.0033
	Architect	-11.35443*	3.07142	.000	-17.4074	-5.3014
	Designer	-3.35443	3.07142	.276	-9.4074	2.6986
	Contractor	-1.99236*	.90290	.028	-3.7718	-.2130
	Subcontractor	-1.82811	1.33423	.172	-4.4575	.8013
	Builder	-3.06872	2.05917	.138	-7.1268	.9894
	Engineer	-2.35443	1.56284	.133	-5.4344	.7256
	Consultant	-.70443	1.30706	.590	-3.2803	1.8715
	Other	.25427	1.23717	.837	-2.1839	2.6924
Architect	Owner	11.00000*	3.69225	.003	3.7235	18.2765
	Director	11.35443*	3.07142	.000	5.3014	17.4074
	Designer	8.00000	4.26345	.062	-.4022	16.4022
	Contractor	9.36207*	3.09170	.003	3.2691	15.4550
	Subcontractor	9.52632*	3.24400	.004	3.1332	15.9194
	Builder	8.28571*	3.60327	.022	1.1845	15.3869
	Engineer	9.00000*	3.34452	.008	2.4088	15.5912
	Consultant	10.65000*	3.23292	.001	4.2787	17.0213
	Other	11.60870*	3.20530	.000	5.2918	17.9256
Designer	Owner	3.00000	3.69225	.417	-4.2765	10.2765
	Director	3.35443	3.07142	.276	-2.6986	9.4074
	Architect	-8.00000	4.26345	.062	-16.4022	.4022
	Contractor	1.36207	3.09170	.660	-4.7309	7.4550
	Subcontractor	1.52632	3.24400	.638	-4.8668	7.9194
	Builder	.28571	3.60327	.937	-6.8155	7.3869
	Engineer	1.00000	3.34452	.765	-5.5912	7.5912
	Consultant	2.65000	3.23292	.413	-3.7213	9.0213
	Other	3.60870	3.20530	.261	-2.7082	9.9256
Contractor	Owner	1.63793	2.23927	.465	-2.7751	6.0510
	Director	1.99236*	.90290	.028	.2130	3.7718
	Architect	-9.36207*	3.09170	.003	-15.4550	-3.2691
	Designer	-1.36207	3.09170	.660	-7.4550	4.7309
	Subcontractor	.16425	1.38026	.905	-2.5559	2.8844
	Builder	-1.07635	2.08930	.607	-5.1938	3.0411
	Engineer	-.36207	1.60232	.821	-3.5199	2.7957
	Consultant	1.28793	1.35402	.343	-1.3805	3.9564
	Other	2.24663	1.28668	.082	-.2891	4.7824
Subcontractor	Owner	1.47368	2.44525	.547	-3.3453	6.2927
	Director	1.82811	1.33423	.172	-.8013	4.4575
	Architect	-9.52632*	3.24400	.004	-15.9194	-3.1332
	Designer	-1.52632	3.24400	.638	-7.9194	4.8668
	Contractor	-.16425	1.38026	.905	-2.8844	2.5559
	Builder	-1.24060	2.30870	.592	-5.7905	3.3093
	Engineer	-.52632	1.87946	.780	-4.2303	3.1776
	Consultant	1.12368	1.67281	.502	-2.1730	4.4204
	Other	2.08238	1.61879	.200	-1.1079	5.2726
Builder	Owner	2.71429	2.90505	.351	-3.0109	8.4394
	Director	3.06872	2.05917	.138	-.9894	7.1268
	Architect	-8.28571*	3.60327	.022	-15.3869	-1.1845
	Designer	-.28571	3.60327	.937	-7.3869	6.8155
	Contractor	1.07635	2.08930	.607	-3.0411	5.1938
	Subcontractor	1.24060	2.30870	.592	-3.3093	5.7905
	Engineer	.71429	2.44794	.771	-4.1100	5.5386
	Consultant	2.36429	2.29311	.304	-2.1549	6.8834
	Other	3.32298	2.25400	.142	-1.1191	7.7651

Table A_2.7: Multiple Comparison test of Stakeholder Performance Measurement with Participants Role [Part II]

Multiple Comparisons

Dependent Variable: Stakeholder Performance Measurement

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	1.44872	2.84932	.612	-4.1666	7.0640
	Director	4.53944*	1.72791	.009	1.1341	7.9447
	Architect	-6.71795	3.69777	.071	-14.0054	.5695
	Designer	2.61538	3.69777	.480	-4.6720	9.9028
	Contractor	3.35676	1.77156	.059	-.1345	6.8481
	Subcontractor	1.66802	2.07797	.423	-2.4272	5.7632
	Builder	1.47253	2.70649	.587	-3.8613	6.8064
	Consultant	2.86538	2.05676	.165	-1.1880	6.9187
	Other	3.57191	2.00322	.076	-.3759	7.5198
Consultant	Owner	-1.41667	2.68725	.599	-6.7126	3.8793
	Director	1.67405	1.44511	.248	-1.1739	4.5220
	Architect	-9.58333*	3.57438	.008	-16.6276	-2.5391
	Designer	-.25000	3.57438	.944	-7.2942	6.7942
	Contractor	.49138	1.49703	.743	-2.4589	3.4417
	Subcontractor	-1.19737	1.84949	.518	-4.8423	2.4475
	Builder	-1.39286	2.53531	.583	-6.3893	3.6036
	Engineer	-2.86538	2.05676	.165	-6.9187	1.1880
	Other	.70652	1.76509	.689	-2.7720	4.1851
Other	Owner	-2.12319	2.64650	.423	-7.3388	3.0924
	Director	.96753	1.36784	.480	-1.7281	3.6632
	Architect	-10.28986*	3.54384	.004	-17.2739	-3.3058
	Designer	-.95652	3.54384	.787	-7.9406	6.0275
	Contractor	-.21514	1.42258	.880	-3.0187	2.5884
	Subcontractor	-1.90389	1.78977	.289	-5.4311	1.6233
	Builder	-2.09938	2.49207	.400	-7.0106	2.8119
	Engineer	-3.57191	2.00322	.076	-7.5198	.3759
	Consultant	-.70652	1.76509	.689	-4.1851	2.7720

*. The mean difference is significant at the 0.05 level.

Table A_2.8: Multiple Comparisons test of Construction Project Performance with Participants Role Multiple Comparisons [Part I]

Dependent Variable: Project Performance

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	-1.29630	3.73463	.729	-8.6562	6.0636
	Architect	-19.33333*	6.24154	.002	-31.6336	-7.0331
	Designer	2.00000	6.24154	.749	-10.3002	14.3002
	Contractor	-4.24561	3.78847	.264	-11.7116	3.2204
	Subcontractor	-5.40351	4.13356	.192	-13.5495	2.7425
	Builder	-8.23810	4.91082	.095	-17.9159	1.4397
	Engineer	-9.82051*	4.35648	.025	-18.4059	-1.2352
	Consultant	-7.06667	4.10868	.087	-15.1637	1.0303
	Other	-1.05797	4.04637	.794	-9.0322	6.9162
Director	Owner	1.29630	3.73463	.729	-6.0636	8.6562
	Architect	-18.03704*	5.18971	.001	-28.2644	-7.8096
	Designer	3.29630	5.18971	.526	-6.9311	13.5237
	Contractor	-2.94932	1.52604	.055	-5.9567	.0581
	Subcontractor	-4.10721	2.25002	.069	-8.5414	.3269
	Builder	-6.94180*	3.47741	.047	-13.7948	-.0888
	Engineer	-8.52422*	2.63728	.001	-13.7215	-3.3269
	Consultant	-5.77037*	2.20399	.009	-10.1138	-1.4269
	Other	.23833	2.08553	.909	-3.8716	4.3483
Architect	Owner	19.33333*	6.24154	.002	7.0331	31.6336
	Director	18.03704*	5.18971	.001	7.8096	28.2644
	Designer	21.33333*	7.20711	.003	7.1302	35.5364
	Contractor	15.08772*	5.22859	.004	4.7837	25.3917
	Subcontractor	13.92982*	5.48379	.012	3.1229	24.7368
	Builder	11.09524	6.09112	.070	-.9086	23.0990
	Engineer	9.51282	5.65372	.094	-1.6290	20.6546
	Consultant	12.26667*	5.46506	.026	1.4966	23.0367
	Other	18.27536*	5.41837	.001	7.5973	28.9534
Designer	Owner	-2.00000	6.24154	.749	-14.3002	10.3002
	Director	-3.29630	5.18971	.526	-13.5237	6.9311
	Architect	-21.33333*	7.20711	.003	-35.5364	-7.1302
	Contractor	-6.24561	5.22859	.234	-16.5496	4.0584
	Subcontractor	-7.40351	5.48379	.178	-18.2104	3.4034
	Builder	-10.23810	6.09112	.094	-22.2419	1.7657
	Engineer	-11.82051*	5.65372	.038	-22.9623	-.6787
	Consultant	-9.06667	5.46506	.099	-19.8367	1.7034
	Other	-3.05797	5.41837	.573	-13.7360	7.6201
Contractor	Owner	4.24561	3.78847	.264	-3.2204	11.7116
	Director	2.94932	1.52604	.055	-.0581	5.9567
	Architect	-15.08772*	5.22859	.004	-25.3917	-4.7837
	Designer	6.24561	5.22859	.234	-4.0584	16.5496
	Subcontractor	-1.15789	2.33829	.621	-5.7660	3.4502
	Builder	-3.99248	3.53517	.260	-10.9593	2.9743
	Engineer	-5.57490*	2.71298	.041	-10.9214	-.2284
	Consultant	-2.82105	2.29403	.220	-7.3419	1.6998
	Other	3.18764	2.18047	.145	-1.1094	7.4847
Subcontractor	Owner	5.40351	4.13356	.192	-2.7425	13.5495
	Director	4.10721	2.25002	.069	-.3269	8.5414
	Architect	-13.92982*	5.48379	.012	-24.7368	-3.1229
	Designer	7.40351	5.48379	.178	-3.4034	18.2104
	Contractor	1.15789	2.33829	.621	-3.4502	5.7660
	Builder	-2.83459	3.90272	.468	-10.5257	4.8565
	Engineer	-4.41700	3.17712	.166	-10.6782	1.8442
	Consultant	-1.66316	2.82779	.557	-7.2359	3.9096
	Other	4.34554	2.73647	.114	-1.0472	9.7383
Builder	Owner	8.23810	4.91082	.095	-1.4397	17.9159
	Director	6.94180*	3.47741	.047	.0888	13.7948
	Architect	-11.09524	6.09112	.070	-23.0990	.9086
	Designer	10.23810	6.09112	.094	-1.7657	22.2419
	Contractor	3.99248	3.53517	.260	-2.9743	10.9593
	Subcontractor	2.83459	3.90272	.468	-4.8565	10.5257
	Engineer	-1.58242	4.13810	.703	-9.7374	6.5726
	Consultant	1.17143	3.87636	.763	-6.4677	8.8106
	Other	7.18012	3.81026	.061	-.3288	14.6890

Table A_2.8: Multiple Comparisons test of Construction Project Performance with Participants Role Multiple Comparisons [Part II]

Dependent Variable: Project Performance

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	9.82051*	4.35648	.025	1.2352	18.4059
	Director	8.52422*	2.63728	.001	3.3269	13.7215
	Architect	-9.51282	5.65372	.094	-20.6546	1.6290
	Designer	11.82051*	5.65372	.038	.6787	22.9623
	Contractor	5.57490*	2.71298	.041	.2284	10.9214
	Subcontractor	4.41700	3.17712	.166	-1.8442	10.6782
	Builder	1.58242	4.13810	.703	-6.5726	9.7374
	Consultant	2.75385	3.14468	.382	-3.4434	8.9511
	Other	8.76254*	3.06283	.005	2.7266	14.7985
Consultant	Owner	7.06667	4.10868	.087	-1.0303	15.1637
	Director	5.77037*	2.20399	.009	1.4269	10.1138
	Architect	-12.26667*	5.46506	.026	-23.0367	-1.4966
	Designer	9.06667	5.46506	.099	-1.7034	19.8367
	Contractor	2.82105	2.29403	.220	-1.6998	7.3419
	Subcontractor	1.66316	2.82779	.557	-3.9096	7.2359
	Builder	-1.17143	3.87636	.763	-8.8106	6.4677
	Engineer	-2.75385	3.14468	.382	-8.9511	3.4434
	Other	6.00870*	2.69875	.027	.6903	11.3271
Other	Owner	1.05797	4.04637	.794	-6.9162	9.0322
	Director	-.23833	2.08553	.909	-4.3483	3.8716
	Architect	-18.27536*	5.41837	.001	-28.9534	-7.5973
	Designer	3.05797	5.41837	.573	-7.6201	13.7360
	Contractor	-3.18764	2.18047	.145	-7.4847	1.1094
	Subcontractor	-4.34554	2.73647	.114	-9.7383	1.0472
	Builder	-7.18012	3.81026	.061	-14.6890	.3288
	Engineer	-8.76254*	3.06283	.005	-14.7985	-2.7266
	Consultant	-6.00870*	2.69875	.027	-11.3271	-.6903

*. The mean difference is significant at the 0.05 level.

Table A_2.9: Multiple Comparison test of Construction Sustainability with Participants Role Multiple Comparisons [Part I]

Dependent Variable: Construction Sustainability

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Owner	Director	-1.29630	3.73463	.729	-8.6562	6.0636
	Architect	-19.33333*	6.24154	.002	-31.6336	-7.0331
	Designer	2.00000	6.24154	.749	-10.3002	14.3002
	Contractor	-4.24561	3.78847	.264	-11.7116	3.2204
	Subcontractor	-5.40351	4.13356	.192	-13.5495	2.7425
	Builder	-8.23810	4.91082	.095	-17.9159	1.4397
	Engineer	-9.82051*	4.35648	.025	-18.4059	-1.2352
	Consultant	-7.06667	4.10868	.087	-15.1637	1.0303
	Other	-1.05797	4.04637	.794	-9.0322	6.9162
Director	Owner	1.29630	3.73463	.729	-6.0636	8.6562
	Architect	-18.03704*	5.18971	.001	-28.2644	-7.8096
	Designer	3.29630	5.18971	.526	-6.9311	13.5237
	Contractor	-2.94932	1.52604	.055	-5.9567	.0581
	Subcontractor	-4.10721	2.25002	.069	-8.5414	.3269
	Builder	-6.94180*	3.47741	.047	-13.7948	-.0888
	Engineer	-8.52422*	2.63728	.001	-13.7215	-3.3269
	Consultant	-5.77037*	2.20399	.009	-10.1138	-1.4269
	Other	.23833	2.08553	.909	-3.8716	4.3483
Architect	Owner	19.33333*	6.24154	.002	7.0331	31.6336
	Director	18.03704*	5.18971	.001	7.8096	28.2644
	Designer	21.33333*	7.20711	.003	7.1302	35.5364
	Contractor	15.08772*	5.22859	.004	4.7837	25.3917
	Subcontractor	13.92982*	5.48379	.012	3.1229	24.7368
	Builder	11.09524	6.09112	.070	-.9086	23.0990
	Engineer	9.51282	5.65372	.094	-1.6290	20.6546
	Consultant	12.26667*	5.46506	.026	1.4966	23.0367
	Other	18.27536*	5.41837	.001	7.5973	28.9534
Designer	Owner	-2.00000	6.24154	.749	-14.3002	10.3002
	Director	-3.29630	5.18971	.526	-13.5237	6.9311
	Architect	-21.33333*	7.20711	.003	-35.5364	-7.1302
	Contractor	-6.24561	5.22859	.234	-16.5496	4.0584
	Subcontractor	-7.40351	5.48379	.178	-18.2104	3.4034
	Builder	-10.23810	6.09112	.094	-22.2419	1.7657
	Engineer	-11.82051*	5.65372	.038	-22.9623	-.6787
	Consultant	-9.06667	5.46506	.099	-19.8367	1.7034
	Other	-3.05797	5.41837	.573	-13.7360	7.6201
Contractor	Owner	4.24561	3.78847	.264	-3.2204	11.7116
	Director	2.94932	1.52604	.055	-.0581	5.9567
	Architect	-15.08772*	5.22859	.004	-25.3917	-4.7837
	Designer	6.24561	5.22859	.234	-4.0584	16.5496
	Subcontractor	-1.15789	2.33829	.621	-5.7660	3.4502
	Builder	-3.99248	3.53517	.260	-10.9593	2.9743
	Engineer	-5.57490*	2.71298	.041	-10.9214	-.2284
	Consultant	-2.82105	2.29403	.220	-7.3419	1.6998
	Other	3.18764	2.18047	.145	-1.1094	7.4847
Subcontractor	Owner	5.40351	4.13356	.192	-2.7425	13.5495
	Director	4.10721	2.25002	.069	-.3269	8.5414
	Architect	-13.92982*	5.48379	.012	-24.7368	-3.1229
	Designer	7.40351	5.48379	.178	-3.4034	18.2104
	Contractor	1.15789	2.33829	.621	-3.4502	5.7660
	Builder	-2.83459	3.90272	.468	-10.5257	4.8565
	Engineer	-4.41700	3.17712	.166	-10.6782	1.8442
	Consultant	-1.66316	2.82779	.557	-7.2359	3.9096
	Other	4.34554	2.73647	.114	-1.0472	9.7383
Builder	Owner	8.23810	4.91082	.095	-1.4397	17.9159
	Director	6.94180*	3.47741	.047	.0888	13.7948
	Architect	-11.09524	6.09112	.070	-23.0990	.9086
	Designer	10.23810	6.09112	.094	-1.7657	22.2419
	Contractor	3.99248	3.53517	.260	-2.9743	10.9593
	Subcontractor	2.83459	3.90272	.468	-4.8565	10.5257
	Engineer	-1.58242	4.13810	.703	-9.7374	6.5726
	Consultant	1.17143	3.87636	.763	-6.4677	8.8106
	Other	7.18012	3.81026	.061	-.3288	14.6890

Table A_2.9: Multiple Comparison test of Construction Sustainability with Participants Role Multiple Comparisons [Part II]

Dependent Variable: Construction Sustainability

LSD

(I) Which of the following best describes your role on projects?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Engineer	Owner	1.44872	2.84932	.612	-4.1666	7.0640
	Director	4.53944*	1.72791	.009	1.1341	7.9447
	Architect	-6.71795	3.69777	.071	-14.0054	.5695
	Designer	2.61538	3.69777	.480	-4.6720	9.9028
	Contractor	3.35676	1.77156	.059	-.1345	6.8481
	Subcontractor	1.66802	2.07797	.423	-2.4272	5.7632
	Builder	1.47253	2.70649	.587	-3.8613	6.8064
	Consultant	2.86538	2.05676	.165	-1.1880	6.9187
	Other	3.57191	2.00322	.076	-.3759	7.5198
Consultant	Owner	-1.41667	2.68725	.599	-6.7126	3.8793
	Director	1.67405	1.44511	.248	-1.1739	4.5220
	Architect	-9.58333*	3.57438	.008	-16.6276	-2.5391
	Designer	-.25000	3.57438	.944	-7.2942	6.7942
	Contractor	.49138	1.49703	.743	-2.4589	3.4417
	Subcontractor	-1.19737	1.84949	.518	-4.8423	2.4475
	Builder	-1.39286	2.53531	.583	-6.3893	3.6036
	Engineer	-2.86538	2.05676	.165	-6.9187	1.1880
	Other	.70652	1.76509	.689	-2.7720	4.1851
Other	Owner	-2.12319	2.64650	.423	-7.3388	3.0924
	Director	.96753	1.36784	.480	-1.7281	3.6632
	Architect	-10.28986*	3.54384	.004	-17.2739	-3.3058
	Designer	-.95652	3.54384	.787	-7.9406	6.0275
	Contractor	-.21514	1.42258	.880	-3.0187	2.5884
	Subcontractor	-1.90389	1.78977	.289	-5.4311	1.6233
	Builder	-2.09938	2.49207	.400	-7.0106	2.8119
	Engineer	-3.57191	2.00322	.076	-7.5198	.3759
	Consultant	-.70652	1.76509	.689	-4.1851	2.7720

*. The mean difference is significant at the 0.05 level.

Appendix 3

Interview Questions

To Investigate Stakeholder Engagement and Sustainability-Related Project Performance in Construction
School of the Built Environment

Personal Information

I am a post graduate research student (PhD) at Liverpool John Moores University. I have an academic background as Mechanical Engineer (B.Eng.), Engineering Management (M.Eng.).

General Information

Records from the interviews will be coded and kept secret so that no individuals can be identified in future. The publication of direct quotes from the interviews will not be accredited to named individuals. All types of data and information collected will be treated with security and confidentiality.

Sample list of questions – Interviews

General questions

1. Could you please tell me the background of your organisation? (Data and information will be treated with confidentiality and anonymity.)
2. How long have you been working in the construction industry?
3. Could you please explain your role and in what sort of project are you involve in?
4. Total how many employees work for your company?

Sustainability

1. What do you mean by sustainability?
2. Do you think that you need sustainability in your organisation? And why?
3. Do you (your company) take any action to be more sustainable? And what is that?
4. What influence does your stakeholder have with the concepts of sustainable construction?
5. To what extent do you deliver against sustainability-related targets in your construction-related projects in respect of the TBL?
6. How much influence do your stakeholders have over sustainable design and specification decisions?
7. Do you face any obstacles in implementing the sustainability and what are those? If yes, how do you overcome these obstacles?
8. How do you measure your performance in relation to achieving sustainability related targets? Do you use any KPI to measure the performance? And how?
9. Do you think that adapting Lean Techniques in construction is a way of achieving sustainability in construction? Why?
10. Does your company follow the Lean Techniques? If yes, how?

Stakeholder Engagement

1. Could you please explain what do you mean by stakeholders?
2. Who are your main stakeholders?
3. How do you engage and communicate with your stakeholders?

4. In your opinion what is the most important thing to your stakeholders?
5. Why do you think that you need to engage your stakeholders for better project outcome? And why?
6. What influence do your stakeholders have on your approach to sustainable construction?
7. How do you manage your relationships with the stakeholders? Do you have a formal process for stakeholder identification, analysis and management? If yes, could you please describe? If not, do you undertake any of these processes on an informal basis? If so, how?
8. Do you use any criteria to prioritize your stakeholders such as according to their interests, attitude, power, impact and/or influence to the project?
9. Do you use any KPI to measure the performance of your stakeholders? If yes, how?
10. Have you faced any risk related with your stakeholders? What types of stakeholders risk usually do you face in your company?
11. What type of risks do you face to manage your stakeholders in your company?
12. Do you follow any risk management strategy in your company? What type of risk management strategy has been implemented?

Construction Project Performance

1. What do you mean by Project Performance?
2. What approach do you have to improve the project performance?
3. Do you think that achieving sustainability could improve the Construction Project Performance? If so, How?
4. What influence do your stakeholders have on your approach to Improve the Project Performance?

Appendix 4

Questionnaire

Confidential
Stakeholder Engagement and Construction Sustainability Survey 2012/13

The following questionnaire is part of study being undertaken within the School of Built Environment, Liverpool John Moores University into the sustainability and stakeholder engagement in UK organisations. All responses will be treated in the strictest confidence and results will not be published in any form that allows the identification of individual organisations or respondents. Responses are based on your own experiences; therefore there are no right or wrong answers. All replies are confidential and you are not asked for your name, or your organisation. The questionnaire should take no longer than 15 minutes to complete. Thank you for your time in completing this questionnaire.

Please answer the following questions, as honestly as possible, with **your own organisation/department** in mind.
To answer the questions, please tick the appropriate box that represents **how you feel**.

SECTION A

Stakeholder Engagement
Please indicate your level of agreement with the following statements which relates to stakeholder engagement -

A1: The Purpose of Stakeholder Engagement -					
The purpose of stakeholder engagement on projects is to	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. to share Individual Knowledge	☐	☐	☐	☐	☐
2. to enhance communication	☐	☐	☐	☐	☐
3. for continuous improvement	☐	☐	☐	☐	☐
4. to reduce risk and uncertainty	☐	☐	☐	☐	☐
5. share challenges	☐	☐	☐	☐	☐
6. to discuss current issues	☐	☐	☐	☐	☐
7. to generate innovative ideas	☐	☐	☐	☐	☐
8. to generate solution					

Please indicate your level of agreement with the following statements which relates to the Impacts of Stakeholder Engagement –

A2: Impacts of Stakeholder Engagement-					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. You engage all people internally/externally linked with your project as stakeholders	☐	☐	☐	☐	☐
2. In construction there are different stakeholders with different needs	☐	☐	☐	☐	☐
3. Stakeholder engagement is the process of exchanging information	☐	☐	☐	☐	☐
4. You engage with selective people as stakeholders to your project	☐	☐	☐	☐	☐
5. Stakeholder engagement is the process of sharing pain from the project outcome	☐	☐	☐	☐	☐
6. Stakeholder engagement is the process of creating innovative ideas	☐	☐	☐	☐	☐
7. Stakeholder engagement emphasizes different issues that are important to the various people involved in a project	☐	☐	☐	☐	☐

8. Building partnerships is a good approach for involving stakeholders in the engagement process	☐	☐	☐	☐	☐
9. A "Stakeholder Register" is a useful tool to analyse the key project stakeholders	☐	☐	☐	☐	☐
10. Stakeholder engagement is a powerful mechanism to identify new business opportunities	☐	☐	☐	☐	☐
11. Stakeholders are generally very supportive of the need to reduce energy emissions	☐	☐	☐	☐	☐
12. Stakeholders are generally very supportive of a carbon management plan	☐	☐	☐	☐	☐
13. Stakeholders are the sources of different project issues	☐	☐	☐	☐	☐
14. By effectively engaging stakeholders we lower the risk for each relationship	☐	☐	☐	☐	☐
15. Stakeholder engagement helps to manage relationships by aligning mutual interests, which mitigate project risk/uncertainty	☐	☐	☐	☐	☐
16. Stakeholder engagement is a powerful mechanism to facilitate collaborative working	☐	☐	☐	☐	☐
17. Engaging stakeholders helps to improve the productivity	☐	☐	☐	☐	☐
18. The project manager needs to analyse how the project itself influences the needs	☐	☐	☐	☐	☐
19. It is better to engage with a small number of key stakeholders rather than with all	☐	☐	☐	☐	☐

Please indicate your level of agreement with the following statements which relate to how you communicate with stakeholders to your projects -

A3: Communication with Stakeholders					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. I like to have face-to-face meetings with the particular stakeholders	☐	☐	☐	☐	☐
2. I communicate with stakeholders through IT Systems	☐	☐	☐	☐	☐
3. I like to communicate with stakeholders privately to discuss issues	☐	☐	☐	☐	☐
4. I communicate with stakeholders through formal meeting	☐	☐	☐	☐	☐
5. Our all Stakeholders have a medium to provide feedback to the project	☐	☐	☐	☐	☐
6. Communicating with different stakeholder helps to expose different thoughts and knowledge	☐	☐	☐	☐	☐
7. Communicating with stakeholders at the early stages of the design process can provide innovative, high-quality solutions at competitive prices	☐	☐	☐	☐	☐
8. Keep stakeholders informed as the project progresses by sending updated information is an important approach of engaging with them	☐	☐	☐	☐	☐
9. Communication with different stakeholders helps to prioritise their needs	☐	☐	☐	☐	☐

Please indicate your level of agreement with the following statements which relates to how you deal with the stakeholders to your projects -

A4: Stakeholder Analysis					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. Stakeholder identification helps to find out who has unique knowledge related to any aspect of the project	☐	☐	☐	☐	☐

2. Project managers should identify the stakeholders as early as possible in the project life cycle	☐	☐	☐	☐	☐
3. The needs of different stakeholder should be prioritized depending on each stakeholders potential to influence project objectives	☐	☐	☐	☐	☐
4. I prioritize stakeholders according to their responsibilities to the project	☐	☐	☐	☐	☐
5. I prioritize stakeholders according to their impact to the project	☐	☐	☐	☐	☐
6. I prioritize stakeholders according to how urgent they see the project interest in	☐	☐	☐	☐	☐
7. I prioritize stakeholders according to their power to influence the project outcome	☐	☐	☐	☐	☐
8. Internal Stakeholders are prioritized above external stakeholders	☐	☐	☐	☐	☐
9. I prioritize stakeholders demand for the project	☐	☐	☐	☐	☐
10. Stakeholder analysis helps to evaluate different stakeholders power	☐	☐	☐	☐	☐
11. In order to ensure the quality of the decision-making processes, stakeholder analysis is useful	☐	☐	☐	☐	☐
12. Stakeholder analysis is useful to find innovative solutions to problems	☐	☐	☐	☐	☐

Please indicate your level of agreement with the following statements which relates to how you deal with the stakeholders mapping to your projects –

A5: Stakeholder Mapping					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. Stakeholder mapping is a simple technique to make sure anyone important in the project planning process is not missed out	☐	☐	☐	☐	☐
2. Stakeholder mapping helps to find out the relationship between the stakeholders	☐	☐	☐	☐	☐
3. Stakeholder mapping helps to find out the stakeholders relationship with the project activities	☐	☐	☐	☐	☐
4. Stakeholder mapping is a simple technique to make sure anyone important in the designing the project is not missed out	☐	☐	☐	☐	☐
5. Stakeholder mapping helps to understand what the key stakeholders are looking for as an outcome of the project	☐	☐	☐	☐	☐
6. Stakeholder mapping is a simple technique to make sure anyone important in the project implementing processes not missed out	☐	☐	☐	☐	☐

Please indicate your level of agreement with the following statements which relates to how you deal with the stakeholders management to your projects -

A6: Stakeholder Management					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. Stakeholder management is an effective approach for Stakeholders Engagement	☐	☐	☐	☐	☐
2. Stakeholder management helps to deal with conflicting among stakeholders views	☐	☐	☐	☐	☐
3. Stakeholder management can assist in reducing the risk	☐	☐	☐	☐	☐
4. When stakeholders are managed properly they will be more motivated to the project	☐	☐	☐	☐	☐
5. Stakeholder management system promotes learning from past experiences	☐	☐	☐	☐	☐
6. On the job training in key areas is important for all contractors	☐	☐	☐	☐	☐

7. Stakeholder management is important for project success as it involves external	☐	☐	☐	☐	☐
8. Stakeholders need academic training to improve their sustainability knowledge	☐	☐	☐	☐	☐
9. Developing good relationship with stakeholders makes it easier to manage them	☐	☐	☐	☐	☐

Please indicate your level of agreement with the following statements which relates to how you deal with the Stakeholders Performance Measurement to your projects -

A7: Stakeholders Performance Measurement					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. It is important for a project to choose the correct Key Performance Indicators [KPIs] for stakeholder performance	☐	☐	☐	☐	☐
2. It is useful if the project managers, employees and other members of the teams are aware of the specific KPIs to be measured	☐	☐	☐	☐	☐
3. A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated responsibilities	☐	☐	☐	☐	☐
4. Evaluating individual performance assists in finding out the individuals qualities which is important	☐	☐	☐	☐	☐
5. KPIs need to measure the stakeholders capabilities to operate and enhance the different processes	☐	☐	☐	☐	☐
6. Measuring stakeholder performance helps to improve project performance	☐	☐	☐	☐	☐
7. A KPI is a quantifiable metric that reflects how well a stakeholder is performing against stated objectives	☐	☐	☐	☐	☐

SECTION B

Please indicate your level of agreement with the following statements which relates to what you feel about the Construction Sustainability to your projects -

B1: Construction Sustainability					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. My company have the approach to evaluate the outcomes of sustainable development	☐	☐	☐	☐	☐
2. Application of a Lean technique in construction improves project quality	☐	☐	☐	☐	☐
3. Application of a Lean technique in construction delivers projects on time	☐	☐	☐	☐	☐
4. Application of a Lean technique in construction delivers projects to budget	☐	☐	☐	☐	☐
5. Sustainable construction manage cost/quality/risk/procurement together to improve project performance	☐	☐	☐	☐	☐
6. Measuring sustainability performance helps to highlight opportunities to improve	☐	☐	☐	☐	☐
7. Working together with stakeholders in the initial stages of a project can provide innovative solutions at affordable prices	☐	☐	☐	☐	☐
8. Sustainable buildings minimise energy use	☐	☐	☐	☐	☐
9. Sustainable buildings minimise construction waste/pollution	☐	☐	☐	☐	☐
10. Sustainable buildings maximize re-use of materials	☐	☐	☐	☐	☐
11. Sustainable construction leads to short/long-term cost reductions	☐	☐	☐	☐	☐

12. Sustainable construction results in short/long-term increase in energy/resource efficiencies	☐	☐	☐	☐	☐
13. Risk management helps to create better value through the management of different threats/opportunities	☐	☐	☐	☐	☐
14. Risk management helps to get better understanding of different issues related to environmental/social/ economic/operational/strategic issues	☐	☐	☐	☐	☐
15. Construction sustainability approach consider environmentally sensitive areas during construction to protect the ecosystem	☐	☐	☐	☐	☐
16. Environmental impacts (energy use, CO2 emissions and non-renewable materials) have a major influence on the construction of the finished product	☐	☐	☐	☐	☐
17. Construction sustainability target compresses the project time that helps to add value in our project environments	☐	☐	☐	☐	☐
18. Sustainability target manage project time to improve the work effectiveness through prioritizing tasks into crucial areas	☐	☐	☐	☐	☐
19. Sustainability target improve the quality of life to aim for getting better project management performance	☐	☐	☐	☐	☐
20. Waste management helps to achieve acceptable environmental quality	☐	☐	☐	☐	☐
21. Managing construction waste helps to manage project cost	☐	☐	☐	☐	☐
22. Managing construction waste helps to achieve better resource management	☐	☐	☐	☐	☐
23. Reducing construction waste helps to lower the carbon emissions during the construction phase	☐	☐	☐	☐	☐
24. Managing waste helps to improve productivity	☐	☐	☐	☐	☐
25. We focus on safety as an aspect of achieving social sustainability in construction	☐	☐	☐	☐	☐
26. It is important to provide local employment as an aspect of our construction activity	☐	☐	☐	☐	☐

B2: Drivers that motivates sustainability in construction sector are -					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. to address adverse effects of climate change	☐	☐	☐	☐	☐
2. to consume less energy	☐	☐	☐	☐	☐
3. to reduce waste	☐	☐	☐	☐	☐
4. to provide durable structure	☐	☐	☐	☐	☐
5. to meet building regulation	☐	☐	☐	☐	☐
6. to satisfy customer demand	☐	☐	☐	☐	☐
7. to improve the quality of life	☐	☐	☐	☐	☐
8. to contribute to the economic development	☐	☐	☐	☐	☐
9. to develop innovative structure	☐	☐	☐	☐	☐
10. to reduce pollution	☐	☐	☐	☐	☐
11. to protect biodiversity	☐	☐	☐	☐	☐
12. to meet pressure from competitors					

B3: Barriers to implement sustainability in construction are -					
	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. a lack of client awareness	☐	☐	☐	☐	☐
2. a lack of sustainability knowledge	☐	☐	☐	☐	☐
3. no affordable solutions	☐	☐	☐	☐	☐
4. the industry being unwilling to accept change	☐	☐	☐	☐	☐
5. adverse political situation	☐	☐	☐	☐	☐

6.	unfavourable government rules/regulations	☐	☐	☐	☐	☐
7.	a lack of demand from clients	☐	☐	☐	☐	☐
8.	the absence of incentives	☐	☐	☐	☐	☐
9.	the nature of the construction industry	☐	☐	☐	☐	☐
10.	disorganised construction supply chain	☐	☐	☐	☐	☐

SECTION C

Please indicate your level of agreement with the following statements which relates to what you feel about the Stakeholder's Impact on sustainability of your project -

Stakeholder's Impact on sustainability	strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1. Internal Stakeholders (i.e. employees, managers) are more motivated to achieving sustainability related target than external stakeholders (i.e. shareholders, community members, government agencies, and media)	☐	☐	☐	☐	☐
2. The External Stakeholders (i.e. customers, contractors, sub-contractors and suppliers) are more motivated to achieve the sustainability target than the internal stakeholders	☐	☐	☐	☐	☐
3. Most of the innovative ideas on sustainability are generated from the internal stakeholders within the organisation	☐	☐	☐	☐	☐
4. In our organisation stakeholder like Government, Regulatory Bodies, Local Community and Media are more supportive to our sustainability target.	☐	☐	☐	☐	☐
5. External Stakeholder (i.e. customers, contractors, sub-contractors and suppliers) comes up with more innovative, creative ideas than the Internal Stakeholders	☐	☐	☐	☐	☐
6. We increase sustainability knowledge amongst all stakeholders to encourage and support the sustainability capacity	☐	☐	☐	☐	☐
7. On my projects all stakeholders collaborate to generate ideas in order to reduce the project risk	☐	☐	☐	☐	☐
8. All of my project stakeholders work together so that it motivates them to deliver sustainable buildings in an affordable price,	☐	☐	☐	☐	☐

Please indicate your level of agreement with the following statements which relates to how you feel about the Items to Measure Construction Project Performance -

SECTION D

Items to Measure the Construction Project Performance		strongly agree	slightly agree	neutral	slightly disagree	strongly disagree
1.	Generally our projects are successful to meet the time objectives	☐	☐	☐	☐	☐
2.	We are usually good at delivering projects within budget	☐	☐	☐	☐	☐
3.	We usually meet our environmental sustainability goals on project	☐	☐	☐	☐	☐
4.	Our projects usually result in tangible benefits for the organisation	☐	☐	☐	☐	☐
5.	Generally customers of our project are satisfied with the outcome	☐	☐	☐	☐	☐
6.	Our Project specifications are usually met by the time of handover	☐	☐	☐	☐	☐
7.	We usually meet our economic sustainability goals on project	☐	☐	☐	☐	☐

8. Our key stakeholders are usually happy with the way our projects are managed	☐	☐	☐	☐	☐
9. Project team members are usually happy working on projects	☐	☐	☐	☐	☐
10. There are clearly identified in tangible benefits from the projects we carry out	☐	☐	☐	☐	☐
11. End users are usually happy with the results from our projects	☐	☐	☐	☐	☐
12. Stakeholders work together to deliver sustainable buildings that are affordable; which is the most effective way of operating on my projects	☐	☐	☐	☐	☐
13. We usually meet our social sustainability goals on projects	☐	☐	☐	☐	☐
14. We usually employ an effective project management process	☐	☐	☐	☐	☐
15. Overall, we are very successful at projects	☐	☐	☐	☐	☐

What do you consider your organisation's main strategic focus? (*please tick one box only*)

Efficiency/Cost reduction ☐ Quality ☐ Innovation ☐ Customer Satisfaction ☐ Cost reduction ☐
Other (please specify) ☐

Finally, a few questions about yourself

These questions are being asked so that comparisons can be made between different groups of respondents.
All responses will remain confidential, with no individual being identified.

What type project do your company involved with –

Development of Building Project ☐
Construction of Roads and Railways ☐
Construction of Other Civil Engineering Project ☐
Building Competition and Finishing ☐
Other Specialised Construction Activities ☐
Construction of residential and non-residential Building ☐
Construction of Utility ☐
Demolition and Site Preparation ☐
Electrical, Plumbing and other Construction Installation Activities ☐

Which department in the organisation do you work for?

……

What is your job title?

……

Which of the following best describes your position in the organisation? (*please tick one box only*)

Executive/CEO/Director ☐ Junior Manager ☐
Senior Manager ☐ Supervisor ☐
Middle Manager ☐ Front-line employee ☐
Other (please state) ☐ ……

How long have you been with the organisation? ……years

How long have you been in your current role?……years

If you have any other comments please add them over the page.

Thank you very much for your time, your thoughts is very greatly appreciated.

Please return the completed questionnaire to:

Regards,
--Menoka Bal
PhD Student
School of Built Environment
Liverpool John Moores University
Byrom Street,
Liverpool, L3 3AF
United Kingdom
Ph. No. - 0044 151 23 14 149
Mob. - 07847014406

Appendix V

Familiarising with the data

Interviewer – Could you please tell me about your organisation i.e. its business, customers, turnover, number of employees?

Interviewee - Okay, our organisation is a registered social housing builder. We have 55000 properties and we operate substantially in north, we have got branch offices Newcastle, Liverpool and midlands. We part of our organisation was a English church is a housing group. And they substantially cover to support the housing and we have wide distribution of supported housing. So we have got an office in Dagenham and as well as in Bristol. We have quite a large distribution, we have got about 2000 employees local authority area and we have got a range of skills and expertise. But our prime focus is housing management. We have separate department here in speak they deal with development and construction but we don't have directly employed architects, engineers and surveyors. They have project manager and they appoint and employ construction professionals.

Interviewer – who are your main customers?

Interviewee - Our customers are the members of public. Very often local authority has rights to nominate residents for the homes and we also develop shared properties and properties right in other words other member of the public who want to take part apart from the rent purchase property.

Interviewer –and the number of employees, do you employ local people?

Interviewee - yes we employ mostly the local people.

We got some system director work in speaks travel from Fleetwood, and a colleague travels from Birkenhead so we got people around the corner so it is wide and varied.

Interviewer – How long have you been working in the construction industry?

Interviewee – I have experience of 30 years in construction. I am a Builder.

Interviewer – Could you please explain your role and what sort of projects you are currently involved in and have been involved with in the past?

Interviewee - I am a project manager, developing two flatted schemes and I have another role in quality and value to assist colleagues, so with just quality and value. My 2 projects are on site.

Interviewer - Do you think that sustainability is important to your organisation in terms of its construction project activities? If yes would you please explain why?

Interviewee - There is a situation of general sustainability economical meeting, generally high level sustainability. These are the sustainability issues meeting about the carbon agenda reducing the use of fossil fuel. I just mindful we sometime use sustainability to mean the reduction of the use of carbon. Generally across the industry when someone talking about the sustainability, you know combining the power district heating and general stuff rather than just simply well this project stuck up and have we got 60 year life.

Interviewer – So that's the main aim to make it longer the building whole life cycle.

Interviewee - That's another fact of the HCA who want us to look at all of that because the maths behind it extremely complicated and depended on too many impoundable too many issues.

Interviewer – what about the environmental and social issues?

Interviewee - Just environmental if you looking at whole life cycle cost of the component there is a whole raft of issues that need to be take into account. As well as complicated math behind it, so it is the influence of making minor changes may or may not have profound effect. Instead of the economy could jeopardise any good reason, so the ethical say of making decision best in whole life cycle cost in my view are very spurious. I just think its got the rigour given the variation and we must involve.

Interviewer – To what extent do you deliver against sustainability-related targets in your construction-related projects in respect of the TBL?

Interviewee - Yes, because we have to. One of our key drivers is specifically to create long term impact on any of our development in the area. So we do a design brief and we look at the risk of the design in a project high level. One of the contributors in that discussion is local authority support. So we don't move anywhere, we want our local authority's support. They undertake the detail housing action plan and identify what housing is required in what area. How many how much what type? And we work with them to help to supply that based on their support and their priorities HCA for grand funding. So when our project are rooted and grounded in local sustainable development, on top of all of that the 2nd root is they have got to be qualified for a grand, they got to be other design standard that matches design standards for the HCA design and they got to be the level called sustainable homes lifetime, home secure about design so the houses are of a that nature, that quality.

Interviewer – Do your all project focus on environmental, economic and social issues?

Interviewee - we really recommend to look at the code of sustainable homes which was previously known as the eco homes considered by HCA; we are currently working in core level 3 and we are trying to achieve the core level 4 even though the minimum requirement is 3, so it exceeds our minimum demand. If you look at what standards' are, you will find that covers local economic sustainability issues. So if you comply with that they are meeting the targets.

Interviewer – Do you take any actions to be more sustainable in these activities? If yes, what are they? If no, do you have any plan to take any actions in near future?

Interviewee - Extra over issues? We always take customer satisfaction surveys. You need to look more closely what they demand on the HCA because that necessity to take customer satisfaction surveys and that just not in the actual design of the house. Its customer choice item as well but also in the local Neighbourhood as to how a scheme is developed, so meeting combine tunnels to make sure to satisfied local residents group needs in terms layout, in terms of the nature and type of the accommodation in the 10 year. Again we work with the local authority that does their all survey to come up with those demands. As for example the need for bungalows and the mobility bungalow how many, where that should be. So we work with that and in compose those requirements in our design is driven by the quality and nature of what we produce because without that we won't get grand funding.

Interviewer – Do you follow this approach because it's the part of the sustainability?

Interviewee - Again 6years ago it was absolute you had to but subsequently that was a condition of funding. We are one of the key drivers and leave us in that; we produce our own method of statement how we are going to achieve it in construction. Subsequently the HCA have back to way from that and why not insisting on that alone. However there are all the drivers which come along i.e. in your procurement rules we got procure building in a certain way and that leave us to work in frameworks and in element with integration. Also we have an economic sustainable model which is more cost effective. Within this model we always follow the key drivers of the lean which is standardisation. So we are seeking to produce standard design and standard specification in our product selection. So a lot of the stuff in lean agenda is quietly going on may be not perceiving as a key driver.

Interviewer– Why it's not a key driver?

Interviewee – We do it but it's in the background. Standardisation for example, we might not be demanding specific measure on how standard the product is, but we know that to get cost effectiveness how standardisation little box we are.

Interviewer – Do you face any obstacles in implementing sustainable construction? If yes, how do you overcome these obstacles?

Interviewee – Yes okay. I really recommend you to look at the code of sustainable in counters homes which is before that was echo homes. Now if we took that as a measure might have what I have said it is less of our houses are that standard funding. So next the HCA demanded greater increase in the instead of level 2, we are currently working in core level 3. We are expecting next year to be looking at 4 carried on the 3 but from 2 to 3 echo home excellent to 3 is a further improvement. I need it because we are going 2 to 3, it need to encore additional cost, we manage that so the rest of industry, we would be able to accommodate those cost.

Interviewer – How did you overcome it?

Interviewee - Well, The first you do it is very expensive. Then it becomes cheaper because it becomes normal. And there is an element of that, also in basis of comparison if everybody has to comply to the same standard then the standard cost increase slightly. So everybody's cost increase slightly so we still getting grand funding on the increased cost for an increased standard of product that's why everybody does the same. So it's on what you comparing it when it increased cost, when it what's the benchmark, everybody's benchmark increased. So percept all these were still efficient, all everybody's cost increase but we still efficient. If you compare the rest of the market with the same product and the danger is comparing with the pairs are increase sustainable products against the product just bearing with building rags is quite different and the cost would be different. But if you comparing the improve product against an improve product then you can compete.

Interviewer – What about the competitor because they are also thinking about the sustainable?

Interviewee - well just told in a minute who you comparing with who is your competitor. We are not competing with bellway, retro homes, and person in homes etc. who are building for general public, because they are building to building rag we are building to high standards. However we are competing against others ourselves or just the social unloads but they have competed at the same standards, we are producing. However, local authorities tend to zone their action areas ourselves because of the zones, so we got to demonstrate the value for money at the high standards. So you got to be very careful when you ask the question about who are your competitors we have the housing associations public different zones to different areas.

Interviewer – How do you measure your performance in relation to achieving sustainability related targets on your projects?

Interviewee – Well, 7 years ago the governments introduce the headlines KPI. We still got a formal KPI, we still benchmarking, use these KPI's to measure sustainability performance. We monitor the performance, they are regularised to bring them in line to make them comparable with other section of the industry. So the make a judgement for the size of the project, make a judgement for the length of the project, make a judgement for those factor, the change the nature of one project against the other project. So we also measure second performance indicator in terms of things like tenancies satisfaction again we got that is a key driver; we select the indicators which indicates into those particulars areas that requires further improvement action.

Interviewer – So all these key drivers varied for project to project?

Interviewee – Yes we do it on annual basis we look at the each project we are doing headlines every year.

Interviewer – Who are your main stakeholders in respect of sustainability? In your opinion what are the most important things to these stakeholders in terms of sustainability-related project outputs and outcomes?

Interviewee – See we regard our stakeholders in wide range because we got to be working with local authorities and their housing demands and requirements. So they are key drivers what close to the local authorities within work in 2 elements our housing management who manage the states, who manage the building who manage the Benz and we are looking at working with managing key stakeholders are residents representative so we have federation of tenant as for example and they do feed us valuable information and we do survey of residents. We have to shortly move in so we also take snap of survey random resident of the 12 month period who has been residents for 10 years more just to see what they are thinking, what are they doing.

Interviewer – what about the other contractors, suppliers? You just mention the tenants, do you survey them?

Interviewee – We don't survey tenant, if you ask the builder what do you think about your client "oh fantastic client" you never going to say the rubbish because they would not get any more work. We get a massive interest to keep our client sweet.

Interviewer – you have contractor, subcontractor, do they impact on your sustainability target by giving any feedback?

Interviewee – The nearest we would get to that element is to look to measure and identify how many defect we are getting and how rework item and slangs that our clark, so if ur builder is dandy workmanship that would be flacked up with would be recording on regular basis.

Interviewer – so do they have any requirement as an outcome related to the sustainability?

Interviewee – No

Interviewer – suppose like suppliers giving any advice that it would be better if you do like that?

Interviewee - there are occasions partnering environment and we would do an exercise of value engineering and all those circumstances they would come to with suggestions to change the specification and make it more cost effective so we would be looking at that.

Interviewer – How do you engage and communicate with the stakeholders?

Interviewee - we have regular liaise and meeting with local authorities monthly basis to find out what is happening in the area regarding development and hand over and new project issues that is caring problems with CPO day to day stuff like that, we have monthly meeting on site with our builder and the design team and the ends of the project we have a post completion review meeting identifying what is good and what is bad.

Interviewer – How do you manage your relationships with the stakeholders? Do you have a formal process for stakeholder identification, analysis and management? If yes, could you please describe? If not, do you undertake any of these processes on an informal basis? If so, how?

Interviewer – if we take local authority they have very little direct individual involvement with the particular project but they certainly have a lot of influence in that sense of power for us to get the project of grand in the first place because we are looking at meeting the strategic meets, so we have constantly liaise on meeting and say we can help to achieve the strategic goals but that's not individual project control that a strategy level. And we always do stakeholder mapping because it shows the interest and who has the ability to influence the project outcome or who can influence to make the whole thing improve.

Interviewer – what about the other stakeholder's contractor and subcontractors?

Interviewee – We have got a framework of principle constructors, framework of building professionals and we have regular meeting with them to identify and in considering issues on outstanding matters.

Interviewer – What influence do your stakeholders have on your approach to sustainable construction?

Interviewee – there are couple of possibilities for example developers come to us, constructor come to us with opportunities and providing the strategic requirements than we would do agree development with them directly so they are bringing to us opportunities and they are meeting our need directly.

Interviewer – they are also thinking about this?

Interviewee - They are no and offering for example a volumetric approach and saying we can do this we can reduce time and site and this is the deal and so people come to us with offering this means quality standard home 4, it's a very good price, other come to us development opportunities and I have to decide in such and such an area, it's for 150 houses and we would like to deal with it 75 for rent and rest for ourselves to bring us opportunities like that.

Interviewer – What obstacles do you face in using Stakeholder Management to achieve sustainability-related goals? How do you overcome them?

Interviewee – we take to engage with our resident group, we take lot of effort and energy goes in to giving them a voice giving them the opportunities to comment to take regular soundings and feedback from our each resident at completion of the project, so we get direct feedback on the closure of the rebuild of the project. Difficulty not really, I mean we just work hard and making sure that we ask the questions and take the information, ensuring the sustainable development through managing the stakeholder's knowledge provides ideas, resources and helps to communicate that could motivate everybody to bring environmental, economic and social benefits.

Interviewer – Do they differed with you, give any negative advice?

Interviewee – very rare it's because of send it before construction team and wanted to please client so it's more about the positive approach now ok its occasionally it will say to the architect that detail not work it needs to be redesign or we have taken to ourselves it to redesign because you are offering it's not right but that not often it's usually small element of the design detail in how things put together for example. But it's not usually a criticism or such, it's not easy to get critique that is useful other than at our closed end of project review meeting close contact, appraisal meeting and we say we want 3 suggestions things that work well, 3 things that work we list them together and send to the feedback. So we do push them to get good and bad feedback. There are also disadvantages to engage stakeholders. Involving stakeholders often takes long time. Depending on the project timeline, we don't get sufficient time to engage stakeholders. And again, if we include the stakeholders but don't agree with their advice, it could rise complain that hasn't been met, which can lead to cynicism and reduce morale.

Interviewer - How important is effective stakeholder management to the achievement of sustainability-related objectives on your projects? Please explain your answer.

Interviewee – I think without, there is absolutely no point building houses wrong place in the wrong area obviously we need to make sure that we are building what is required what the nation can afford. How do we do that? Yes we listen to feedback it's important. I am not sure about that. Over the years there is an innovation didn't come from industry and yes innovation has come to solve specific problem like developing a new boiler more efficient boiler system and some affordable tapes to produce electricity that type of primary innovation has come about and is continue to come about. But very little actual innovation has come from the industry to say this is new we are working we can save your build cost by 20% if you adopt this approach. A lot of it comes has from the client, ourselves another making effort to try and change stuff we are doing and go to the market place and ask for try to price things differently and push things to happen.

Interviewer - Your clients means?

Interviewee – I am not saying all comes from them, I am saying that the Govt. would make a requirement for as for example Egan agenda, so we had go away and push the industry and say you got to help us with this to cope with us the way we dealing with it of you go the industry didn't come to us if you do it this way it's been driven your mirror substantially.

Interviewer – What type of risks (threats and opportunities) related to sustainability do you typically encounter during construction (considering the TBL)? Do you follow any risk management strategy in your company to identify, analyse and control these risks? If so, please describe.

Interviewee - Yes we do the risk management we do strategic risk, we look at the risk of a project, we look at the funding risk, we look at risk of a whether the houses if we going

to sell part, we look that all those risk of site and do the high level risk assessment right day 1, we have a an account package which looks at the viability of the project once we factoring all the cost. So we do financial assessment and we take that very seriously and the company we look at that very carefully and each project are signed out by director. So it is viability financially is very important on the strategic level, directors get together and identify the company objectives for the year and we make sure that we don't over extend ourselves in development and don't take on too many risky development and so strategically director take great pain to make sure our business is put on risk then come down to individual project look on individual once we look on individual project, project managers regularly or monthly check the cash flow on monthly basis and our series of financial viability checks that key stages through the life of the project.

We start up with the strategic risk of the project we consider the overall risk of the project or is it too risky. So we make a value judgement very earlier on. Once the project is been accepted it's been worthwhile to presume funding again we would validate again the cost to make sure the actual cost is working on against and we would do for example a detail site investigation, this top survey all that stuff to make sure whole cost is covered and a financial model is developed. When we go to site to sign a contract we make sure that the contract sign is compatible and has to change. During each project meeting we look at risk, we have a risk register for commence in very early stages through the design process and life trough risk register is checked and the ownership of risk is assigned.

Interviewer – How do you manage these risks? What obstacles do you face in using Risk Management to achieve sustainability-related goals? How do you overcome them? How important is effective risk management to the achievement of sustainability-related objectives on your projects? Please explain your answer.

Interviewee - We have contingencies and we make sure that we comply with the budget, if we going over we do value engineering take something out to comply with the budget. We do Value Engineering to find out how to reduce the cost. We have a green route biomass boiler and affordable green timber roof. Everything is very sustainable; we try to provide affordable plastic windows and doors. The biomass boiler goes and we are trying to achieve the core level 4 even though the minimum requirement is 3 it is exceed our minimum demand.

Interviewer – What about the delivery problem? Delivery of the material in the middle of the project?

Interviewee – All the time, every day. We always have problem, pipe not found, drains not discovered, across the delay, windows, doors are not is not fitting, it's an issue we come across the problem all the time but it's a part of the project management isn't it?

Interviewer – Does it impact on the completion of the project?

Interviewee – No, because we have regular meeting, we discussed what we want to do.

Interviewer – If you finished the project in 3 months?

Interviewee - Occasionally stuff happen you don't expect, and you can't get a power supply all the time there is delay there is something. I have one project local authority come through delay a legal relay with a power authority we can get electricity on so we can have no electricity it's not our fault entirely due to the local authority and power Supply Company. Eventually you got the thing right and finalized on board and we got delay the project that's the nature of the thing.

Interviewer – Do you face any issues with stakeholder management?

Interviewee – We take regular meeting, we take regular survey and the end of the individual project we take a survey of the moved in to the problem. Not particularly I mean residents have a difficulty or problem or complain if something goes wrong, if boiler failed and if it's not repaired within reasonable time, they will go to complain. So we put in train and new system managing defects, because we want to improve customer satisfaction.

Interviewer - What sort of risks do you face in relation to your interaction with your stakeholders? Do these risks impact on sustainability?

Interviewee - I think in principles everybody sees risk management is a good thing; the problem is how it is interpreted because it's a notional thing. Risk register is just a list of things that might go wrong, there is a factor, there is a waiting's, whether you multiply the probability with impact, whether you add them together or multiply whatever. All we are trying to do to produce an early warning system, rating the risk. Some use traffic light, some use numbers, so it's really matter. But you can get very energize by looking at numbers and trying to relate probability with the impact with your risk plot or put the cost what it looks like who has ownership at all. If we didn't want any risk you could build without risk to the client but the cost would reflected and the time would reflected. So we are trying to do things, we are trying to have the both ways, we are trying to have cheap project within the middle of period of time, what I am saying is life is like that.

Interviewer – When you think about the cheapest could you able to deliver the quality project?

Interviewee - Of course that's possible, that's where skills come into it. We need to push work with quality builder who want to work with us. For that reason we have sustainable materials framework where we have list of standard product that we have worked with at to get the cheap and best price possible and then we standardise those products and call them off for which so what I am saying we can get a very good price and still maintain a very good product.

Interviewer – Do you practice Value Management on your projects, either formally or informally? If yes, how? Do you involve your stakeholders in any Value Management practices?

Interviewee - I think the thing we have to what term, how we measuring the value, people often recognise that the cheapest price isn't necessary the lowest price in other words in

the long run, so you can have a cheap product which have loads of problems and then surprise it cost more in the long run. How do you actually measure that to put it into practise and so it comes back into asking. We could get survey on 100% satisfaction we can give them everything they wanting but at what cost, so another words if we through enough money on it satisfaction, another word we could buy satisfaction. But it cost lots of money. We could do it totally risk free at riverside but we have to pay for that. So it's all in this element of delivering value against cost and so you can't this regarding triangle cost, time, quality all time put in contact. Cost is simple because it has some number attached. How do you measure value? Because value does not come with number attached, it's subjective, it's a feel factor, at the end of the day. So you cannot, its very hard to relate it to a number and cost. No we have suavity, we put some number against it customer satisfaction. We have 93% customer satisfaction. It does not mean at least what? What is satisfaction? Does that mean every individual resident percentage of what? When you say you are satisfied, do you mean really satisfied, do you mean big satisfied? Its qualitative value measurement, its virtual minimums. So if you could get very cheap product and most people just very satisfied, you know how to play with a number, you could get 90% satisfaction. Oh its fantastic value measurement, value itself is slightly meeting with fog. You can't put number on it.

We are looking at achieving best value of our product. I think the best value is another push forward at this moment in the construction industry. We prefer value rather than cost, quality giving best value, and you will be a good contractor when you will give a best value to your client. The best we can do is Design standard and those design standard in themselves I have got number attached we can put some qualitative, subjective measure against them. It comes down to human nature, if you present somebody a brand new car, it smell fantastic. If that person has bit of they over moon after it could be though, but after 6months it's broken down and its given trouble, and things are happen with it. They will get really of it and that's within short period of time. Value is strange if you got somebody who is given the same car and they have a really good quality, expensive car, and again into this little tiny brand new car, they would have same car you would have a totally different take, it's under power, it's under steer, its noisy, its nasty and they would think it's terrible. Same car, somebody else come said before who has bad in clapped out, unreliable car get in a brand new car, how the lights work, heating work, fantastic!!! Same car, two totally different perspectives, it's extremely high, which is true. It's for value, so they are the difficulties actually valuing that and putting some financial numbers to it.

Interviewer – Do you have an integrated approach to Stakeholder, Risk and Value management? If so, how are they integrated? Do you think such an integrating approach is beneficial? If so, how and if not, why not?

Interviewee – I think at the end of the day what the nature of the project in hand who is prepared to manage the risk what form of contact. So if you don't like risk and you don't take any risk, and we have done all the risk with the builder, thank you very much, or we could do the development agreement, don't pull the risk with the builder. You paid the

money and you provide the house and end up. If you don't like risk I am a prepared to take some risk. Then you start negotiating what is important to you detailed of design, you already prepared to have whatever happens to be, and how far you going to that. It all depend on what type of contract do you have, that will determine substantially the relationship. One of the key drivers of lean is integration, reduce supply chain partnership work and express interest and commitment, I think absolutely. Yes there is a linkage between all these things. Yes, but however there are some difficulties and some of them relate to believe by client what we can commit to, prepare to commit and how much trust, we are talking about human nature

6years ago we introduced a framework best of lean principle; reduce supply chain use of PPC 2000. But it was not fully adopted because one of the industry and my colleague use it initially, because they didn't understand it because people felt it they could get better deal elsewhere. Yes you could, if you commit to it and open to it, and then I am suggesting people will respond and get a better and will able to measure the improvement because those things would happen anything cost more and they will go elsewhere.

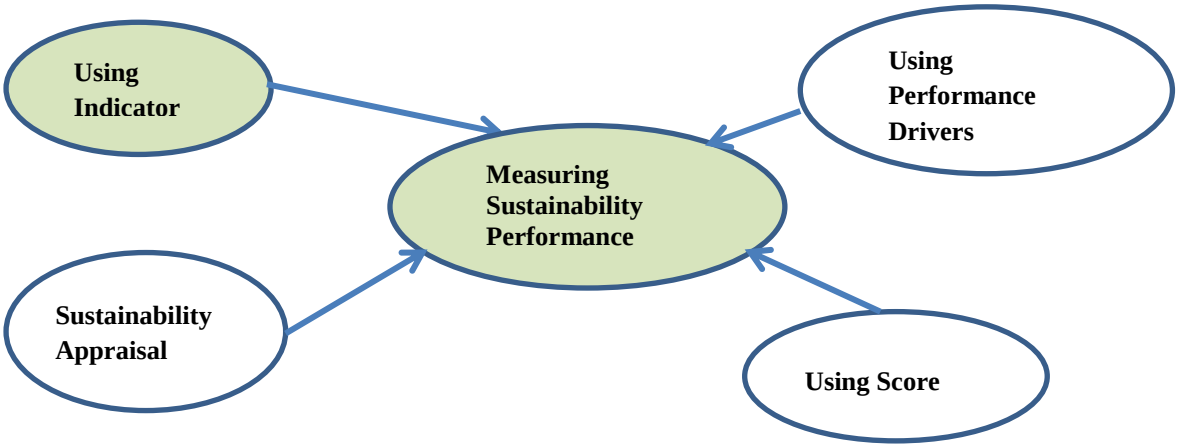
So who are the drivers- the clients can't be the drivers, but I am suggesting there is a goal and opportunities for the construction industry and we build the developers to take the horns and reduce their cost by going lean and coming to us with goal and opportunities. We can have 20% off of the project and really integrating the supply chain reducing their cost by reduction of the client but that takes lot of work.

Content Analysis

Codes produced from the interview are marked as green. All themes produced from the codes coloured as green.

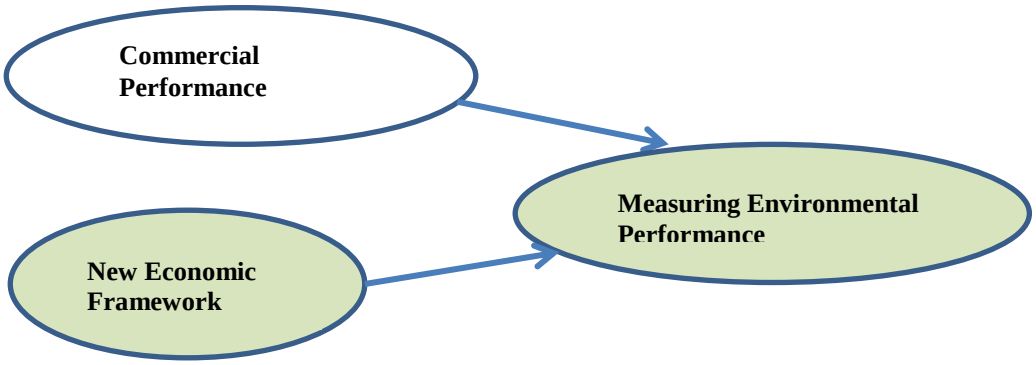
1. **Generating Initial Codes**

Using Indicator – Well, 7 years ago the governments introduce the headlines KPI. We still got a formal KPI, we still do benchmarking**.**

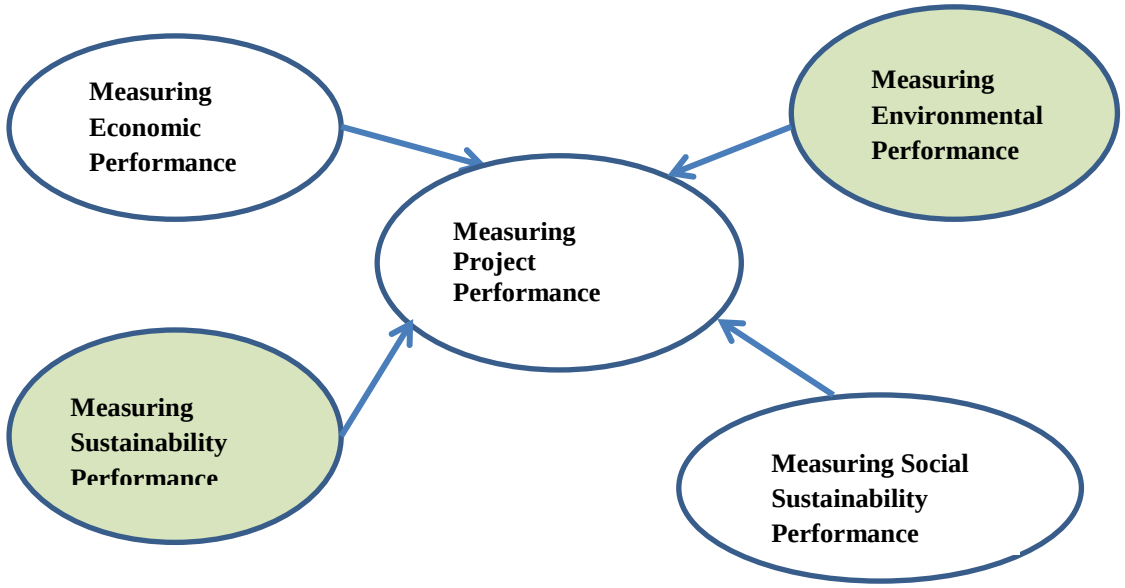


2nd Level Coding

New Economic Framework - Also we have an economic sustainable model which is more cost effective. Within this model we always follow the key drivers of the lean which is standardisation.



Producing Theme



2. Generating Initial Codes

Cost Effective Design - Also we have an economic sustainable model which is more cost effective. Within this model we always follow the key drivers of the lean which is standardisation. So we are seeking to produce standard design and standard specification in our product selection.

Cheap Sustainable Material - …….reduce their cost by going lean and coming to us with goal and opportunities. We can have 20% off of the project and really integrating the supply chain reducing their cost by reduction of the client but that takes lot of work.

Whole Life Costing - Just environmental if you looking at whole life cycle cost of the component there is a whole raft of issues that need to be take into account. As well as complicated math behind it, so it is the influence of making minor changes may or may

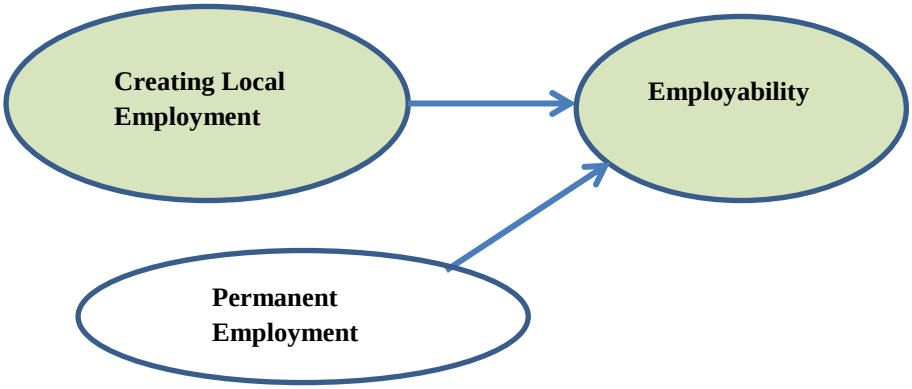
not have profound effect. Instead of the economy could jeopardise any good reason, so the ethical say of making decision best in whole life cycle cost in my view are very spurious.

Cost Saving - But very little actual innovation has come from the industry to say this is new we are working we can save your build cost by 20% if you adopt this approach.

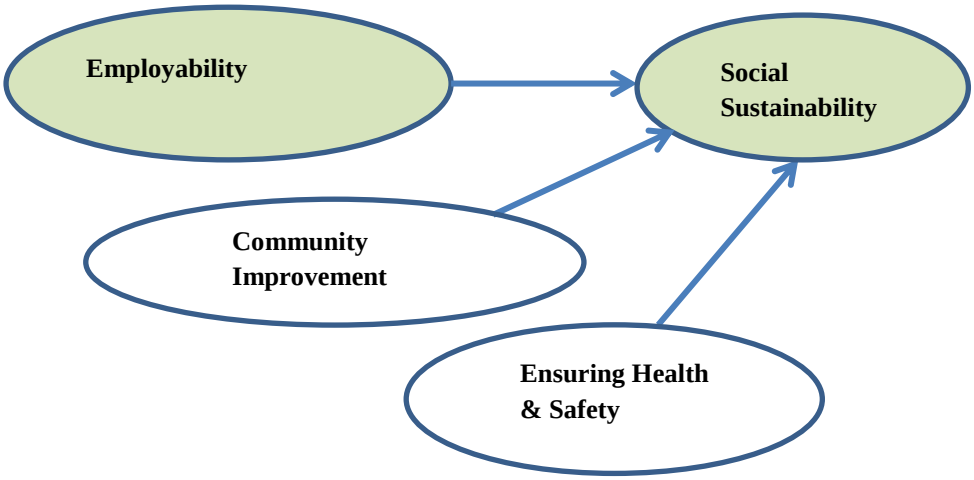
Generating 2nd Level Code

Generating Initial Code

Creating Local Employment – Yes we employ mostly the local people.

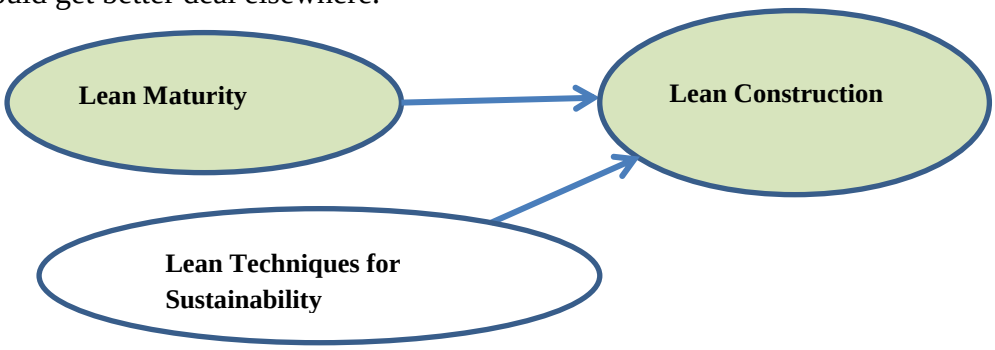


Generating 2nd Level Code



Generating Initial Code

Lean Maturity: 6years ago we introduced a framework best of lean principle; reduce supply chain use of PPC 2000. But it was not fully adopted because one of the industry and my colleague use it initially, because they didn't understand it because people felt it they could get better deal elsewhere.



Generating Initial Code

Risk Rating – All we are trying to do to produce an early warning system, rating the risk. Some use traffic light, some use numbers, so it's really matter. But you can get very energize by looking at numbers and trying to relate probability with the impact with your risk plot or put the cost what it looks like who has ownership at all.

Risk Register - When we go to site to sign a contract we make sure that the contract sign is compatible and has to change. During each project meeting we look at risk, we have a risk register for commence in very early stages through the design process and life trough risk register is checked and the ownership of risk is assigned.

Risk Assessment - We look at risk of a whether the houses if we going to sell part, we look that all those risk of site and do the high level risk assessment right day 1, we have a an account package which looks at the viability of the project once we factoring all the cost.

Generating Initial Code

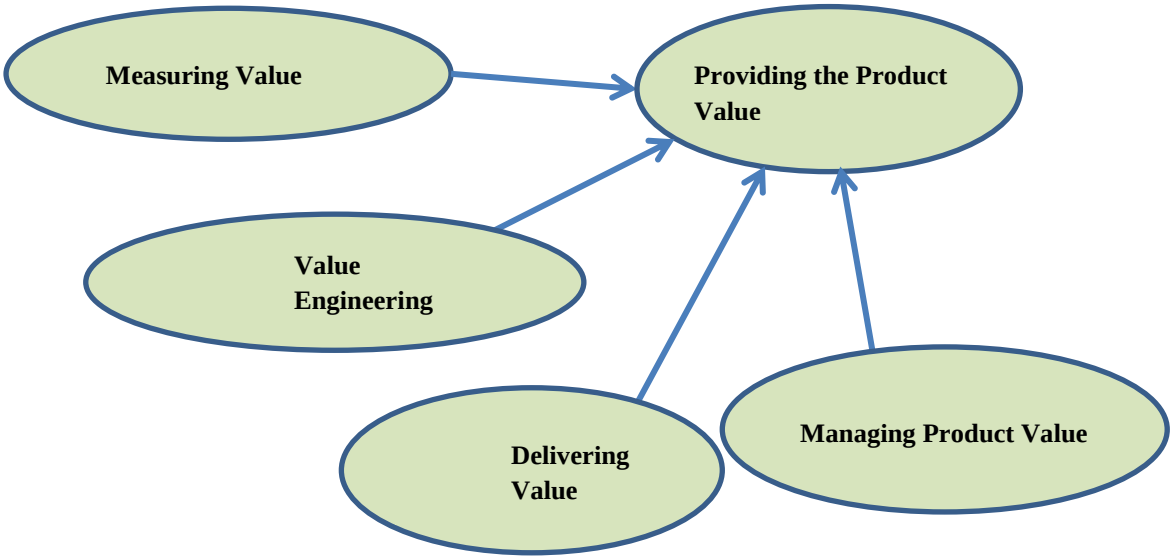
Measuring Value – Its qualitative value judgement, its virtual minimums. So if you could get very cheap product and most people just very satisfied, you know how to play with a number, you could get 90% satisfaction.

Value Engineering - There are occasions partnering environment and we would do an exercise of value engineering and all those circumstances they would come to with

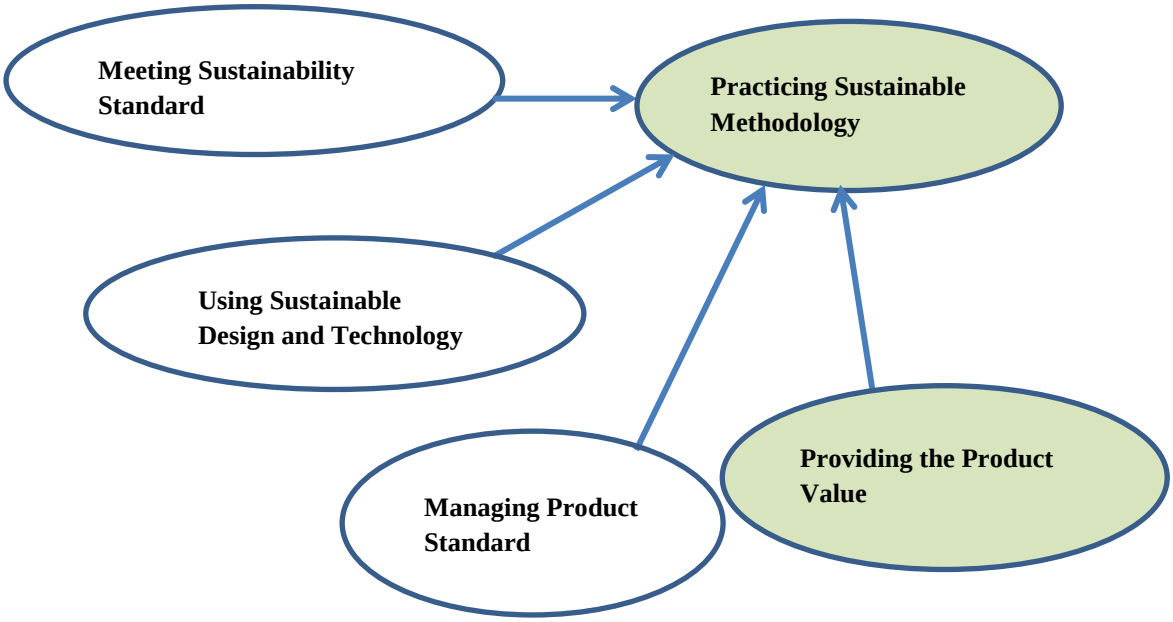
suggestions to change the specification and make it more cost effective so we would be looking at that.

Delivering Value – We could do it totally risk free at riverside but we have to pay for that. So it's all in this element of delivering value against cost and so you can't this regarding triangle cost, time, quality all time put in contact.

Managing Product Value - We are looking at achieving best value of our product. I think the best value is another push forward at this moment in the construction industry. We prefer value rather than cost, quality giving best value, and you will be a good contractor when you will give a best value to your client.



Generating 2nd Level Code



Generating Theme