

# A Study of Innovation Perception within the Construction Industry

A thesis submitted to the University of Manchester for the degree of  
Doctor of Philosophy  
in the Faculty of Engineering and Physical Sciences

2014

Ayda Abadi

School of Mechanical, Aerospace and Civil Engineering

## **Table of Contents**

<b>LIST OF TABLES .....</b>	<b>6</b>
<b>LIST OF FIGURES .....</b>	<b>7</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>8</b>
<b>SHORT ABSTRACT .....</b>	<b>10</b>
<b>DECLARATION.....</b>	<b>11</b>
<b>COPYRIGHT STATEMENT .....</b>	<b>12</b>
<b>ACKNOWLEDGEMENT .....</b>	<b>13</b>
<b>CHAPTER 1 INTRODUCTION.....</b>	<b>14</b>
1.1 BACKGROUND.....	14
1.2 MOTIVATION TO STUDY THE RESEARCH .....	17
1.3 AIM OF THE RESEARCH .....	18
1.4 RESEARCH OBJECTIVES.....	18
1.5 RESEARCH QUESTIONS.....	19
1.6 STRUCTURE OF THESIS .....	19
<b>CHAPTER 2 LITERATURE REVIEW.....</b>	<b>23</b>
2.1 INTRODUCTION.....	23
2.2 KEY WORD SEARCH.....	23
2.3 A BRIEF HISTORICAL OVERVIEW OF INNOVATION DISCOURSE .....	24
2.4 EVOLUTION OF RESEARCH ON INNOVATION.....	26
2.5 CONTESTATION OF INNOVATION DEFINITION.....	29
2.6 INNOVATION IN THE CONSTRUCTION INDUSTRY .....	32
2.7 CLASSIFICATION OF INNOVATION IN THE CONSTRUCTION INDUSTRY.....	37
2.8 MANUFACTURING INNOVATION VS. CONSTRUCTION INNOVATION .....	40
2.9 DRIVERS, BARRIERS AND ENABLERS OF CONSTRUCTION INNOVATION .....	42
2.10 INDIVIDUAL OVERVIEW .....	52
2.11 SUMMARY .....	62

<b>CHAPTER 3</b>	<b>RESEARCH METHODOLOGY .....</b>	<b>64</b>
3.1	INTRODUCTION.....	64
3.2	REFLEXIVITY.....	66
3.3	RESEARCH PHILOSOPHY.....	67
3.3.1	Philosophical Assumptions .....	67
3.3.2	Research Ontology .....	68
3.3.3	Research Epistemology .....	70
3.3.4	Research Paradigms .....	73
3.4	RESEARCH APPROACHES.....	76
3.4.1	Deductive Approach.....	76
3.4.2	Inductive Approach.....	77
3.4.3	Abductive Approach .....	78
3.5	RESEARCH DESIGN.....	79
3.5.1	Quantitative Research Method.....	80
3.5.2	Qualitative Research Method.....	81
3.6	RESEARCH STRATEGY .....	85
3.6.1	Narrative Inquiry - a review .....	88
3.6.1.1	Introduction .....	88
3.6.1.2	Approaches to Narrative analysis.....	90
3.6.1.3	Narrative approach in organisational studies .....	92
3.6.1.4	The Spectrum of Narrative.....	94
3.7	DATA COLLECTION METHODS .....	96
3.8	RELIABILITY AND VALIDITY .....	97
3.9	METHODOLOGICAL DEBATE IN CONSTRUCTION PROJECT MANAGEMENT STUDIES .....	98
3.10	METHODOLOGY OF THE RESEARCH.....	105
3.10.1	Reflexivity of the Research.....	105
3.10.2	Ontological and Epistemological Assumption of the Research .....	105
3.10.3	Design of the Research.....	107
3.10.1	Approach adopted to the Research.....	108
3.11	INTERVIEW PLANNING .....	108

3.11.1	Sampling Strategy: Purposive and snowballing sampling .....	108
3.11.2	Research Sample .....	109
3.11.3	Interview Designing .....	113
3.11.4	Interview Process .....	115
3.11.5	Use of NVivo Software .....	116
3.11.6	Ethical Consideration and Approval .....	117
3.11.7	Analysing the Data .....	118
3.11.8	Stage of Analysis .....	120
3.11.9	Validity and Reliability of the Research .....	124
3.12	SUMMARY .....	126
<b>CHAPTER 4 REVIEW OF GOVERNMENT REPORTS .....</b>		<b>128</b>
4.1	INTRODUCTION.....	128
4.2	THE HISTORY OF THE PUBLICATION OF UK GOVERNMENT SPONSORED REPORTS.....	128
4.2.1	Internationalisation of the UK Construction Industry (1960- 1970s) 131	
4.2.2	Call for Change in the Construction Industry (1990-1994) .....	131
4.2.2.1	Latham Report (1994-1995).....	132
4.2.2.2	Egan Report (1995-1998).....	133
4.2.2.3	Fairclough Report (2002).....	136
4.2.2.4	Wolstenholme Report (2009).....	138
4.3	SUMMARY .....	142
<b>CHAPTER 5 THEORY OF SENSEMAKING .....</b>		<b>144</b>
5.1	INTRODUCTION.....	144
5.2	SENSEMAKING PERSPECTIVE .....	144
5.2.1	The cognitivist approach .....	149
5.2.2	The social constructionist approach .....	150
5.2.3	Implication of sensemaking in organisational studies .....	151
5.3	SUMMARY .....	153
<b>CHAPTER 6 INTERVIEW FINDINGS .....</b>		<b>154</b>

6.1	INTRODUCTION.....	154
6.2	INNOVATION DEFINITION MOBILISED BY INTERVIEWEES .....	154
6.3	EXAMPLES OF INNOVATIONS REPORTED BY INTERVIEWEES.....	159
6.4	RISK AND UNCERTAINTY .....	167
6.5	BLAME IT ON THE INDUSTRY’S NATURE.....	169
6.6	REWARDING AND RECOGNISING INNOVATION .....	173
6.7	PESSIMISTIC AND OPTIMISTIC ATTITUDE TOWARDS INNOVATION.....	179
6.7.1	Pessimistic Attitude.....	180
6.7.2	Optimistic Attitude.....	183
6.8	POWER .....	187
6.8.1	Managerial and Institutional Power .....	188
6.9	SUMMARY .....	194
<b>CHAPTER 7 DISCUSSION .....</b>		<b>196</b>
7.1	INTRODUCTION.....	196
7.2	ORGANISATIONAL, MANAGERIAL AND INSTITUTIONAL DEBATE .....	196
7.3	THE PRACTITIONERS’ PERSPECTIVE FROM SENSEMAKING THEORY PERSPECTIVE.....	201
7.4	SUMMARY .....	207
<b>CHAPTER 8 CONCLUSION.....</b>		<b>209</b>
8.1	INTRODUCTION.....	209
8.2	SUMMARY AND KEY FINDINGS OF THE RESEARCH.....	209
8.3	THEORETICAL CONTRIBUTION .....	212
8.4	PRACTICAL CONTRIBUTION.....	213
8.5	LIMITATIONS OF THE RESEARCH.....	215
8.6	RECOMMENDATIONS FOR FURTHER RESEARCH .....	215
<b>REFERENCES.....</b>		<b>217</b>
<b>APPENDIX A .....</b>		<b>252</b>
<b>APPENDIX B .....</b>		<b>253</b>
<b>APPENDIX C .....</b>		<b>257</b>

## **List of Tables**

TABLE 2.1: SUMMARY OF CONSTRUCTION INNOVATION DEFINITIONS EXTRACTED FROM THE LITERATURE REVIEW .....	34
TABLE 2.2: DRIVERS OF CONSTRUCTION INNOVATION .....	45
TABLE 2.3: BARRIERS TO CONSTRUCTION INNOVATION .....	49
TABLE 2.4: ENABLERS OF CONSTRUCTION INNOVATION.....	52
TABLE 2.5: KEY LITERATURE BASED ON CONSTRUCTION INNOVATION .....	54
TABLE 3.1: ONTOLOGICAL CLASSIFICATION .....	69
TABLE 3.2: CONTRASTING IMPLICATIONS OF POSITIVISM AND SOCIAL CONSTRUCTIONISM .....	71
TABLE 3.3: METHODOLOGICAL IMPLICATION OF DIFFERENT EPISTEMOLOGIES.....	73
TABLE 3.4: DEDUCTION, INDUCTION, AND ABDUCTION: FROM REASON TO RESEARCH .....	79
TABLE 3.5: DIFFERENT APPROACHES TO QUALITATIVE RESEARCH .....	84
TABLE 3.6: KEY RESEARCHER USING ORGANISATIONAL STORYTELLING.....	93
TABLE 3.7: EXAMPLES OF RESEARCHES USING STRONG QUALITATIVE METHODS IN CONSTRUCTION MANAGEMENT STUDIES .....	101
TABLE 3.8: LIST OF PARTICIPANTS OF THE RESEARCH .....	111
TABLE 3.9: THE RESEARCH INTERVIEW QUESTIONS .....	114
TABLE 3.10: CODES AND CONCEPTS EMERGING FROM EMPIRICAL DATA.....	121
TABLE 6.1: LIST OF INNOVATION EXAMPLES .....	160
TABLE 6.2: REWARD AND RECOGNITION OF INNOVATION .....	174

## List of Figures

FIGURE 2.1: ANALYSIS OF NUMBER OF PUBLISHED DOCUMENTS ON CONSTRUCTION INNOVATION SUBJECT .....	24
FIGURE 2.2: FIRST GENERATION MODEL OF INNOVATION (TECHNOLOGY- PUSH).....	26
FIGURE 2.3: SECOND GENERATION MODEL OF INNOVATION (MARKET-PULL) .....	27
FIGURE 2.4: THIRD GENERATION OF INNOVATION MODEL (COUPLING MODEL) .....	28
FIGURE 2.5: INNOVATION PROCESS MODEL FOR THE CONSTRUCTION PROJECTS .....	39
FIGURE 3.1: THE RESEARCH PROCESS.....	65
FIGURE 3.2: A SCHEME FOR ANALYSING ONTOLOGICAL ASSUMPTIONS ABOUT THE NATURE OF SOCIAL SCIENCE.....	68
FIGURE 3.3: A SCHEME FOR ANALYSING EPISTEMOLOGICAL ASSUMPTIONS AND HUMAN NATURE OF SOCIAL SCIENCE .....	70
FIGURE 3.4: PARADIGMS FOR THE ANALYSIS OF SOCIAL THEORY .....	74
FIGURE 3.5: OUTLINE OF THE RESEARCH PROCESS .....	104
FIGURE 4.1: TIMELINE OF KEY UK CONSTRUCTION INDUSTRY REPORTS .....	130
FIGURE 5.1: WEICK’S SENSEMAKING MODEL .....	147
FIGURE 7.1: MEASURING INNOVATION BY SECTOR.....	198
FIGURE 7.2: DISCURSIVE MODEL OF INNOVATION IN THE CONSTRUCTION INDUSTRY .....	206

## List of Abbreviations

AE&C	Architecture Engineering and Construction
ARCOM	Association of Researchers in Construction Management
BAA	British Airways Authority
BIM	Building Information Modelling
BP	British Petroleum
CAD	Computer-aided design
CAQDAS	Computer-assisted qualitative data analysis software
CCC	Confederation of Construction Clients
CCF	Construction Clients' Forum
CIB	Construction Industry Board
GDP	Gross Domestic Product
ICT	Information and Communication Technology
KPI	key Performance Indicators
M4I	Movement for Innovation
NCG	National Contractors' Group
NESTA	National Endowment for Science, Technology and the Arts
PIS	Participant Information Sheet



R&D	Research and Development
SME	Small and Medium Enterprises
SWOT	Strength, Weaknesses, Opportunities and Threats
WWII	World War Two

The University of Manchester  
Ayda Abadi  
Doctor of Philosophy

**A Study of Innovation Perception within the Construction Industry**  
20<sup>th</sup> August 2014

**Short Abstract**

There is a long history of criticising the construction industry for its lack of innovation as a source of competitive advantage. However, through a critical literature review, it was found that the problem with managing innovation in construction has its roots in a misconception of innovation and indeed the industry is a source of new ideas. This thesis draws on prior publications in the field of innovation management, organisational narratives and sensemaking theory and aims to analyse innovation perception within the construction industry, focusing on the meanings attributed by the industry's practitioners and policy makers. In contrast to the dominant positivist and rationalistic approach in studying construction innovation, this research employs a qualitative, interpretative, social constructionist perspective. Data is incorporated through twenty semi-structured interviews with practitioners who work within the UK construction firms as well as UK government reports published regarding the progress review of performance of the construction industry. The findings of the study indicated that there is a disconnection between managerial frameworks of innovation and practitioners' action and their narratives. Through the viewpoint of sensemaking theory, this study argues that the construction of meaning of innovation is a dynamic process that can be changed constantly over a period of time. In narrating innovation, the practitioners draw on their own real-world experiences of a situation and the characteristics of the organisations which they work in. Moreover, individuals' stories often are associated with the dominant popular examples of innovation mobilised with the organisational strategic settings and government initiatives in order to provide a shared perspective. This study demonstrates a discursive model of innovation, assigning the individuals' innovation within an organisation as 'situational innovation' and 'contextual innovation' and the government report and policy makers' innovation as 'rhetorical innovation'. There has been limited application of a narrative approach to innovation in the domain of the construction industry. This thesis has provided theoretical and practical contributions through the application of narrative and innovation within the context of the construction industry. It has also demonstrated the value of the narrative approach to understanding innovation perception within a construction industry context, while identifying its limitations as a research method. The findings of the research further recommend implications for construction industry policy makers. Policy makers can tap into the 'situational innovation' and 'contextual innovation' to promote government programmes and policies, especially those concerned with change and innovation in the industry.

## **Declaration**

that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

## Copyright Statement

- i. The author of this thesis (including any appendices and/or schedules to this thesis) owns certain copyright or related rights in it (the “Copyright”) and s/he has given The University of Manchester certain rights to use such Copyright, including for administrative purposes.
- ii. Copies of this thesis, either in full or in extracts and whether in hard or electronic copy, may be made **only** in accordance with the Copyright, Designs and Patents Act 1988 (as amended) and regulations issued under it or, where appropriate, in accordance with licensing agreements which the University has from time to time. This page must form part of any such copies made.
- iii. The ownership of certain Copyright, patents, designs, trade marks and other intellectual property (the “Intellectual Property”) and any reproductions of copyright works in the thesis, for example graphs and tables (“Reproductions”), which may be described in this thesis, may not be owned by the author and may be owned by third parties. Such Intellectual Property and Reproductions cannot and must not be made available for use without the prior written permission of the owner(s) of the relevant Intellectual Property and/or Reproductions.
- iv. Further information on the conditions under which disclosure, publication and commercialisation of this thesis, the Copyright and any Intellectual Property and/or Reproductions described in it may take place is available in the University IP Policy (see <http://documents.manchester.ac.uk/DocuInfo.aspx?DocID=487>), in any relevant Thesis restriction declarations deposited in the University Library, The University Library’s regulations (see <http://www.manchester.ac.uk/library/aboutus/regulations>) and in The University’s policy on Presentation of Theses

## **Acknowledgement**

This thesis would not have been possible without support of many people. First and foremost, I would like to express my sincere thanks to my supervisors, Dr. Peter Fenn for his illuminating encouragement and always being available with support and advice, and Dr. Ian Stewart for his guidance and his inspiring feedbacks throughout my research project.

Sincere appreciation to my colleagues, past and present at the Management of Projects group and in particular Farhad, Kamal, Mansoor, Vivian, Mostafa, Santi, Seunguk, Erika, Moheeb, and Jenny. You have helped, encouraged, and your acquaintance gave me a rich and rewarding experience as a PhD student. My special thanks to my work-out and climbing friends Cintia, Daniel, Jan and Sarah. You have cheered me and gave me a wonderful experience out of academic world.

This research would not be possible without the participation and kindness of all the research participants, whose willingness to share their experiences and friendly approach made it a pleasure to conduct this study.

I also would like to thank my brother, Ghaflan, and my brother-in-law, Farshad for their support. My sister, Tarla, despite her engagement with her own PhD, being patient and a good listener during these four years of my PhD provided emotional support and helped whenever I needed.

Last but not least, I thank my mum for bringing positivity and support during the stressful time of writing-up. I dedicate this thesis to my dad, Mohammad Abadi. I thank him for his confidence and believing in me, and for his unconditional endless support and inspiration throughout my life.

# Chapter 1 Introduction

## 1.1 Background

A cumulative study has been developed on *innovation* studies from a diverse, multidisciplinary context. Numerous earlier approaches to the study of innovation led Wolfe (1994, p. 405) to observe that:

*“[...] results of innovation research have been inconclusive, inconsistent and characterised by low levels of explanation [...] as a consequence the most consistent theme found in the organisational innovation literature is that its research results have been inconsistent”.*

Yet, there is still a growing body of research on understanding how innovation works in the domain of organisations and management. Similarly, many scholars have studied the context of innovation within the construction industry, and governments continually set innovation as a significant agenda item in their reports. Underpinning many of the studies of construction innovation is the construction industry's resistance to innovation and these barriers are mainly a result of the peculiar characteristics of the industry. The inconstancy of innovation studies and the fragmented nature of the construction industry have made the study of innovation within the industry even more inconsistent. Innovation in construction is largely studied as a mode of product. Two mainstream debates exist on innovation within the construction industry context: drivers and barriers of innovation and promotion of innovation. Drivers and barriers have been studied extensively to justify the low level of innovation. In terms of actors' involvement, clients have been a main theme as a major barrier and driver to construction innovation. Up until now, the researchers still cross-cite the notion that 'the industry is non-innovative and old' along with revisiting the initial framework development identifying factors that inhibit innovation. The existing studies on construction innovation are largely

oriented towards organisational and institutional (macro-level), adopting a positivist position and a quantitative approach (e.g. Blayse and Manley, 2004; Koskela and Vrijhoef, 2001) to justify the lack of innovation in the construction industry. According to the innovation process introduced by Rogers (1983), innovation happens in three overlapping phases; idea generation, idea development, and idea implementation. Before ideas are developed and implemented, they first need to be shared and contributed to. However, there is little argument on why action of sharing ideas would be carried out in the first place by the practitioners in the industry and how the concept of innovation is understood by them. In general, the significance of context and the role of human agency in contributing to and sharing new ideas to later become identified as innovation have been downplayed.

This research is a response to the call for a need to have a defined research agenda by the likes of Green (2011), Phua (2013) and Seligman (2006), for more research into individuals as ‘human agency’ in construction researches and the way the actions are structured in an everyday context. This research, by adopting a narrative perspective sets out to contribute to the understanding of construction practitioners’ narrative in the domain of construction innovation to open a new perspective in studying innovation in the construction industry. The methodological approach of this research is qualitative, seeking to understand, rather than predict and control (Gubrium and Holstein, 2000). The objective of the research is to investigate the way practitioners and policy makers in the industry have come to talk about innovation. Specifically, the aim is to make sense of innovation from the point view of construction practitioners to combine their various stories to explain how specific activities of organisations become identified as an innovation.

This research is neither laboratory simulation nor a grounded theory. It is not focused in the formulation of testable propositions. The research incorporates a series of interviews with the construction practitioners who their organisations are members of the Constructing Excellence group in the UK who claim to be a platform to promote innovation. A total of 20 in-depth interviews take place aimed at unfolding multiple perspectives of what innovation really means in practice as well as

discourse analysis of the key reports of the UK government including those of Latham, Egan and Wolstenholme, to uncover the implication of innovation discourse in individual performance and policy making.



## **1.2 Motivation to Study the Research**

The motivation behind this research derived from the researcher's background working as a civil engineer and project manager in the construction industry and being alarmed by the resistance to change and new ideas by her colleagues and other stakeholders on projects in the construction sector. Inspired by the book "why is construction so backward?" by Woudhuysen and Abley (2004), the researcher wished to discover reasons for this problem. Certainly, this was not a new line of inquiry. Searching among the large number of publications, the highlight of the discussion around construction innovation was that the sector was considered to be a "low innovation" sector. Meanwhile, the researcher realised there was ambiguity in the definition of innovation among scholars, which brought inconsistency to the studies. The "Hidden Innovation" report published by the National Endowment for Science, Technology and the Arts (NESTA) in 2007 backed up the researcher's realisation. The argument of this report was that the construction industry is potentially undertaking innovative activities, but because it does not fit conventional policy definitions of innovation, the sector is considered a low innovative industry. Therefore, the researcher aimed to investigate what innovation really means for construction practitioners. This was followed by the researcher's curiosity about how sense would be made from the inconsistent storylines emerged from empirical data. The researcher came across Weick's sensemaking concept in organisational studies. This concept helped the researcher to frame the unique storylines of each participant and provide a plausible justification for their stories.

### **1.3 Aim of the Research**

The aim of the research is to develop a conceptual framework of the term innovation within construction industry environment to determinate the possibility of improving the use of innovation discourse in practice and among the construction management community scholars.

### **1.4 Research Objectives**

In order to achieve the aim of the research, the research objectives are described as follow:

- To examine various meanings of the term innovation and the principle theories in innovation management within the construction industry literature.
- To carry out a historical overview of the published UK government review reports regarding the construction industry performance to reconstruct the timeline of ‘call for change’ in the industry and the way the innovation term appeared in those reports.
- To explore the use of discourse of innovation within the key UK government reports.
- To investigate the way innovation perception is perceived in narratives of construction practitioners.
- To examine how specific everyday activities of organisations becomes identified as an innovation by analysing the data from the narratives of practitioners.

- To correlate findings of literature review, the reports and practitioners' narratives in order to develop a framework of innovation discourse.

## 1.5 Research Questions

- How do construction practitioners present themselves as idea generators in their everyday activities, thereby claiming to be innovative?
- How is an organisational activity narrated by the practitioners identified as an innovation?
- How do policy makers discuss the perception of innovation in their progress review report of the construction industry?

## 1.6 Structure of thesis

This thesis is presented in eight chapters:

**Chapter One** is the introduction chapter. It sets the scene for the thesis by providing a background to construction innovation. Furthermore, it presents the research aim, questions and objectives and how the thesis intends to address these issues.

**Chapter Two** presents the current and key debate concerning innovation in the construction industry by locating innovation in two levels: historical and conceptual overview. The dominant drive is to outline the broad field of innovation management in business and organisational studies followed by innovation studies within the context of the construction industry. The road map for the review begins with the examination of the general field of innovation management, key theories and models and the description of terms employed. This is followed by the critique of its key theories and models. This chapter critically reviews the fact that the definition of innovation in construction is contested and the positivist approach to construction innovations created problems in the measurement and meaningful enactment of the

concept of innovation. The review highlights the neglected focus of scholars at the grassroots level of construction organisations.

**Chapter Three** presents the approach used to undertake the investigation of the practitioners' understanding of innovation in the construction industry, and the underlying assumptions that have informed the chosen methodology for the research. Clarifying the ontological and epistemological commitments, and the choice of methodology that follows, the chapter also articulates the processes of the study conducted in ten sections. The first section explains the reflexivity of research. The second section explains the different philosophical assumptions, paradigms and considerations of the research. This is followed by describing different strategies and design approaches to research. Finally, the last section demonstrates the methodology and selected approaches to the research. This is done by explaining reflexivity and situating the researcher within the research, research philosophy, thus leading to the choice of data collection and analysis as well as the data collection planning and the procedures that took place before and after interviews. The methodological standpoint of the researcher and research design is employed through a social constructionist and interpretative standpoint. The study is comprised of two phases. The first phase is to historically review the UK government reports in the construction sector and discourse analysis of the term 'innovation' in four key reports which are Latham, Egan, Fairclough and Wolstenholme. The second phase is the semi-structured, face-to-face interviews with construction practitioners who their organisations are member of the Constructing Excellence forum in the UK. Moreover, the narrative approach that this research adopts in collecting and analysing the interview data is explained.

**Chapter Four** presents an institutional overview of innovation studies in the construction industry with a particular focus on the UK. The aim of this chapter is twofold. First of all, this chapter carries out a historical overview of publicly available UK government reports regarding review of construction industry performance. Reviewed are the reports since 1987, which was the milestone year calling for change in the industry. Secondly, this chapter analyses the way the

discourse of innovation is articulated within the key published reports including Latham, Egan, and Fairclough as the most cited reports in innovation studies in the construction industry, along with Wolstenholme's report.

**Chapter Five** presents the theoretical perspective of this thesis where the empirical data from interview transcripts are framed. The first section of this chapter explains the seven properties of sensemaking theory, which is based on Weick's theoretical framework. The second section describes the two different epistemological approaches to sensemaking; the cognitivist and the social constructionist approaches. The final section reviews the application of sensemaking in organisational studies.

**Chapter Six** aims to present construction practitioners' perception of innovation and their different responses to the activities and events that they described as innovation in their narratives. This chapter engages with questions concerned with understanding the practitioners' perspective of construction innovation by presenting the empirical data constructed from interviews with construction practitioners; that is to say, senior, middle and line managers at various levels within contractor and subcontractor construction firms across the UK. This chapter demonstrates the examination of how these practitioners make sense of innovation within the project and company in which they are working by providing interpretation of their definition of innovation and a list of examples of innovations.

**Chapter Seven** correlates the discussion from the literature review, analysis of the government reports, and practitioners' perspectives from chapters two, four and five. Interpretation related to the social construction of innovation derived from data provided by the practitioners is placed within a conceptual framework of sensemaking. This chapter thus responds to the related research questions posed in the introduction chapter which are both concerned with understanding the practitioners' and policy makers' perspective of construction innovation.

**Chapter Eight** is the concluding chapter of the thesis. It presents a summary of the key findings of the research, the theoretical and practical contribution of this thesis as well as the limitations of the study and further research agenda.

# **Chapter 2 Literature Review**

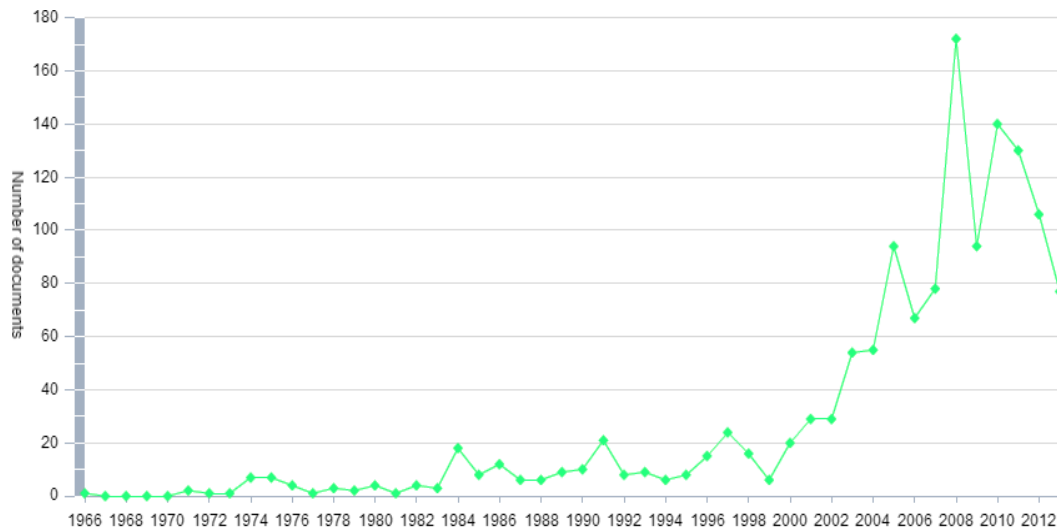
## **2.1 Introduction**

This chapter presents a review of literature and current knowledge of innovation studies in the context of the construction industry. It outlines the broad field of innovation management in business and organisational studies followed by innovation studies within the context of the construction industry. The road map for the review begins with the examination of the general field of innovation management, key theories and the description of terms employed. This is followed by the critique of its key theories and models.

## **2.2 Key Word Search**

Electronic literature searches were conducted in Google Scholar, Science Direct, Scopus, Web of Knowledge and JSTOR. The electronic search strategy was developed by a combination of keywords including: construction industry, construction sector, innovation, innovation management, motivation, incentives, drivers, barriers, strategy, idea, new, idea generation, creativity, innovative, innovativeness. This was followed by The University of Manchester Library catalogue search on the available hard copies and soft copies of books. The initial search design was not limited to any specific research design or language. Figure 2.1 shows an analysis of the number of publications produced on innovation in the construction industry topic.

**Figure 2.1: analysis of number of published documents on construction innovation subject**



Source: Scopus website

### 2.3 A Brief Historical Overview of Innovation Discourse

The word innovation entered English texts in the mid-1500s from the Latin verb ‘innovare’ meaning renew, alter or make new (Oxford English Dictionary). Innovation history as it is regarded today (i.e. a success factor for businesses) has been through a progressive process throughout classical economic history. The history of innovation is widely discussed in the literature (See e.g. Mokyr, 1990). According to the texts where the term ‘innovation’ was found between the 1500s and 1800s, innovation was a deviant behaviour and considered as a strong barrier to social, religious and political norms. Innovation was a desirable behaviour only if it could sustain the status quo. Any changes outside the norms and interests of the corporate body, the state of religion or church were classed as deviance and the term innovation would be used to describe that behaviour. Even for practical technological developments, the term innovation would not be considered to describe the action. The Oxford English Dictionary from 1500s to 1800s has negative quotations from institution of Christian religious contexts to Shakespeare



and law dictionaries to scientific articles (See <http://www.oed.com/view/Entry/96311?>).

In the 19th century, innovation changed from a taboo and deviant social behaviour into something positive. In 1939, Joseph Schumpeter initiated a new understanding in his book 'Business Cycles', of innovation as a driving force in economic growth in the United States in particular and in the West more generally. Following the Schumpeterian initiation of the new concept of innovation, many scholars began debating the new understanding of innovation in social and economic contexts (Sweezy, 1943, Ruttan, 1959). Schumpeter's main interest was "discovering the effect of variations in the rate of both technological and organizational changes on economic growth and development", whereas explaining the 'process of innovation' was not his major concern (Ruttan, 1959, p. 606). The researches on 'why' innovation was important dominated over those concentrating on the actual occurrence of innovation ('how').

Since in modern American management discourse, mechanisation, systemisation and repeatability are emphasised, this led to a discussion of where innovation stands in the functioning of a modern organisation. Innovation as a managerial issue emerged when it was proposed that entrepreneurs should be replaced by professional managers in 'organising innovation' (Ruttan, 1959). Schumpeter's theory discusses the role of entrepreneurship in economic development as consisting of a process which involved reformation of various equipment of production, outputs, marketing and industrial organisations (Jones and Saad, 2003). Eventually, the development of process models which could be measured and systematised emerged to address the issue of 'how' (See e.g. Rothwell, 1994).

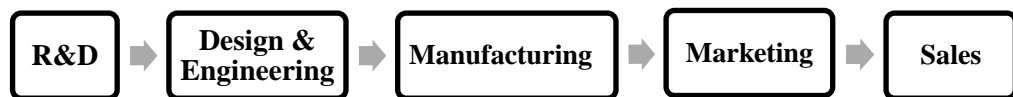
Between the 1970s and 1990s, following continued publication of linkages between innovation and business strategy, innovation scholars were searching for a prescription for managerial action in support of innovation. At that time, innovation was much more product and technologically orientated. From the beginning of the 1990s to 2008, innovation became the centre of attention for organisations. "Get

innovative or get dead” was a dramatic statement from Tom Peters in 1990. Innovation moved from product and technology to the innovation process and was recognised as a competitive advantage. It became the daily business of companies and was widely accepted as a source of competitive advantage.

## 2.4 Evolution of Research on Innovation

Interest in innovation research can be seen to have started at the beginning of 1950s when new industries emerged and industrial activity expanded (Niosi, 1999; Rothwell, 1994). The rapid emergence of technology resulted in rapid application of technology and employment creation. Scientific advances and industrial innovation stimulated major Research and Development (R&D) programmes at universities and government laboratories. The main emphasis was on R&D in order to produce new product ranges to satisfy the demand of the market. Innovation initiated by scientific research is known as “Technology-Push”, which was the earliest linear model of innovation (See Figure 2.2). The Technology-Push model suggests that new ideas generated in professional R&D activities by qualified engineers and scientists lead to technological developments in industries and consequently innovation (Jones and Saad, 2003). Therefore, this model suggests a less significant role for market demand.

**Figure 2.2: First Generation Model of Innovation (Technology-Push)**



Source: Adapted from Rothwell (1994)

In the mid-1960s when the employment level of manufacturers remained almost static and the productivity of manufacturers increased, the perception of innovation

shifted to the demand factor (Rothwell, 1994). The interest of the market was re-allocated from production of new products to identifying the ‘need’ of market. Innovation initiated by demand is known as “Market-Pull” (See Figure 2.3). The Market-Pull model focuses on the market or the customer as the initiation point of the process of innovation. In other words, in the Market-Pull model, innovation starts to fulfill the market demand, changing incrementally to meet the customer’s requirements (Jones and Saad, 2003). Some studies have shown that market demand is the main initiator of the innovation process and R&D cannot be the only generator of innovation. However, R&D activities ascertain that innovations are available when they are needed by the market. Therefore, in many cases, there is an interaction between marketing and R&D. Consequently, it would be too simplistic to choose either of these models as the *only* model of innovation (Jones and Saad, 2003; Tidd, 2006).

**Figure 2.3: Second Generation Model of Innovation (Market-Pull)**

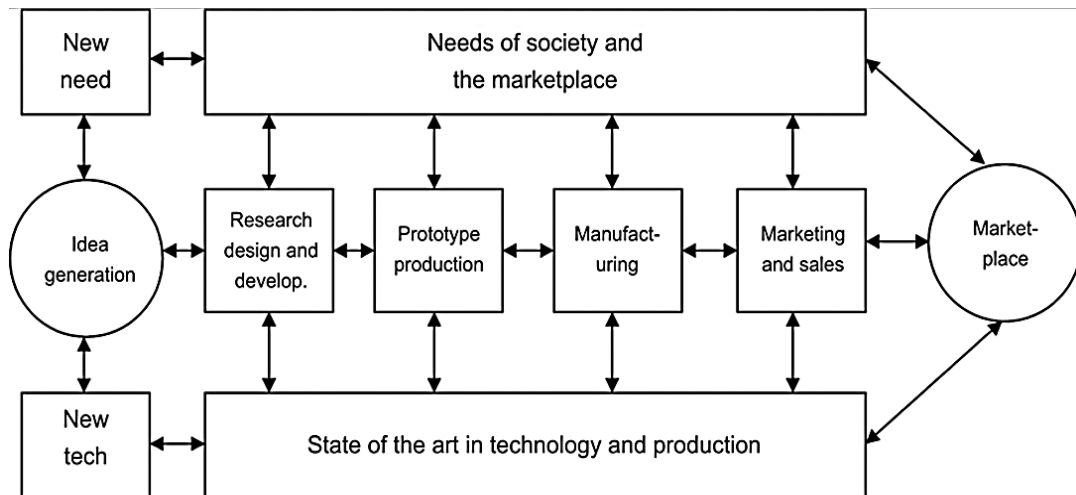


Source: Adopted from Rothwell (1994)

In the early 1970s, there was high inflation and a demand saturated market caused by the major oil crisis in 1973. As a result of the recession, companies began to apply cost reduction strategies. The first and second generation of innovation models were not sufficient in practice, since the models were too general. It was necessary to understand the basis of successful innovation to reduce incidence of failure (Rothwell, 1994). As a result, it came to be realised that both knowledge of science and technology and market are crucial elements of success in innovation which need to be coupled (Mowery and Rosenberg, 1979). The new model, the so-called “coupling elements”, focused on the interaction of R&D and marketing strategies to

yield more commercially successful results (Niosi, 1999; Rothwell, 1994). This “coupling model” demonstrated that innovation can be managed more efficiently if more attention is paid to the interaction of the different elements and the feedback loops between them (Rothwell, 1994) (See Figure 2.4).

**Figure 2.4: Third Generation of Innovation Model (Coupling Model)**



Source: Rothwell (1994)

After the economic recovery from the early 1980s until the early 1990s, the strategic alliances and networking between companies became a top agenda in the companies and the innovation process model moved from a sequential process to a parallel process. The focus was on ‘global strategy’ to accumulate technology in manufacturing, external interaction and business alliances between companies. The successful performance of Japanese companies in technological innovation created a globally competitive market (e.g. the ‘Just in Time’ model). The goal in western companies became to apply competitive strategy to compete with Japanese companies. Simultaneous shortening of product life-cycle and involvement of suppliers in the early stage of production with in-house department activities resulted in increased development speed. Hence, ‘time-based strategy’ became an important factor.

In the early 1990s, one of the main issues was resource constraint. The focus became 'being first innovator' and 'being first to market'. The main benefits of this were greater market share, monopoly profits and increased customer satisfaction. However, the speed of development of products caused issues of high cost. The 5<sup>th</sup> generation innovation process is similar to the 4<sup>th</sup> generation with one major addition - time and cost management. The innovation process models exist in diverse forms according to the industry's nature, for example assembly industry, consumer industry and science-based industry.

The latest generation of innovation researches are focused on the link between the factors identified from previous generations of innovation in order to globalise the market environment and connect to the world economy. Researchers such as Chaminade and Roberts (2002) and Marinova and Phillimore (2003) attempt to introduce the 6<sup>th</sup> generation of innovation model based on intangible activities (social capital, tacit knowledge and geographical proximity).

## **2.5 Contestation of Innovation Definition**

Dictionaries and scholars have various insights and often conflicting definitions of innovation. Reviewing the literature on innovation management and construction innovation from mainly business and construction engineering management disciplines, it was observed that there is no single definition of the term 'innovation'. Adams et al. (2006, p. 22) emphasise this statement: "the term innovation is notoriously ambiguous and lacks either a single definition or measure". The heterogeneity in content and absence of a single and complete definition of innovation which causes problems and confusion is also highlighted by a few other researchers (Ozorhon et al., 2010; McAdam et al., 2004; Baregheh et al., 2009; Manseau and Seaden, 2001). However, there were few attempts to define a consistent definition of innovation for multi-disciplinary purposes.

Baregheh et al. (2009), by studying 60 definitions of innovation from various disciplinary literatures (economy, innovation and entrepreneurship, business and

management, marketing, technology and science engineering, organisational studies) from 1934 to 2007, concluded that the diversity of innovation definition creates confusion and uncertainty amongst researchers and practitioners. The content analysis of the definitions demonstrates that ‘newness’ dominates most of the definitions. The word “new” appears 76 times, meaning it is repeated more than once in the same definition. “Product”, “organization” and “idea” are the most repeated terms in the definitions after “new”.

In a very similar approach to Baregheh et al.’s (2009) work, Johannessen et al. (2001), by focusing on the types of innovation rather than the disciplines, studied six different types of innovation; new products, new services, new methods of production, opening new markets, new sources of supply, and new ways of organising from 8 different industry groups. Their aim was to explore a perception of innovation that could contribute to a meaningful definition. The argument was that the term “new” is used naïvely in definitions of innovation between scholars without addressing what is new, how new it is and to whom it is perceived as being new. In the ‘what is new?’ argument, the problem is generated where the measurement of innovation is heavily focused on R&D and the number of patents. Two reasons are discussed by Johannessen et al. (2001). Firstly, not all the patents are commercialised. Secondly, more focus is on engineers and scientists and other members of the organisation are left out. The degree of newness in ‘how new?’ that constitutes innovation may differ in degree - radical or incremental. With regard to ‘new to whom?’ newness can be argued relative to the company or to the market, with each case requiring a different framework. In the economic unit, it is more likely that innovation will be defined in a radical scale. As a result of their study, they concluded that “the success of an innovation is determined more by the extent of its adoption than by who originates it or how technologically advanced it is. What makes it innovative is its newness”.

Contrary to Johannessen et al.’s (2001) research, Stewart (2011) highlights the importance of the individuals’ role in the process of bringing new ideas as raw material to the innovation-as-action or innovation-as-object. He criticises the

ignorance of the human element in the definition of innovation. “Innovative action alone or the presence of some new thing does not make the outcome an innovation” (Stewart, 2011, p. 219). In fact the thoughts of the human mind that turn to action (in a praxeological sense - personal goals and fears, etc.) and the judgment of people is needed in the acceptance of an idea which later on will become an object or action known as innovation. Stewart (2011) coined a term called ‘contra-novation’ in opposition to in-novation. Contra-novation is the action against novelty and a “state wherein innovation-as-action comes to rest in nothing due to the effect of forces external to the innovator” (Stewart, 2011, p. 220). Earlier, the importance of the individual’s role as a success factor in innovation was also pointed out in a number of researches (Coopey et al., 1997; Rothwell, 1992; Anderson et al., 2004). Among the diversity of the definitions of innovation, a theme of “successful exploitation” could be observed. The definition “a successful exploitation of new ideas” is largely adopted by many academic researchers and policy makers (DTI, 2003; NAO, 2009; Stewart and Fenn, 2006; Fairclough, 2002; Egbu et al., 1998). It is vague in terms of what is adopted and what constitutes a success. Stewart (2011) argues that the term ‘exploitation’ is an action of bringing the ‘raw materials’ to the ‘new objects’ - if the action has not led to profit for the organisation, then no innovation has occurred, no matter how many ‘new objects’ might subsequently exist. Stewart and Fenn (2006, p. 173) suggest the definition of innovation as “a profitable exploitation of new ideas”, explaining that “Profit or gain is the goal and reason for acting and the only meaningful indicator of its accomplishment”. Nonetheless, researchers such as Akintoye et al. (2012, p. 45) believe that “the development of a single definition of innovation is a fruitless and pointless exercise. The more meaningful challenge is to adopt a particular view of innovation appropriate for a specific context.”

The discussion of innovation type can be observed in almost all the innovation studies, either in a straightforward manner or rather more obscure (Schumpeter 1934, Damanpour 1991; Cooper and Kleinschmidt, 1987; Henderson and Clark, 1990; Burningham and West, 1995; Neely and Hii, 1998; Johannessen et al. 2001). The important significance of classification is excessively discussed in Garcia and Calantone (2002). Garcia and Calantone (2002) establish that different types of

innovation have different impacts on the innovation process and its output. They point out that inconsistency in labelling innovations may contribute to the slow progression of knowledge of the innovation process whereas the consistency helps practitioners to identify the characteristics of the new products and compare it to the real new products. Adam et al. (2006) acknowledges three general typology discussions in innovation studies; types according to the ‘functionality or domain of application’, ‘degree of newness’ and ‘attributes of innovation’. The Oslo Manual classified innovation as being either technical or organisational (Blayse and Manley, 2004). Organisational innovation is also referred to as process innovation, whilst technical innovations are sometimes referred to as product innovations. Abernathy and Utterback (1978) disputed that the interaction between product and process innovation is required to be considered in depth.

In other research, they showed that product innovations often lead to process innovations (Abernathy and Utterback, 1978). However, process innovations are required to produce a product innovation. Furthermore, it is often the resulting process innovation that sustains the initial product innovation. Early economists approached the subject of product innovations, “carefully and imaginatively” (Rosenberg, 1982), and in some cases, ignored the area entirely. Schumpeter (1947) emphasised the importance of product innovations for economic growth. He argued that product innovations had fundamental implications for understanding the nature of capitalism as well as the nature of competitive forces. Utterback (1974) confirmed this by observing that product innovations are not just about increased output but are creative responses to competitive and technological challenges (Murphy et al., 2011). Although typologising in innovation studies helps to manage the diversity and reduce the complexity, there is no universal agreement on which is the most suitable of the typologies to operationalise in innovation research (Calvert et al., 2002).

## **2.6 Innovation in the Construction Industry**

In reviewing the literature, a wide range and variety of definitions of innovation were observed. Murphy et al. (2011) criticise the lack of attempts that have been put



forward in construction innovation definitions. They stated that definitions are ‘less prolific’, ‘scant’ and ‘insubstantial’. Table 2.1 summarises the definitions that emerge from the construction innovation literature. As can be seen, the early construction innovation definitions are mostly technology and product (material) oriented. The concept of ‘first use’ was echoed in early definitions, however the shift of concept to ‘exploitation’, ‘application’ and ‘generation’ of an idea is evident in the latest definitions.

‘Newness’ and ‘new ideas’ are the key themes in the nature of definitions. Sexton and Lu, (2012) criticise the application of ‘newness’ characteristics in the definitions of innovation, which need to be distinguished between new to the world or new to the given situation. One could argue a most striking missing element in the definitions is the human factor in the process of generating new ideas to become the subsequent action of innovation. Another criticism in the construction innovation definition is that they are “value neutral” - the definitions do not clearly state that innovation should be beneficial and add value to the organisation or the actors (stakeholders) (Barrett et al., 2008). On the contrary, Capaldo et al. (1997) argue that innovation does not necessarily lead mechanically to improved performance, but that conversely “the decision to innovate may even strongly jeopardise the firm”. Barrett et al. (2008, p. 13) states that “the risk of such jeopardy leads to the ‘innovator’s dilemma’ (Christensen, 1997) under which conditions firms should stick to what they already do and in which situation they should initiate innovation activity”. In contrast, Aouad et al. (2010) advocated that the characteristics of the construction industry, including its fragmentation and project-based nature, causes the pattern of innovation vary from those of other industries. They articulate that “industry innovation remains hidden when co-developed at the project level”. Similarly, Sexton et al. (2008) stress the characteristics of the construction industry as multi-stakeholder, there is a need for maximisation of joint-value and benefits for all the stakeholders involved in the construction process, not just for example the client.

**Table 2.1: Summary of construction innovation definitions  
extracted from the literature review**

<b>Authors</b>	<b>Definitions of Construction Innovation</b>
<b>Tatum (1987, p. 649)</b>	“Innovation is the first use of a technology within a construction firm”
<b>CERF (1993)</b>	“Apply innovative design, methods or materials to improve productivity”
<b>Slaughter (1993, p. 535)</b>	“Innovation is defined as anything new that is actually used; this term has legal origins”
<b>Pries and Janszen (1995, p. 43)</b>	“Innovation can be defined as the application of new (or renewed) products, processes or services (new for the Dutch building industry)”
<b>Pedersen (1996, p. 184)</b>	“the first use of a technology within a construction firm either in the process or in the product”
<b>The construction Research and Innovation Strategy Panel (1997, p.5)</b>	“The successful exploitation of new ideas, where ideas are new to a particular enterprise, and are more than technology related—new ideas can relate to process, market or management”

<b>Toole (1998, p. 323)</b>	“[...] is the application of technology that is new to an organisation and that significantly improves that design and construction of living space by decreasing installed cost, increasing installed performance, and/or improving the business process
<b>Egbu et al. (1998, p. 605)</b>	Innovation can be seen as the successful exploitation of new ideas, where the ideas are new to the unit of adoption. In construction, new ideas can be in the form of processes, products, technologies, and markets
<b>Slaughter (2000, p. 2)</b>	“A non-trivial improvement in a product, process, or system that is actually used and which is novel to the company developing or using it”
<b>Davey-Wilson (2001, p. 136)</b>	“Innovation in the construction process occurs when new methods are needed to enable something to be constructed either quicker, cheaper, or in different conditions.”
<b>Manseau and Seaden (2001, p. 8)</b>	“Innovation appears to be viewed as a process that enhances the competitive position of a firm through the implementation of a large spectrum of new ideas”
<b>Dewick and Miozzo (2002, p. 824)</b>	“[it] can be defined as the use of production equipment, techniques and procedures, and products and product delivery mechanisms that are sustainable (because they conserve energy and natural resources, minimise the environmental impact or footprint of human activity and protect the natural environment)”

<b>Saad et al. (2002, p. 174)</b>	“Innovation is increasingly defined as the interaction of the dynamics of the process, the firm and the environment in which the firm operates. Its development depends on feedback mechanisms between external environments and technical developments”
<b>Fairclough (2002, p.19)</b>	“Successful exploitation of new ideas leading to profitable change”
<b>Ling (2003, p. 635)</b>	“An innovation is defined as a new idea that is implemented in a construction project with the intention of deriving additional benefits although there might have been associated risks and uncertainties”
<b>Sexton and Barrett (2003, p. 626)</b>	“the effective generation and implementation of a new idea, which enhances overall organizational performance”
<b>Lim and Ofori (2007, p. 964)</b>	“the purposeful search for new knowledge and the application of this knowledge in production”

## **2.7 Classification of Innovation in the Construction Industry**

Similar to the discussion of classification of innovation in general terms, there is also an ongoing discussion on the classification of the construction innovation. The first classification of construction innovation is noted in Bowley's (1960) book; those that change the product and those that affect processes. There are a number of researchers who have studied types of innovation in the construction industry (Nam and Tatum, 1988; Groak, 1992; Slaughter, 1998; Slaughter, 2000, Murphy et al., 2011; Lim and Ofori, 2007; Stewart and Fenn, 2006).

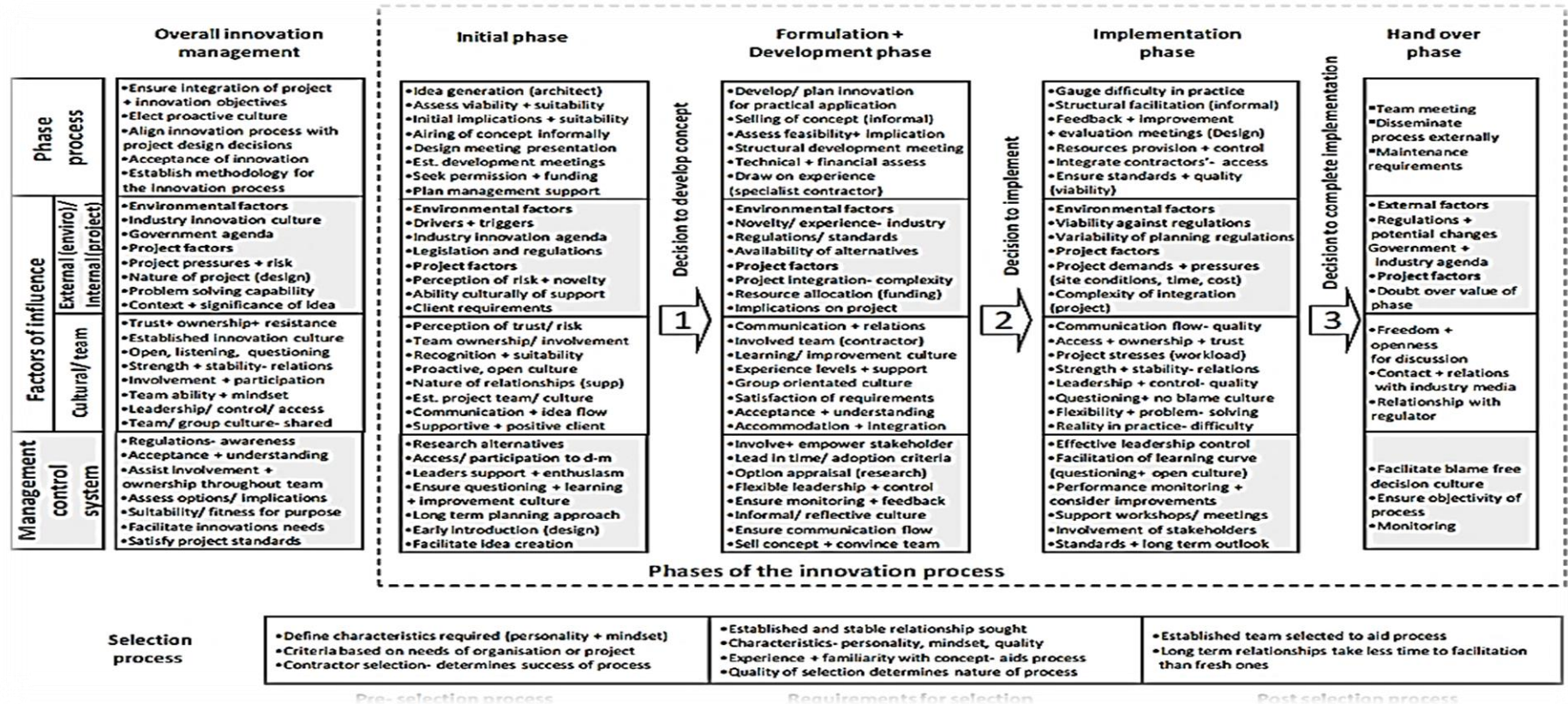
Nam and Tatum (1988, 1989) studied construction innovation as product innovation and criticised the focus of researchers only on technological progress in the Architecture Engineering and Construction (AE&C) industry. They quoted Rosenberg (1982): "to ignore product innovation and qualitative improvements in products is to ignore what may very well have been the most important long-term contribution of technical progress to human welfare. To exclude product innovation is to play Hamlet without the prince". Nam and Tatum (1989) in studying construction innovation analysed innovation as a complex product which is constructed from raw material, including farmed products (e.g. cotton), natural materials (e.g. sand and stone) and chemical and forest products. On the other hand, what they meant by construction innovation was heavy immobile structures and facilities such as homes.

Meanwhile, Slaughter (1998) provided a set of models of construction innovation which she believes reflect the nature of the construction industry and the activities of specific construction companies. The proposed models are incremental innovations (e.g. full-body safety harness), modular innovations (e.g. post-tensioned concrete), architectural innovations (e.g. self-compacting concrete), system innovations (e.g. pre-fabricated bathroom pods) and radical innovations (e.g. introduction of structural steel). Slaughter's model is in the mode of product innovation. She argues that much of the research concerning innovation within construction is based on examples of

the manufacturing of products for the industry. Consequently, it remains a failure to assess innovation within the context of construction as a mode of production. Even though the products produced are for construction, the process of innovation is tied to the principles and production methods of manufacturing. In her model, the interaction of innovation within the context of the construction environment is neglected.

Stewart and Fenn (2006) argued that construction innovations occur in three domains: product, process and organisation. Process innovation is oriented towards production methods and organisational innovation towards approaches to managing the firm and implementation of corporate strategic orientations. Lim and Ofori (2007) proposed a classification of innovation in terms of source and types of resource required for the innovation strategy to provide a competitive advantage to guide the contractors to take strategic decisions for their construction businesses. “Type 1 innovations that consumers are willing to pay for, Type 2 innovations that reduce contractors’ construction costs, and Type 3 innovations that encompass intangible benefits such as improved reputation and high credibility, which provide contractors with sustainable competitive advantage”. There were also attempts in modelling and generic understanding of the innovation process in construction projects. For example, Thomson (2006) developed a model of the innovation process within the construction project environment which is structured in phases to assist the managers in successful progression of innovation (See Figure 2.5). Thomson’s view on construction innovation was similar to the manufacturing style (i.e. mass production) as presented in section 2.4.

Figure 2.5: Innovation Process Model for the Construction Projects



Source: Thomson (2006)

## **2.8 Manufacturing Innovation vs. Construction Innovation**

The unique characteristics of the construction industry differentiate the effect of applicability of technology and technology development from the manufacturing (Nam and Tatum, 1989). Immobility, complexity, durability, costliness and high risk of failure are common negative features attributed to the industry. Barrett (2005) refers the industry to some ruthless characteristics including adversarial stakeholder relationships, cut-throat, unscrupulous low bidders competition and lack of trust. Groak (1992) argues that the construction industry (building industry) is not easy to understand. He describes the whole industry as a puzzle made of many parts. Studying parts in order to obtain the knowledge of the whole often results in very different outcomes.

The construction industry is generally driven by single and unique projects with separate design and production, each creating and disbanding project teams (Betts and Wood-Harper, 1994; Carty, 1995; Tatum, 1986; Welling and Kamann, 2001; Barrett and Sexton, 2006) which implies that possible feedback from the construction process is not taken into account in the design process; within a single project, the design remains fixed. Thereby, contractors (and subcontractors) often have very little autonomy with which to alter design specifications and introduce product and process innovations (Miozzo and Dewick, 2002). The level of involvement of actors in the construction industry is quite different from that in manufacturing. The high level of product complexity and risk failure builds a need for various specialised professionals which results in a fragmented environment. “if there are two million people in the British building industry, there are two million and one different jobs” (Groak, 1992). As a result, it has become problematic for designers and constructors to understand all the different tasks that they are expected to do. The owners (clients) influence the construction process from the design to the end and also initiate and extract the innovation, whereas in manufacturing the role of the buyer (client) is passive in the form of “market demand” or “potential needs”. On the other hand, the construction industry is mostly a “customer-order activity” (Nam and Tatum, 1989). Nam and Tatum (1989) believed that the reaction of customers to



a new product, for example a new type of house, is generally cautious rather than simulative.

The construction industry does not have the advantage of the production process and the mass-production system because of being a site operation. In addition, being a project-based sector (i.e. temporarily undertaking to produce unique products), the product in the construction industry is novel with its design function separated from production. Another nature of construction products is their costly nature and high level of responsibility involved that leads to discouragement of the implementation of trial-and-error. It has been evident that trial-and-error is a major strategy for innovation in other industries such as manufacturing. As Cox and Thompson (1997, p. 128) claim, the type of cooperation on innovation in manufacturing has “very little application to an industry such as construction where repetition is rare and works are procured typically on a one-off project-by-project basis”. Nam and Tatum (1989) emphasise that “it is inappropriate to try to adopt theories of innovation process developed from the manufacturing industry and blindly apply them to construction”. Somewhat contrary to this, Koskela and Vrijhoef (2001) suggest that concepts and methods for innovation, developed on the basis of manufacturing industries, may be transferred if the theoretical core of the concepts and methods can be abstracted from its original industrial setting and then recreated in an application that fits the peculiarities of construction. There have been attempts to apply volume production methods and manufacturing to construction which have ultimately failed. The reason for this failure was the increasing cost of housing compared to other goods and services and resistance to the virtuous cycle of simultaneous cost reduction and quality improvement. In addition, Winch (1998), concludes that the tenacity and preclusion of the problem suggests the volume of the manufacturing model might not be appropriate for construction. There is still no precise prescription or recipe for successful innovation and no one model can adequately address all the needs of the process of innovation, whatever in organisational context or project-based industry context, including the construction industry (Thomson, 2006, Tatum, 1984).

The construction industry from a construction project viewpoint: projects are unique in some respects and it is not possible to make and test full-scale prototypes (Gann and Salter, 2000). The tender system is another characteristic of the construction industry where usually products and subcontracting work awarded at the lowest price rely on standardised types of contracts that limit the respective responsibilities of the actors (Cox and Thompson, 1997). “In several countries [...] it appears that the practice of awarding contracts through lowest cost tender may act as a constraint to innovation and R&D spending among contractors” (Dewick and Miozzo, 2002, p. 990). Accumulation of knowledge in the construction industry is a problem due to the lack of continuity and temporary nature of projects, as a new learning curve is climbed by the supplier each time (Cox and Thompson, 1997).

Winch (2003) criticises the comparison of the construction industry with other mass-production industries, calling such a comparison “a case of apples and pears”. He believes that the cross-sectional comparison of the performance of the construction industry, which is typically in terms of productivity trends or expenditure on R&D, is inherently flawed due to the international standards for the organisation of Standard Industrial Classifications. Therefore there is no firm evidence that the performance of the ‘construction’ sector is any worse (or any better) than that of any other sector such as ‘motor vehicles’.

## **2.9 Drivers, Barriers and Enablers of Construction Innovation**

This section will discuss the factors and different drivers that affect the adoption of innovation within the construction industry context. The innovation drivers in the construction industry have been argued in two broad levels ‘organizational level’ (Tatum, 1989; Nam and Tatum, 1992; Nam and Tatum, 1997; Winch, 1998; Gann and Salter, 2000) and ‘institutional level’ (Bernstein and Lemer, 1996; Larsson, 1996; Gann et al., 1998; Guy and Kibert, 1998; Bon and Hutchinson, 2000; Ngowi, 2001; Manseau and Seaden, 2001). The factors identified in the literature are mostly

oriented towards the product, technical and technological development levels (Gambatese and Hallowell, 2011) and at the firm level (Ozorhon, 2012).

Authors such as Toole (1998), Gambatese and Hallowell (2011), Ozorhon et al. (2010), Thorpe et al. (2009), Slaughter (1998), and Lim and Ofori (2007) agree on the financial aspects of construction innovation in terms of profit for the construction projects and frequently high cost involvement in construction innovation. The cost reduction factor is discussed enormously in the literature as a main driver and often the only selection criterion especially for the public clients in innovation (Bingham, 2003). Lim and Ofori (2007) argue that it is an inadequate incentive for contractors and construction firms to innovate.

Some researchers discuss the benefits of innovation beyond the product and technological development, for example competitive advantage achieved through competition and improved firm reputation (Gambatese and Hallowell, 2011; Ozorhon et al. 2010; Dulaimi, 2007). Competitive advantage is recognised as the added-value (Poter, 1998) motivation for the organisations to explore new philosophies to gain an advantage over their competitors. Dulaimi (2008) describes examples of the business development agenda of some organisations including quality assurance, total quality management and lean thinking as an incremental improvement to the existing business.

The construction industry is notable for its use of a ‘client-driven’ approach to innovation. Therefore, clients are a dominant factor in driving innovation in the construction innovation literature. The role of clients and end-users in contributing to innovation is extensively studied in the book entitled “Clients Driving Innovation” both theoretically and empirically (Brandon and Lu, 2008). However, prior to the book’s publication, numerous other authors (Nam and Tatum, 1997; Winch, 1998; Salter and Gann, 2003; Rose and Manley, 2010) also examined the significant role clients play in innovation.

Technology and technological improvement and their effect on the construction innovation as a driver are widely discussed in the literature (Manseau and Seaden, 2001; Tatum, 1989; Arditi et al., 1997; Bossink, 2004; Gann, 2000; Ozorhon et al., 2010; Bossink, 2007). In addition to studying technology itself as a driving force for innovation, a few researchers have examined drivers and antecedents in the adoption of Information and Communication Technology (ICT) and Computer-aided design (CAD) (Khosrowshahi et al., 2014). In some studies, ‘innovativeness’ is measured by the number of advanced technologies adopted (Manley and Mcfallan, 2006).

R&D activities are highly emphasised in studying innovation drivers within the construction industry. Environmental sustainability for example, reduction in waste, energy consumption, and carbon emission are denoted as other factors in promoting innovation (Qi et al., 2010; Ozorhon, 2013; Bossink, 2004; Brandon and Lu, 2008). The degree of influence of each factor is also debated in some of the literature, for example Gann (2000) argues that demand-pull is a stronger driver than technology-push. Table 2.2 frames the factors observed through the literature review that drive construction innovation.

**Table 2.2: Drivers of Construction Innovation**

<b>Author(s)</b>	<b>Drivers</b>
<b>Tatum (1989); Arditi et al. (1997); Bossink (2004, 2007); Gann (2000); Ozorhon et al. (2010)</b>	(client) demand-pull vs. (contractor) capability-push,
<b>Tatum (1989); Arditi et al. (1997); Bossink (2004, 2007), Gann (2000), Ozorhon et al (2010)</b>	Technology-push
<b>Toole (1998); Gambatese and Hallowell (2011); Ozorhon et al. 2010; Thorpe et al. (2009); Slaughter (1998)</b>	Increase performance and productivity (cost saving, desired duration, improved quality) Improve efficiency of your firm Desire to improve firm's reputation
<b>Gambatese and Hallowell (2011); Ozorhon et al. (2010); Dulaimi (2008)</b>	Competitive advantage Competition
<b>Blayse and Manley (2004); Kulatunga et al., (2011); Thorpe et al. (2009); Ozorhon et al. (2010); Bossink (2004); Brandon and Lu (2008)</b>	Clients End-user requirement Innovation brokers Champions suppliers innovation leaders Head contractor requirement
<b>Slaughter (1998)</b>	Easier work process Improved ability to attract new employees
<b>Blayse and Manley (2004); Kulatunga et al., (2011); Thorpe et al. (2009); Ozorhon et al. (2010); Bossink (2004)</b>	Regulations/standards/government Manufacturing firms Procurement system Absorptive capacity

<b>Bossink (2004)</b>	Knowledge exchange: <ul style="list-style-type: none"> <li>• Stimulation of research</li> <li>• Creation of knowledge networks</li> <li>• Programs promoting collaboration</li> <li>• Broad view of risk</li> <li>• Integrated and informal R&amp;D function</li> <li>• Effective information gathering</li> <li>• Training of workers on the site</li> <li>• Lateral communication structures</li> </ul> Boundary spanning: <ul style="list-style-type: none"> <li>• Integration of design and build</li> <li>• Mechanisms for sharing financial risks and benefits</li> <li>• Coordination of participating groups</li> <li>• Explicit coordination of the innovation process</li> <li>• Strategic alliances and long term relationships</li> </ul>
<b>Ozorhon et al. (2010)</b>	Environment/sustainability Aesthetics/design trends

Classical economics studies such as those of Schumpeter (1939), Schmookler (1966) and Freeman (1990) have argued the importance of innovation and financial performance. Within the Engineering Procurement and Construction (EPC) industry, it is generally assumed that innovation is necessary to lower costs, increase functionality and maintain market share (Seaden et al., 2003; Thomas et al., 2004; El-Mashaleh et al., 2006; Toole et al., 2013).

Hierarchical boundaries within the project teams can restrict communication as well as various knowledge-creating activities in construction projects (Fong, 2008). The boundary that exists between clients, consultants and contractors due to a diverse body of knowledge is one of the innovation barriers in the construction sector,

“knowing differently, innovating together” (Fong, 2008). The diversity of internal and external stakeholders also raises innovation barriers (Hartmann, 2008). He argues two reasons for resistance to innovation, one being ‘resistance due to risk’ and the other being ‘resistance due to behavioural change’.

Human-beings are naturally resistant to risk. Risk associated with innovation is one of the barriers in the construction industry. Ivory (2005) mentions two types of risk involved in construction projects; short-term risks such as late or over-budget projects and long-term risks such as high maintenance costs which are a possible threat to clients and may slow down the rate of innovation (Hartmann, 2008). Individuals typically tend to sustain their habits towards an existing practice and preserve the status quo rather than constantly change their behaviour (Hartmann, 2008; Gambatese and Hallowell, 2011). As mentioned in the previous section, clients are key to influencing conduct innovation. Hartmann (2008) argues that the culture of the client must allow for approaching the construction project differently and for using the potential of different procurement strategies that establish innovation-demanding procedures. The characteristics of the construction itself, for example being fragmented (Naaranoja et al., 2008) or of a project-based nature (Dikmen et al., 2005) are barriers to innovation (Naaranoja et al., 2008).

In addition, Hampson and Brandon’s (2004) report demonstrated a number of barriers to innovation within the Australian construction industry. The barriers ranged from the individual to the national level. They included the “cyclical nature of the industry”, “a dearth of client and industry leadership”, “a limited history of business deliverables from researchers”, “the self-interest of many participants”, “the inability of the industry to foresee the tide of competition (in global or green terms)”, “insufficient trust between industry and researchers with respect to sharing vital information”, and “the lack of a long-term funding basis for a national research and development (R&D) centre” (Hampson and Brandon, 2004, p. 10). In addition, Hampson and Brandon (2004) mentioned the low potential of small and medium enterprises (SME) in adding value to the industry because of similarly being fragmented, cyclical and conservative by giving the scale of SMEs make up 94 per

cent of the Australian construction industry, which was 94 per cent. Firms' characteristics and organisational culture are highlighted in some researches as barriers to innovation (Dubois and Gadde, 2002; Acar et al. 2005). Acar et al. (2005) similarly recognised that the organisational culture was a main factor in the fact that the application of information and communications technologies (ICT) in construction firms was more substantial than technical problems. Dubois and Gadde (2002) state that the industry is tight to individual projects, but at the same time loose in the permanent network which makes it difficult to apply mechanisms to handle complexity used in other business contexts. Furthermore, researchers such as Manley et al. (2005) and O'Farrell and Miller (2002) found that the high cost and insufficient time involved in construction innovations are the main obstacles in developing innovations in the construction industry. Three hundred and eighty-three Australian construction firms were investigated. O'Farrell and Miller (2002) describe an example of the use of new material as a substitute to pozzolans in cement in order to make the concrete more environmentally friendly. For the firm, price, which was driven by the competitive tendering process, was the main concern. To sum up, reviewing the literature on barriers to construction innovation shows that the key factors in preventing the industry from innovating are the industry culture and cost. Table 2.3 summarises the barriers to innovation identified by different scholars.



**Table 2.3: Barriers to Construction Innovation**

Author(s)	Barriers
<b>Gambatese and Hallowell (2011)</b>	Lack of technical capabilities Long payback period Lack of recognition of the value of the innovation Risk of failure
<b>Slaughter (1998); Gann (2000); Harty (2005); Manley and McFallan (2006); LePatner (2008); Miozzo and Dewick (2002); Manley and Blayse (2004)</b>	Contracting issues: Contracting strategies resulting in a fragmented and disjointed design and construction process Choice of firms based on low bid Procurement system
<b>Gambatese and Hallowell (2011); Ozorhon et al. (2010); Manley and Blayse (2004)</b>	Industry regulations and codes Lack of government role model Inappropriate legislation regulations/standards
<b>Gambatese and Hallowell (2011); Murphy et al., (2011)</b>	Poor/Lack of communication between project participants
<b>Dikmen et al. (2005); Ozorhon, et al. (2010)</b>  <b>Gambatese and Hallowell (2011)</b>	Characteristics of the construction industry: Project-based nature Price-based competition Temporary nature of construction projects Adversarial approaches within the supply chain Fragmented nature of construction business Project delivery method
<b>Ozorhon et al. (2010); Toole (1998, 2001); Mitropoulos and Tatum (1999)</b>	Economic conditions Availability of financial resources Financial resistance
<b>Toole (1998, 2001); Mitropoulos and Tatum (1999)</b>	Technological and employee resistance risks
<b>Hamel (2006)</b>	Tight organisational controls that hamper pursuit of radical innovations with potentially large paybacks

<b>Dikmen et al. (2005)</b>	Political conditions
<b>Blayse and Manley (2004)</b>	Firms' innovation strategy Lack of incentives Relationships with manufacturers Knowledge codification
<b>Murphy et al. (2011)</b>	Lack of technical competency of innovation champion
<b>Manley and Blayse (2004); Murphy et al. (2011)</b>	Inappropriate culture and context
<b>Gambatese and Hallowell (2011); Ozorhon et al. (2010)</b>	Fear of change Unwillingness to change
<b>Ozorhon et al. (2010)</b>	Risk in commercialising innovations Extensive inter-organisational change required Lack of awareness Lack of end-user involvement Lack of innovative investment procedure practices (R&D, training and education) Lack of clear benefits Belief that the industry is doing well without innovation
<b>Toole (1998, 2001); Mitropoulos and Tatum (1999); Ozorhon et al. (2010)</b>	Employees' resistance Lack of qualified staff

Similar to drivers and barriers to innovation, the study of enablers of construction innovation has also been carried out by scholars. Egbu (2004) viewed enablers of innovation in terms of strategic decision-making within organisations. He discusses that any innovation strategy must be supported from the top managerial position and it is essential to be supported by the organisation's rank and file, and sit naturally within the organisation's overall strategy. Likewise, Dulaimi et al.'s (2003) study on the Singaporean construction industry concluded that a successful innovation needs to be supported throughout the implementation process by high-managerial commitment.

To provide further insight into the factors that facilitate innovation, Sexton and Barrett (2003) studied seven small firms over an 18 month period. They realised that the power of the firms' owners and the type of innovation is brought together in the decision-making process of operating innovation. In addition, they concluded that the process of innovation is behavioural and cyclical in nature. Furthermore, growing sustainable construction practices is a potential driver for innovation (Hill and Bowen, 1997; Raynsford, 1999).

Manley et al. (2005) pointed out that a culture that supports innovation is one of the key elements in maintaining innovation within organisations. They emphasised business strategies including investing in R&D, adopting high numbers of advanced practices and developing innovation with a higher degree of novelty. Ling (2003), on the hand, articulated that adopting novel practices is enabled only if it is in the interests of all members of the team and within the capabilities of the people involved. Table 2.4 summarises the enablers to innovation identified by different scholars.

**Table 2.4: Enablers of Construction Innovation**

<b>Authors</b>	<b>Enablers</b>
<b>Gambatese and Hallowell (2011)</b>	Support from upper management Owner/client support Organisation culture Presence of an innovation champion Communication
<b>Ozorhon et al. (2010)</b>	Leadership Supportive work environment Collaboration with partners Deep understanding of the customer Education & training policy Knowledge management practices Encouraging staff to get involved with external networks Use of problem solving techniques Awards, grants, funds Government schemes Reward schemes Emphasis on R&D

## **2.10 Individual Overview**

Another perspective of the innovation literature is studying the individuals' role in implementing innovation. An individualist perspective makes predictions based on the assumption that individuals are the source of innovation (Egbu, 2008). Yet again, the unique characteristics of the construction industry are pointed out and often compared to manufacturing in terms of the level of involvement of individuals and the team (Blayse and Manley, 2004; Gann et al., 1998). In a project-based industry, project participants are involved temporarily. Slaughter (1998) examined the role of builders in the construction innovation process. The role of clients has been studied extensively in the literature as the inhibitor and catalyst (by extracting pressure to

improve overall performance, devising strategies to cope with unforeseen changes and demanding high standards) to foster innovation (e.g. Brandon and Lu, 2008; Gann and Salter, 2000; Barlow, 2000). It is highlighted that champions play an important role in promoting new ideas and overcoming the barriers to innovation in organisations (Nam and Tatum 1989; Nam and Tatum, 1997; Hartmann, 2008; Widen et al., 2008; Sexton et al., 2008). “A new idea either finds a champion or dies.” (Schon, 1963, p. 84).

Becoming a champion stems from individual rather than from managerial intervention (Markham and Griffin, 1998). Champions are characterised as ‘self-confidant’, ‘persistent’, ‘energetic’ and ‘risk prone’ (Howell and Higgins, 1990). Hartmann (2008) discusses the different types of innovation champions and criticises the lack of studies on construction innovation champions. He argues that the resistance to innovation in construction projects is mostly caused by a temporary coalition of independent organisations. He introduces a new type of champion called the “integrated champion” who needs to remove cooperation barriers and make an innovative idea a desired part of the project. Earlier, the perspective of the key individuals is briefly explained by Rothwell (1994), which was more focused on the team level, for example ‘technological gatekeepers’, ‘product champions’, ‘brokers’ and ‘change agents’. Table 2.5 summarises the key literature reviewed in respect to innovation in the construction industry.

**Table 2.5: Key Literature Based on Construction Innovation**

<b>Author</b>	<b>Title</b>	<b>Background</b>	<b>Method of Study</b>	<b>Result of Study</b>
<b>Akintoye et al. (2012)</b>	Construction Innovation and Process Improvement	To emphasise the role of innovation and process improvement in construction industry	This book is divided into three broad categories (theory and practice; process drivers; future technologies) and includes 18 chapters authored by different researchers	Highlighted the importance of innovation in the construction industry and enhanced knowledge in delivering future construction technologies
<b>Hardie and Newell (2011)</b>	Factors influencing technical innovation in construction SMEs: an Australian perspective	To establish whether any common lessons can be drawn from the experience of individuals who are against or in favour of technical innovation in SMEs	A value tree developed from the literature by using the analytical hierarchy process methodology	Revealed the importance of supportive clients and significant differences between small- and medium-sized companies
<b>Bröchner (2010)</b>	Construction contractors as service innovators	To study the internal and external factors for intensity of technological and non-technological innovations	44 questionnaire survey responses from the 50 largest construction contractors in Sweden	Indicated that competence patterns in firms are important for understanding how firms innovate
<b>Kale and Arditi (2009)</b>	Innovation diffusion modelling in the construction industry	To study the diffusion of a technological innovation in Turkish architectural design practice	Used non-uniform influence model	Addresses the limitations of previous innovation diffusion research and provides quantitative insights into the diffusion of innovation; knowledge that is lacking in the construction management literature
<b>Brandon and Lu</b>	Clients Driving Innovation	To investigate the role of clients in overcoming the	This book is arranged in three sections (the context	Provided diverse views on the role stakeholders (mostly clients)

<b>(2008)</b>		perception of the construction industry as a non-innovative industry	for innovation; the innovation process; moving ideas into practice), consisting of 26 diverse articles	have in the concept of driving construction innovation
<b>Lim and Ofori (2007)</b>	Classification of innovation for strategic decision making in construction businesses	To provide a classification of innovation to guide construction firms to develop innovation strategies for a competitive advantage	21 interviews with construction practitioners	Identified three classes of innovation: innovations that consumers are willing to pay for; innovations that reduce contractors' construction costs; and innovations that encompass intangible benefits, thus providing contractors with a competitive advantage
<b>Manley (2006)</b>	Identifying the determinants of construction innovation	To examine the drivers and barriers to construction innovation in the Australian construction industry	400 questionnaire surveys and 12 case studies	Gives recommendations for businesses to improve their innovation performance by focusing on partnering and training programmes to enhance managerial and social skills to overcome innovation barriers
<b>Miozzo and Dewick (2004)</b>	Innovation in Construction: A European Analysis	To identify key features of innovation in the construction sector To explore the innovation process related to thermal insulation and active solar heating systems	70 interviews with senior managers from different stakeholders in Denmark, France, Germany, Sweden and the UK	Identified two main themes as the weakness of 'system innovation', which were "the effect of corporate strategy and structure on innovation" and "the importance of inter-organizational networks for innovation"
<b>Bossink (2004)</b>	Managing drivers of innovation in	To identify drivers of construction innovation and	66 experts in construction innovation	Provided a list of drivers under four themes, which were

	construction networks	manage the innovation process	8 meetings 28 interviews Gathering info from 45 documents	“environmental pressure”, “technological capability”, “knowledge exchange” and “boundary spanning”
<b>Miozzo and Dewick (2004)</b>	Networks and innovation in European construction: benefits from inter-organisational cooperation in a fragmented industry	To explore the relationship between inter-organisational networks and innovation in the construction industry in 5 European countries	Interviews with different stakeholders in 5 European countries	Suggestions made to strengthen inter-organisational cooperation in order to enhance the performance of the construction industry
<b>Miozzo and Dewick (2004)</b>	Networks and innovation: sustainable technologies in Scottish social housing	To understand innovation in small construction firms	Action research Case study (7 SME firms in the UK) 4 semi-structured interviews from each firm (28 in total)	Identified aspects influencing motivation for successful innovation (power of owners, type of innovation, process of innovation) Identified the innovation differences between small and large construction firms
<b>Sexton and Barrett (2004)</b>	The role of technology transfer in innovation within small construction firms	To study technology transfer as movement of knowledge from one firm to another	Case study and action research with seven small construction companies	A model presented to help small construction firms to better understand and manage technological innovation
<b>Holmen et al. (2003)</b>	Building relationships for technological innovation	To argue that many initiatives are taken based on models and theories developed on the basis of experience in other industries. To argue the importance of	22 in-depth semi-structured interviews, field trips and document studies of two construction projects in Norway and Denmark on MSTF technology (construction of multi-	Analysed the projects in terms of relationship substance (actor bands , resource ties and activity links) The logic of trial-and-error innovation processes, which rely on learning across a sequence of



		studying the initiatives to 'building relationships for technological innovation' in the construction industry To implement inter-firm relationships and technological innovation from an IMP perspective	storey timber frame)	projects, is found to be difficult to implement in a construction industry characterised by an organisation of shifting coalitions around unique projects
<b>Salter and Gann (2003)</b>	Sources of ideas for innovation in engineering design	To explore the sources of ideas for innovation	Case study and survey from designers in Arup	Identified different strategies for innovation in Arup and outlined patterns of innovation in project-based firms
<b>Davey-Wilson (2001)</b>	Innovation in the building process- a postgraduate module	To discuss the issues involved in introducing students to the concept of innovation in the construction process	Conceptual article	Suggested new ways of teaching the innovation construction, taking realistic approaches
<b>Slaughter (2000)</b>	Implementation of construction innovations	To examine how users and manufacturers learn about a new technology, and how they may apply that learning to create related innovations	A detailed case study of a single (major) innovation (stressed-skin panels) in the construction of residential housing Structured interviews with manufacturers and experienced users of the stressed-skin panels	A de facto design partnership exists among users and manufacturers Users receive benefits and possess capabilities which are unique to their implication role, including the accessibility and immediacy of the required information. The significance of user contributions in innovation of manufacturing products. The product development process

				or the product itself can be modified to take advantage of user innovation, which is an advantage in responding to users' requirements and also to reduce the time required by manufacturers to cycle products
<b>Barlow (2000)</b>	Innovation and learning in complex offshore construction projects	To explore the problems and solutions in aligning the construction industry to its customers in complex project system types in offshore projects	Case study of British Petroleum (BP)	Concluded that parts of the construction industry can be similar to CoPS and highlighted the problems regarding the construction industry which need to be addressed
<b>Gann and Salter (2000)</b>	Innovation in project-based, service-enhanced firms: the construction of complex products and systems	To study management and innovation in project-based firms in engineering and construction	30 organisations including design, engineering and construction firms. Semi-structured interviews with two firms - each with up to 40 interviews	Recommended a need for a conceptual framework to understand new management practices to link project and business processes in order to improve performance of projects
<b>Veshosky (1998)</b>	Managing innovation information in engineering and construction firms	To investigate the way in which project managers achieve information about innovations in large US construction companies	Interview and survey questionnaire with managers of 50 firms	Recommended that managers should have encouraging and motivational attitude towards innovation in order for the construction industry to be improved in the US
<b>Slaughter (1998)</b>	Models of construction innovation	To develop models which reflect the unique characteristics of construction including scale, longevity	Discussion article	Developed 5 models of construction innovation as incremental, modular, architectural, system and radical

		and complexity		
<b>Winch (1998)</b>	Zephyrs of creative destruction: understanding the management of innovation in construction	To put forward a comprehensive framework for the management of innovation in construction in order to address the problems at the institutional and firm levels in the construction industry	Discussion and conceptual article	Identified the gaps in construction innovation studies and called for more case studies on construction innovation
<b>Nam and Tatum (1997)</b>	Leaders and champions for construction innovation	To study the role of individuals in the success of the innovation process in construction	10 case studies of construction innovation (all product innovation - e.g. bridge, tunnel and office building etc.)	Highlighted the importance of owner's leadership and top management. Opposite to manufacturing, no role/position of 'champion' found in construction projects. Recommended appointing champion position in construction projects, similar to manufacturing
<b>Slaughter (1993)</b>	Builders as Sources of Construction Innovation	To demonstrate the widespread occurrence of innovation in the construction industry and builders as a source of innovation rather than manufacturers of materials	100 in-depth interviews with manufacturers of stressed-skin panels (7 companies), contractors, vice-presidents and research directors, builders and presidents and project managers (six construction companies)	Demonstrated the ability of builders to develop more effective innovations than the manufacturers. Recommended coordination between on-site builders and manufacturers
<b>Slaughter (1993)</b>	Innovation and learning during implementation: a	To expand the theoretical and empirical understanding of "learning-by-doing" and	Interviewed 100 people from residential construction and	Highlighted the importance of cooperation of innovation users with manufacturers in process of

	comparison of user and manufacturer innovations	“learning-by-using” concepts in construction innovation process	manufacturing of stress-skin panels	developing the component products of construction
<b>Nam and Tatum (1989)</b>	Toward understanding of product innovation process in construction	The main theme of this book is change in the construction industry, which historically reviews the change in products, development processes, and information and communication technologies (ICTs) in the construction industry	The book is divided into three parts; the machine age, the digital age and knowledge for innovation	Discussed the ‘possibilities’, ‘potential’ and ‘opportunities’ for new products and new ways of working based upon new technologies
<b>Nam and Tatum (1988)</b>	Major characteristics of constructed products and resulting limitations of construction technology	To describe the major characteristics of construction projects as a product	Discussion article	Provided suggestions for construction firms to increase the degree of integration between design and construction in order to develop new technologies and gain a competitive advantage
<b>Tatum (1987)</b>	Process of innovation in construction firm	To describe major steps and processes of construction innovation in comparison with other industries	Discussion article	Highlighted the significant differences in the innovation process in the construction industry compared with other industries and concluded that project-based characteristics of construction can be an incentive to “find a better way” and increase the rate of innovation

<b>Tatum (1984)</b>	What prompts construction innovation?	To provide guidelines for industry professionals and researchers in order to support engineering and construction innovation. To identify factors promoting construction innovation	Case study of power plant project	Provided seven different types of construction innovation
-------------------------	---------------------------------------	--	-----------------------------------	---

## 2.11 Summary

This chapter reviewed the existing literature in two broad sections: innovation studies in organisations, and innovation studies specifically within the construction industry. As was presented, research on innovation has developed and engaged in various shapes over the last 60 years. The innovation literature is a diverse and fragmented body of knowledge. Different scholars from a diverse school of thoughts adopt different ontological and epistemological positions to examine and report on a phenomenon that is complex and multidimensional (Wolfe 1994).

The main focus has been on different approaches to only the innovation measurement and the number of different measures. In general, the processual approach to innovation made it difficult to find a comprehensive body of literature regarding innovation issues in which the issue of innovation discourse might be discussed. In other words, this diversity has been a challenging task to represent in a synthesised framework. There are two main perspectives in studying innovation; the structuralist perspective and the individualist perspective. The structuralist perspective concerns analysing organisations as systems of interdependent parts, which cannot exist autonomously. This approach assumes that the characteristics of the organisation such as size, strategy and longevity play a crucial role in organisational innovations (Zaltman et al., 1973; Pierce and Delbecq, 1977). There are criticisms of the structuralist perspective of studying innovation to represent the nature of organisation and innovation as an objective entity which is driven predominantly by predictable factors (Slappendel, 1996). In contrast, the individualist perspective is grounded in social psychology, which predicts the assumption that individuals are the source of innovation. Individuals such as champions or change agents in an organisation are focused on this perspective (Maidique, 1980; Rogers, 1983). However, there are recommendations that both organisational and individual levels of analysis should be considered in studying innovation (Van de Ven and Poole, 1990; Swan et al., 1999; Egbu, 2008).

To summarise, research studies on innovation in the construction industry are a disjointed body of knowledge. The structuralist perspective of construction innovation has been at the centre of scholars' attentions. Characteristics of the industry, drivers and barriers are the main focus of the studies. Nevertheless, the individualist perspective in construction management studies has been downplayed.

# Chapter 3 Research Methodology

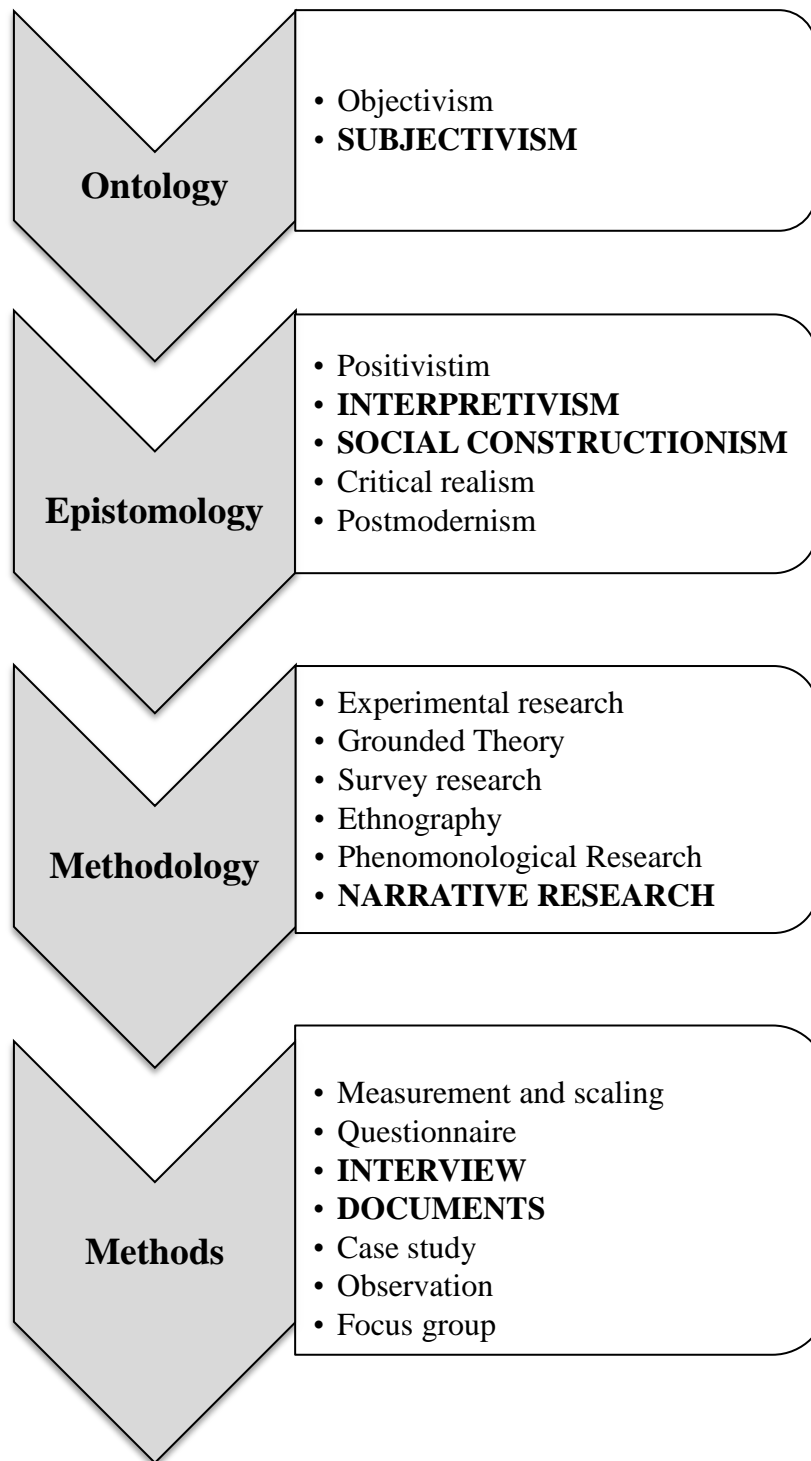
## 3.1 Introduction

Research methodology is a generic term for “the combination of techniques used to inquire into a specific situation; and methods are individual techniques for data collection, analysis, and so on” (Easterby-Smith et al., 2012, p. 18). Contradictions and inconsistencies in methodological philosophies arise mainly because they are “defined in such a way as to be able to differentiate between and across them on the basis of a fixed set of principles and procedures” (Goulding, 1999, p. 862). Identifying and employing the appropriate theoretical perspective (Philosophy) for a research study is crucial and can also be challenging.

This chapter presents the approach used to undertake the investigation of the practitioners’ understanding of innovation in the construction industry, and the underlying assumptions that have informed the chosen methodology for the research. Clarifying the ontological and epistemological commitments, and the choice of methodology that follows, the chapter also articulates the processes of the study conducted in ten sections. The first section explains the reflexivity of research. The second section explains the different philosophical assumptions, paradigms and considerations of research. This is followed by describing different strategies and design approaches to research. Finally, the last section demonstrates the methodology of this research by explaining reflexivity and situating the researcher within the research and research philosophy, thus leading to the choice of data collection and analysis as well as the data collection planning and the procedures that took place before and after the interviews. The elements of the research process are schematically represented in Figure 3.1:



**Figure 3.1: The Research Process**



Source: adapted from Crotty (1998)

### 3.2 Reflexivity

“Without some degree of reflexivity any research is blind and without purpose” (Flood, 1999, p. 35). Reflexivity is a significant element in interpretive research which refers to acceptance of the fact that a research is being created through the active roles of the researcher, participants and their relationships. It refers to recognition of the influence of the researcher’s own background and perceptions brought to the qualitative research process (Ruby, 1980; Lingard et al., 2008). On the other hand, reflexivity means giving our inevitable reflections, which are biased perceptions of ourselves.

The researcher strongly advocates that the pre-understandings of the research subject impacts on the result of the research. This argument has been put forward by some researchers, for example Chia (1996), Palmer and Dunford (1996), and Watson (1995). Pre-understandings as “subjective meta-theoretical commitments” are being attached to ourselves and hence must be inspected carefully through our capacity for reflexivity (Bourdieu, 1990). However, as also discussed by Marcus (1994), many aspects including gender, race, class, culture and other factors remain unconscious to researchers.

Schutz, cited in Burrell and Morgan (1979, p. 244), argues that “consciousness is fundamentally an unbroken stream of lived experiences which have no meaning in themselves”. Meaning is dependent upon reflexivity – “the process of turning back oneself and looking at what has been going on”. There is the responsibility of being aware of how we are subjective (partial) and selective, as Antonacopoulou and Tsoukas (2002) state, “to reflect on our reflections”. Talmy (2011) points out that the researchers are not only instruments for collecting data and recording facts about the world, they also actively engage with the subject of the study in a social practice to draw out a representation of reality. Finlay (2002) argues that researchers should be aware of how far they give a methodological account of their experiences and how much personal detail to relate and to what extent they represent a multiplicity of

voices and lose their own. However, Antonacopoulou and Tsoukas (2002) urge researchers not to fall in love with their own voices and neglect those of participants.

Brown and Phua (2011) call to stimulate construction management researchers to set a self-identity of themselves as a starting point for any investigation of practices in the construction industry. Similarly, Chan and Liang (2012, p. 1201-1202) assert that:

*“it is the identity of ourselves as researchers that ought to come under initial scrutiny before one can even begin to problematise the identity of others. [...] the fluidity of our own identities as researchers could result in the re-telling of some organisational tales, and the censoring of others.”*

Similarly, Harding (2007) emphasises the importance of influence of identity of the researchers in interpretation of collected and observed data.

### **3.3 Research Philosophy**

Research philosophy describes how research knowledge assumptions adopted by the researcher notify her/his specific research approaches, strategies and methods. It refers to the development of knowledge in terms of its nature in a particular field of study (Johnson and Clark, 2006; Saunders et al., 2012). The following sub-sections explain the philosophical assumption, research ontology, research epistemology, and research paradigms as well as the positions adopted by the researcher.

#### **3.3.1 Philosophical Assumptions**

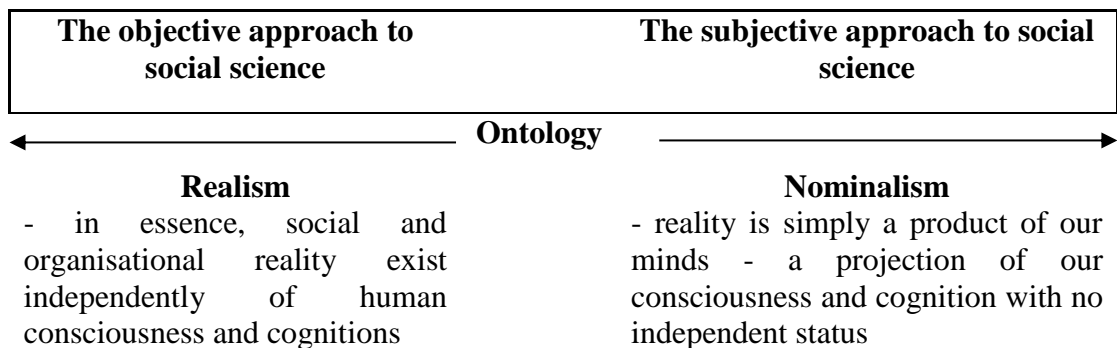
The underlying ontological and epistemological assumptions held by the researcher are important as they inform the choice of research methodology and influence interpretation of findings through to the conclusion drawn (Bryman and Bell, 2007). The adaptation of a research methodology (i.e. a combination of approaches to inquire into a particular area) and a research method (i.e. techniques for data

collection and analysis), and the interpretation of research findings are shaped by researchers' assumptions about human knowledge and the nature of reality (Denzin and Lincoln, 2011; Easterby-Smith et al., 2012). Research philosophy has two main areas of assumption: ontology and epistemology (Lincoln et al., 2011).

### 3.3.2 Research Ontology

Defined by Easterby-Smith et al. (2012, p. 18) as “philosophical assumptions about the nature of reality”, Ontology is a branch of philosophy consisting of two main features, objectivism and subjectivism (Creswell, 2007; Denzin and Lincoln, 2011). Objectivism points out social entities, which means that reality exists independent of social actors in relation to their existence. According to subjectivism, however, social phenomena are in fact created by social actors concerned with their existence (Denzin and Lincoln, 2011; Saunders et al., 2012).

**Figure 3.2: A Scheme for Analysing Ontological Assumptions about the Nature of Social Science**



Source: adapted from Burrell and Morgan (1979, p.3)

Easterby-Smith et al. (2012) classify ontology into four categories: realism, internal realism, relativism, and nominalism. (See Table 3.1)

**Table 3.1: Ontological Classification**

<b>Ontology</b>	<b>Realism</b>	<b>Internal Realism</b>	<b>Relativism</b>	<b>Nominalism</b>
<b>Truth</b>	“Single truth”	“Truth exists, but is obscure”	“There are too many truths”	“There is no truth”
<b>Facts</b>	“Facts exist and can be revealed”	“Facts are concrete but cannot be accessed directly”	“Facts are dependent on viewpoint of observer”	“Facts are all human creations”

Source: Easterby-Smith et al. (2012, p. 19)

Realism entails that reality is about the concrete social world which is “out there”, say the world of organisations, and individuals have no role in creating that – it is external to individual cognition. In contrast, the nominalist accepts that the social world is external to individual cognition; however, it is not concrete, but rather consists “of nothing more than names, concepts, labels, or conventions, which are used to structure reality” (Burrell and Morgan, 1979). Under such a premise, something like communication, negotiation, meaning and language are tools to describe, and to make sense of the organisational world.

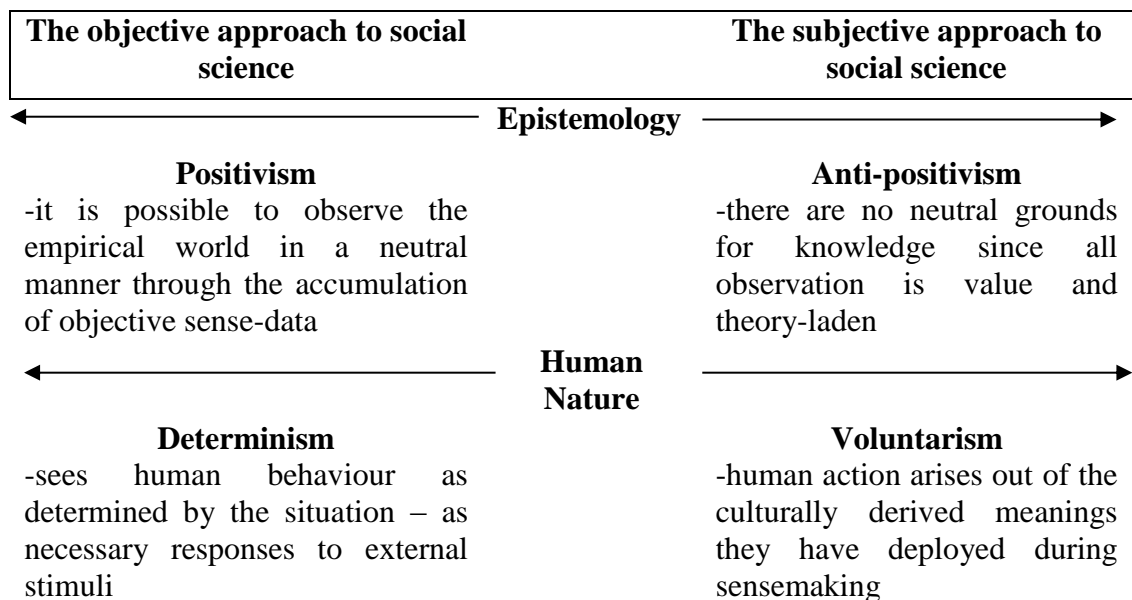
In between, internal realism assumes that there is a single reality but it is inaccessible, and only indirect collection of its fundamental physical processes is possible (Putnam, 1987). In contrast to internal realism, relativism entails that there is not a single reality that can be discovered, especially with regard to issues related to the social sciences - for example human behaviour. Reality could be defined and experienced differently by different people (Easterby-Smith et al., 2012). Latour and Woolgar’s (1979) work strongly influences this position. Their focus was on different debates about the explanation of observed phenomena and patterns within research laboratories. They pointed out that since people hold different perspectives, the truth of a particular idea is reached through negotiations between the main protagonists (Easterby-Smith et al., 2012). Nonetheless, Knorr-Cetina (1983) emphasised the importance of the impact of political business and financial resources

on the closure of these scientific discussions as the acceptance of a particular theory. Therefore, nominalism may vary from one contextual place and time to another (Collins, 1983). On the other hand, this position acknowledges labels and names used by individuals are shaped by their experiences (Easterby-Smith et al., 2012). In general, it presumes that different facts may be found by people; as a result there is no truth (Easterby-Smith et al., 2012). It also infers that social life is inexplicit and uncertain (unknown), and therefore social reality would be the creation of human beings through language and discourse (Cunliffe, 2001).

### 3.3.3 Research Epistemology

Epistemology or theory of knowledge deals with the views of interpreting knowledge (Koskinen et al., 2003), and asks questions such as ‘What constitutes knowledge?’. ‘Where is that knowledge located?’, ‘How is that knowledge acquired?’ (Cunningham and Fitzgerald, 1996).

**Figure 3.3: A Scheme for Analysing Epistemological Assumptions and Human Nature of Social Science**



Source: adapted from Burrell and Morgan (1979)

Epistemology is concerned with what comprises acceptable knowledge and what information a researcher considers to be substantial in the field of research (Denzin and Lincoln, 2011). It is concerned with the relationship between the knower and the fact which can be known (Guba and Lincoln, 1994; Creswell, 2007). Easterby-Smith et al. (2012, p. 18) define epistemology as “a general set of assumptions about ways of inquiring into the nature of the world”. Alongside a continuum of epistemology there are two contrasting positions; positivism and social constructionism. (See Table 3.2)

**Table 3.2: Contrasting Implications of Positivism and Social Constructionism**

<b>Implication</b>	<b>Positivism</b>	<b>Social Constructionism</b>
<b>The observer</b>	“must be independent”	“is part of what is being observed”
<b>Human interests</b>	“should be irrelevant “	“are the main drivers of science”
<b>Explanations</b>	“must demonstrate causality”	“aim to increase general understanding of the situation”
<b>Research progress through</b>	“hypothesis and deductions”	gathering rich data from which ideas are included
<b>Concepts</b>	“need to be defined so that they can be measured”	“should incorporate stakeholder perspectives”
<b>Units of analysis</b>	“should be reduced to simplest terms”	“may include the complexity of ‘whole’ situations”
<b>Generalisation through</b>	“statistical probability”	“theoretical abstraction”
<b>Sampling requires</b>	“large numbers selected randomly”	“small numbers of cases chosen for specific reasons”

Source: Easterby-Smith et al. (2012, p. 24)

Social constructionism argues that people understand the world differently through communicating and sharing experiences with others (Mangan et al., 2004; Easterby-Smith et al., 2012). This approach is developed by authors such as Berger and Luckmann (1966), Watzlawick (1984), and Shotter (1993). Habermas (1970), one of the leading social scientists, indicates that social constructionism is an interpretative method and social scientists should deeply understand the several constructions of

meanings that people provide through their experiences rather than collecting facts and inspecting how the specific patterns happen (Lincoln et al., 2011; Easterby-Smith et al., 2012). In contrast, on the other side of the continuum, positivism developed by Comte in 1853 emphasises the significance of the objectivity of reality and external observation of the knowledge (Remenyi et al., 1998; Mangan et al., 2004; Bryman and Bell, 2007).

The methodological implications of various epistemologies along with their relationships with ontologies are illustrated in Table 3.3. Strong positivism refers to strong or decisive verification of a proposition which fits with realism, whereas normal positivism or positivism refers to weak or probable indirect verification of a proposition and is concerned with internal realism (Ayer, 1971). On the other hand, normal constructionist or constructionist assumes that knowledge can be constructed along with the extant independent objective knowledge and is concerned with relativism. In contrast, according to strong constructionism, individual and social knowledge are the same, fitting within nominalism.



**Table 3.3: Methodological Implication of Different Epistemologies**

<b>Ontology</b>	<b>Realism</b>	<b>Internal Realism</b>	<b>Relativism</b>	<b>Nominalism</b>
<b>Epistemology</b> <b>Methodology</b>	Strong Positivism	Positivism	Constructionism	Strong Constructionism
<b>Aims</b>	Discovery	Exposure	Convergence	Invention
<b>Starting points</b>	Hypotheses	Propositions	Questions	Critique
<b>Designs</b>	Experiment	Large surveys; multi-cases	Case sand surveys	Engagement and reflexivity
<b>Data types</b>	Numbers and facts	Numbers and words	Words and numbers	Discourse and experiences
<b>Analysis/ interpretation</b>	Verification/ falsification	Correlation and regression	Triangulation and comparison	Sensemaking; understanding
<b>Outcomes</b>	Confirmation of theories	Theory testing and generation	Theory generation	New insights and actions

Source: Easterby-Smith et al. (2012, p. 25)

### 3.3.4 Research Paradigms

Research paradigms are defined as a set of philosophical assumptions that directs researchers' actions (Denzin and Lincoln, 2011; Lincoln et al., 2011). Saunders et al. (2012) explain the concept as a way of investigating social phenomena through particular understandings. On the other hand, paradigms attribute to research results a scientific revolution that can offer new theories, invaluable questions for scientists, and change the worldviews of people through independent and creative thinking (Mangan et al., 2004). Burrell and Morgan (1979) proposed a classification of social science paradigms for social science researchers and explained the subjective-objective dimension of the nature of science and the regulation-radical change of the nature of sociology. The fourfold classification of Burrell and Morgan is shown in Figure 3.4.

**Figure 3.4: Paradigms for the Analysis of Social Theory**

THE SOCIOLOGY OF RADICAL CHANGE			
Subjective	‘Radical humanist’	‘Radical Structuralist ’	Objective
	‘Interpretative’	‘Functionalist’	

**THE SOCIOLOGY OF REGULATION**

Source: Burrell & Morgan (1979, p. 22)

Each of these classifications is related to different schools of thought which share common ontological assumptions despite their different perspectives (Morgan, 1984). The functionalist paradigm is rooted in the view that society has a tangible, real existence, and an organised nature in which can be generated a regulated state of affairs (Burrell and Morgan, 1982; Morgan, 1984). This paradigm appreciates the role of human beings - for instance behaviourism and determinism in society in social theory and social system theory - and values objectivity and a value-free social science. In this paradigm, empirical knowledge is generated through rigorous scientific methods (Burrell and Morgan, 1982; Morgan, 1984). However, the interpretive paradigm refers to the perspective of a social world where the world has a very unstable ontological status, and social reality exists in an unfixed sense as the outcome of the subjective experience of people (Burrell and Morgan, 1982; Morgan, 1984). This paradigm is concerned with multiple realities and the subjective nature of science. It views scientific knowledge as problematic and common sense knowledge (Morgan, 1980; Burrell and Morgan, 1982). Including hermeneutics,

ethnomethodology, and phenomenology and symbolic interactionism, the paradigm criticises the functionalist paradigm for its objective investigation of social science (Morgan, 1980; Burrell and Morgan, 1982; Morgan, 1984).

The radical humanist paradigm is similar to the interpretive paradigm which focuses on how reality is socially constructed and sustained through subjective approaches such as anti-organisation theory (Burrell and Morgan, 1982; Morgan, 1984). This paradigm views the creation of reality as being affected by human beings, particularly their psychology and social processes (Morgan, 1980; Burrell and Morgan, 1982; Morgan, 1984). Consequently, it is related to the investigation of how people's thoughts and actions relate (Morgan, 1980; Burrell and Morgan, 1982; Morgan, 1984).

Similarly, the radical structuralist paradigm highlights that reality depends on the social view as the dominating force (Morgan, 1980; Burrell and Morgan, 1982; Morgan, 1984). Nevertheless, this paradigm is attached to a concrete ontological status and relies on principles that reality exists independently without the effect of people's perceptions.

Criticising Burrell and Morgan's (1982) theory of research paradigms, Deetz (1996) points out that Burrell and Morgan have perpetuated the subjective-objective controversy by refining the research approaches and have socially arranged the meaning and conception of issues. Deetz (1996) suggests a new organisational theory by altering the paradigms to discourses and retaining the orientations.

According to Deetz (1996), normative is a modern and progressive discourse emphasising objectivity and operationalisation in order to present codification, orientation, regulation, and normalisation (Deetz, 1973; Hollway, 1984; Deetz, 1996). Therefore, similarly to the natural sciences, it is related to statistical reduction, hypothesis, and pattern recognition (Deetz, 1996). The traditional and pre-modern interpretive discourse accepts the representational and consensual view of science which is similar to the normative view (Gergen, 1992; Deetz, 1996).

Focusing on the social rather than the economic aspect, it views organisation as a social site or a special kind of community sharing significant features with other communities, and human beings as active sense makers rather than objective, and emphasises the core conceptions and understandings derived subjectively from the phenomena under investigation (Gergen, 1992; Deetz, 1996). Often associated with the use of ethnography, phenomenology or hermeneutics through prolonged observation and in-depth interviews, views reality as socially constructed and sustained through norms and rituals within the field of human activity. Therefore, it deals with social and life functions of individuals beyond the work process (Frost et al., 1985; Deetz, 1996).

On the other hand, critical refers to the historical accomplishments of organisations within dominations and conflicts (Deetz, 1992, 1996). Being a late modern and reformist discourse, it also emphasises the “critique forms of domination” and “distorted communication” through demonstrating how “everyday life realities favour only specific interests” (Buchanan and Bryman, 2009, p. 34) and describes the effect of organisation and rationalisation of society on social (Alvesson and Willmott, 1992; Deetz, 1996).

### **3.4 Research Approaches**

This section explains three main research approaches; the deductive approach, the inductive approach, and the abductive approach (Thomas, 2004; Saunders et al., 2012). These approaches can be used independently or concurrently in a research. The following sub-sections explain each approach.

#### **3.4.1 Deductive Approach**

Deductive reasoning specifies that the conclusion drawn rationally from a set of assumptions would be true if all the assumptions were true (Ketokivi and Mantere, 2010; Saunders et al., 2012). The deductive approach is concerned with testing a theory that has already been developed before the data collection. In this approach,

researchers develop hypotheses or propositions associated with the theory from the academic literature in order to examine those (Saunders et al., 2012). A research strategy is designed in such a way as to test the findings, which leads to explanations of causal relationships between different variables relating to a particular phenomenon (Saunders et al., 2012). The deductive approach follows a positivism philosophy and its foundation is similar to natural science and scientific researches (Saunders et al., 2012). Hence, this approach requires a highly structured methodology to deliver repetition to guarantee reliability (Gill and Johnson, 2010; Saunders et al., 2012). Moreover, the deductive approach mainly captures the facts quantitatively while dealing with simple elements to assist better understanding of the concepts. In other words, it helps to operationalise concepts. Therefore, as Bryman (2012) and Saunders et al. (2012) mention, it is associated with quantitative research design.

### **3.4.2 Inductive Approach**

The inductive approach specifies that the conclusion is judged and verified through observations of the real world. It is built on theory generation in the form of a conceptual framework as a result of analysis of the collected data by the researcher, which leads to the generation of new insights into different entities (Eisenhardt and Graebner, 2007; Saunders et al., 2009). Unlike the deductive approach, the basis of the inductive approach is in social science and follows an anti-positivism philosophy (Bryman, 2012; Saunders et al., 2012). The common research data collection method in the inductive approach is mainly associated with qualitative research design (Bryman, 2012; Saunders et al., 2012). This enables the researcher to explore different views of certain phenomena, and in contrast to the quantitative research approach, there is no need for a large sample of research (Easterby-Smith et al., 2008; Saunders et al., 2012).

### **3.4.3 Abductive Approach**

Abductive is a branch of the inductive approach with the aim of investigating a phenomenon to generate or amend a theory by discovering themes, and explaining patterns in the data collected (Ketokivi and Mantere, 2010; Saunders et al., 2012). The term abductive is coined by Peirce (1957) in contrast to deductive and inductive reasoning. According to Peirce, abductive approach is not a conscious logical process, but rather an intuitive leap that come forth as whole. “It is this intuitive grasping of the whole meaning of something without a conscious logical thought process that is the essential nature of aesthetic experience. This aesthetic felt meaning bypasses conscious critical filters that individuals may apply to information as they try to make sense of events and themselves. Although some individuals may reflect on the felt meaning and question it over time, there is a tendency to trust the intuitively grasped felt meaning because it is based in feelings- it feels right” (Taylor et al., 2002, p. 316) The abduction approach “moves back and forth between deduction as the theory-to-data approach and induction as the data-to-theory approach”, integrating these approaches to derive a conclusion (Saunders et al., 2012, p. 147). Hence, it enables researchers to lead their research procedures particularly data collection according to data analysis, to adopt their methodological choices flexibly, and to study unexplored issues (Easterby-Smith et al., 2008; Saunders et al., 2012). Table 3.4 shows the main characteristics of the discussed research approaches.

**Table 3.4: Deduction, induction, and abduction: from reason to research**

	<b>Deduction</b>	<b>Induction</b>	<b>Abduction</b>
<b>Logic</b>	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
<b>Generalisability</b>	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific and the general
<b>Use of data</b>	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
<b>Theory</b>	Theory falsification or verification	Theory generation and Building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

Source: Saunders et al. (2012)

### 3.5 Research Design

The overall research plan of how a researcher could collect and analyse data, answer research questions, and achieve research aims and objectives as well as address the ethical issues of the research is described as research design (Cooper and Schindler, 2011; Saunders et al., 2012). Research design refers to the set of procedures from the underlying philosophical position to the detailed research methods (Creswell, 2009; Birks and Mills, 2011). Therefore, the adoption of a specific research design is influenced by the nature of the research subject, philosophical assumptions, interests and experiences of researchers, research strategy, and methods of data collection, analysis, and interpretation (Creswell, 2009).

In conducting a research in social science, there are two main methods that can be used by researchers: quantitative and qualitative (Creswell, 2009; Saunders et al., 2009). Within a particular research, both qualitative and quantitative methods can be used, or they can be used separately (Creswell, 2009; Saunders et al., 2012). The following sub-sections explain both methods along with justifications for selecting each.

### **3.5.1 Quantitative Research Method**

The origination of quantitative research is from natural sciences, to investigate natural phenomena (Saunders et al., 2009). The positivist philosophical position advocates this method. It generally searches for relationships between variables in phenomena. Its focus is on collecting numerical data, measuring phenomena, and analysing the statistics with the aim of testing hypotheses (Creswell, 2009; Saunders et al., 2009). Yin (2009) describes quantitative research as statically structured in the presentation of data but difficult in initial design. Saunders et al. (2009) indicate that quantitative research has a systematic structure that limits the researcher's ability to discover new findings.

They further criticise the quantitative approach to research in terms of its limitation in closed questions, which causes some details in the research process to be ignored. Krathwohl (2009) articulates that the quantitative research method has a significant disadvantage in transferring information into summary measures as well as providing a clear picture of reality. In addition, the researchers are kept objectively separated from the subject of the study (McGuire, 1986; Remenyi et al., 1998; Krathwohl, 2009; Saunders et al., 2009). Therefore, research participants are not able to provide extra information to improve the understanding of the researcher and in cases where they could not answer correctly, the research enquiry would not be responded to accurately by the researcher (Cooper and Schindler, 2011).



### **3.5.2 Qualitative Research Method**

In contrast to quantitative research, qualitative research is not concerned with statistically examining the meanings, process and entities, but rather, it is associated with the quality of phenomena. Qualitative research is based on the interpretations of words rather than numbers. The qualitative research method is “a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem” (Creswell, 2009, p.4). This method involves different interpretations that make the world visible and turn it into sets of representations, namely interviews, field notes, photographs, and so on (Denzin and Lincoln, 2011). With the qualitative research method, researchers make sense of how people make sense of phenomena in terms of meanings that people give to particular natural settings (Denzin and Lincoln, 2011). Corbin and Strauss (2008) state that qualitative research focuses on discovering data and uncovering particularities of the phenomena as well as explaining findings according to the context of the study. Charmaz (2000) describes qualitative research as a comparative, descriptive and explorative research method that can deliver a better description of reality. Researchers have different techniques at their disposal to collect and analyse data. They are subjectively engaged in their activities to attain a complete understanding of participants involved in the chosen field (Silverman and Marvasti, 2008). Hussey and Hussey (1997) point out that qualitative research is less concerned with tangible aspects of a research, but is rather more subjective in nature, being concerned with things such as beliefs, values and attitudes. Hence, it helps researchers to understand human beings’ social activities and their world and cultural lives (Hussey and Hussey, 1997; Myers, 1997).

Qualitative research is suitable for investigation of a person’s experience and behaviour where it is required for an in-depth analysis of a phenomenon (Ghauri and Grønhaug, 2005). It normally advocates interpretivism as it explores patterns of associations between factors, as opposed to abstract interrelations achieved from examination of a large scale survey (Krathwohl, 2009; Saunders et al., 2012). Furthermore, qualitative research provides a rich insight into the research matter but

produces contextual rather than generalised findings (McGuire, 1986; Remenyi et al., 1998; Krathwohl, 2009; Saunders et al., 2009). In this respect, Corbin and Strauss (2008) state that the qualitative research method allows researchers to achieve an inner experience of the research participants. They also articulate that this method can provide beneficial possibilities and opportunities in learning more about the people within the context of the study as it places emphasis on dealing with people's beliefs, values, behaviours and feelings so as to understand their attitudes in relation to their experiences, beliefs, and values within a social context (Corbin and Strauss, 2008).

There are countless books and publications debating the selection of either quantitative or qualitative approaches in social science and psychology researches (e.g. Gummesson, 2000; Willig, 2001; Mason, 2002; Howitt and Cramer, 2005; Bryman, 2008; Flick, 2014). The use of qualitative methods has been highly acknowledged as a tool or technique when modelling very complex situations. It is defined as a “means for exploring and understanding the meaning of individuals or group ascribes to a social or human problem” (Creswell, 2009). Willig (2001) argues that qualitative researchers are concerned with the quality and texture of experience rather than working with predefined and preconceived ‘variables’. She further articulates that qualitative research is focused on “meanings attributed to events by the research participants themselves and using preconceived ‘variables’ would lead to the imposition of the researcher’s meanings and it would preclude the identification of respondents’ own ways of making sense of the phenomenon under investigation”.

The realisation of the importance of using qualitative methods within academic management research occurred at the beginning of the 21<sup>st</sup> century. This was when management research began to realise the failure to understand behaviour of humans by use of the quantitative research approach (Gummesson, 2000). Qualitative analysis allows to gain access to the mindset of an individual’s perception of life and reasoning for their subsequent behaviour. By understanding the reasons individuals

or groups behave in the manner they do, it is possible to model their behaviour and interactions.

The most common approach to the qualitative method is interview, which is involved with the measurement of the opinions of participants. The qualitative research approach is chosen in order to keep the questions broad-based in order to achieve in-depth experience of participants. Qualitative methods are the best or only way of addressing some research purposes and answering some types of question, such as in the following cases: (Richards and Morse, 2007)

- If the purpose is to understand an area where little is known or where previously offered understanding appears inadequate (thin, biased, partial)
- If the purpose is to make sense of complex situations, multi-context data, and changing and shifting phenomena
- If the purpose is to learn from the participants in a setting or a process the way they experience it, the meanings they put on it, and how they interpret what they experience

In contrast, quantitative research, which is a standardised method concerned with numbers, limits the ability “to reveal deep understandings about human interaction” (Pinnegar and Daynes, 2007, p. 16). Pinnegar and Daynes (2007) argue that the embedded assumption of a realist perspective is that things such as culture, human interactions and relationships can be dealt with similarly to physical things whereas an interpretive approach studies “things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them” (Denzin and Lincoln, 2000, p.3). The focus on ‘thick description’ is in contrast to quantitative researchers who “are deliberately unconcerned with rich descriptions because such detail interrupts the process of developing generalisations” (Denzin and Lincoln, 2000, p. 10). The researchers who adopt positivist and realist approaches aim to reach control, prediction, objectivity and generalisability and believe in things

and causes that are “out there” waiting to be discovered. In contrast, rather than being a mirror of reality, interpretivism theorises processes through which meaning is made (Hatch, 2002).

There are three methodological approaches in qualitative approach mentioned by Robson (2002); case studies, ethnography and grounded theory. Creswell (2007) identifies two more approaches to the qualitative research; narrative research and phenomenology. Table 3.5 shows the five approaches adopted from Creswell (2007).

**Table 3.5: Different Approaches to Qualitative Research**

<b>Characteristics</b>	<b>Narrative research</b>	<b>Phenomenology</b>	<b>Grounded theory</b>	<b>Ethnography</b>	<b>Case study</b>
<b>Focus</b>	Exploring the life of an individual	Understanding the essence of the experience	Developing a theory grounded in data from the field	Describing and interpreting a culture-sharing group	Developing an in-depth description and analysis of a case or multiple cases
<b>Type of problem best suited for design</b>	Needing to tell stories of individual experiences	Needing to describe the essence of a lived phenomenon	Grounding a theory in the views of participants	Describing and interpreting the shared patterns of culture of a group	Providing an in-depth understanding of a case or cases
<b>Data collection forms</b>	Using primarily interviews and documents	Using primarily interviews with individuals, although documents, observations, and art may also be considered	Using primarily interviews with 20-60 individuals	Using primarily observations and interviews, but perhaps collecting other sources during extended time in field	Using multiple sources, such as interviews, observations, documents, artefacts

Source: Creswell (2007)

### **3.6 Research Strategy**

Research strategy is defined as a “general plan of how the researcher will go about answering the research question” (Saunders et al., 2009). A research strategy should be chosen in such a way that enables the researcher to answer the particular research questions and meet the research objectives, contribute to existing knowledge and maximise the researcher’s available time and resources. Seven research strategies were identified by Saunders et al. (2009), and are as follows:

#### **1) Experiment:**

This strategy is often used in natural science, social science and particularly psychology. It is used to study the causal relationship between two variables and determine how the change in one independent variable will affect another dependent variable (Saunders et al., 2009). In general, it is associated with natural sciences, social science and psychology researches with a purpose to study causal links between dependent variables (Saunders et al., 2009).

#### **2) Survey:**

This is more often used in business and management research. It is applied to answer why, what, where, how much and how many questions. As a result, the survey strategy is often associated with the deductive approach such as questionnaires, structured observations, and structured interviews (Saunders et al., 2009). Generally, it is used in exploratory and descriptive researches with the deductive approach and usually tends to answer who, what, where, how much and how many questions (Saunders et al., 2009).

#### **3) Case Study:**

Yin (2009, p. 23) describes case study research as: “... an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly

evident”. Robson (2002) defines case study as “a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence”. In other words, the subject of the research is an example of a real life event, within the context in which it happens. The case study strategy is more often used in explanatory and exploratory research as the researchers have the ability during the case study strategy to determine the answer to questions of why, what, and how (Saunders et al., 2009). Yin (2009, p.178) defines a case study as “a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence”. Although both quantitative and qualitative data are used in the case study approach, the qualitative data is dominant (Robson, 2002). The case study involves detailed information collected by the researcher over a sustained period of time. It is bounded by time and activity, and the researchers (Creswell, 2009). In contrast to ethnography which involves participant observation over a long period of time, the case study is conducted through a series of sequential interviews over a short period of time (Yin, 2009).

#### **4) Action Research:**

This is a methodology in which a researcher actively observes a situation and engages with the phenomenon being studied to bring about change. Action research consists of an iterative cycle of three steps: planning action, taking action, and evaluating the action which leads to the whole cycle repeating again, and so on. The researcher in action research is constantly involved in the process of observing, identifying, and evaluating with the organisational member in the researched case (Saunders et al., 2009). Clegg et al. (1999, p. 278) state that “for action research it is important to move towards reflecting upon the role of pre-understanding only as theories begin to emerge, rather than in advance of the research”.

#### **5) Grounded Theory**

This is a methodology for researchers who intend to develop a theory by means of the comparative method. This implies looking at or observing the same process in a

different situation or department or organisation. This is a strategy more useful for explaining and predicting people's behaviour in the case of business and management research study (Saunders et al., 2009). Grounded theory is associated with the inductive approach. It is both a research strategy and a style for analysing data with the purpose of generating theory from the collected data (Robson, 2002). In grounded theory, Saunders et al. (2009, p. 149) state that "data collection starts without the formation of an initial theoretical framework. Theory is developed from data generated by a series of observations". These data generate predictions which will be tested by further observation that may verify or falsify those predictions (Saunders et al., 2009).

## **6) Ethnography**

Ethnography is a qualitative inductive approach which comes from anthropology. It brings the researchers closer to where the action takes place, reveals the worldview of people, and explains their daily cultural meanings (Myers, 1997; Saunders et al., 2009). Ethnography enables the researcher to interact with a group "in a natural setting over a prolonged period of time by collecting, primarily, observational data" (Creswell, 2009, p. 16). One of the crucial aspects of collecting data in ethnography is to witness participants' behaviour by participating in their activities (Creswell, 2009). There are criticisms over ethnography research such as it being time consuming because it occurs over a long period of time in order that the researcher may become immersed in the social world under study. For ethnography to be conducted appropriately, the following points need to be considered (Saunders et al., 2009):

- The researcher should select the group or setting for study carefully and ensure that such a group or setting will be able to answer research questions before immersing completely with them.
- The researcher should build a rapport and trust with the group for maximum cooperation.

- The researcher should develop strategies to cope with the situation of simultaneously being both a member of the group and a researcher.

## **7) Archival Research**

The principle source of data for archival research is administrative documents. The archival research strategy facilitates answering the research questions from historical documents and monitoring change over time. However, the ability to answer research questions depends on the quality of and accessibility to documents (Saunders et al., 2009).

## **8) Narrative Inquiry**

Since the narrative inquiry is chosen as a research strategy for this research, it is extensively explained in the next section.

### **3.6.1 Narrative Inquiry - a review**

#### **3.6.1.1 Introduction**

Narrative analysis originates from literary theory and narratology. It became increasingly popular in social science from the 1990s onwards. ‘Narrative’ derives from the Latin word ‘narrare’, meaning ‘to tell’, which originates from ‘gnarus’ meaning ‘knowing’ (Oxford English Dictionary). It is defined as “an organised interpretation of a sequence of events” (Murray, 2003) which means it is non-random and one thing leads to another. It possesses plot and causality. Czarniawska (1998, p. 2) defines narrative as a “sequence of events, experiences, or actions with a plot that ties together different parts into a meaningful whole”. Riessman (2008, p. 3) defines narrative as follows:

*“...in everyday oral storytelling a speaker connects events into a sequence that is consequential for later action and for the meanings that the speaker wants listeners to take away from the story. Events perceived by the speaker*



*as important are selected, organised, connected and evaluated as meaningful for a particular audience.”*

Narratives are important because language is a fundamental tool by which people make sense of the world through the stories we tell. Narratives are one of the main ways of communicating and can be observed everywhere. “People by nature lead storied lives and tell stories of those lives” (Connelly and Clandinin, 1990, p. 2). On the other hand, as we experience things and from the moment we start to think about the experience, we use narratives. We start to link events that happened today to what has happened before. Language is a shared cultural tool through which we communicate with each other. Not only do we communicate about what is happening around us or within us but we also communicate to others who we are and what has happened to us, how we ended up being who we are today as a result of what has gone before. Narratives are our inherent part of everyday experiences. Narratives are the way in which we make sense of our world.

Riessman (2002), who has carried out a helpful review of narrative approaches, concludes that the narrative literature is diverse and there is no binding theory of narrative. She articulates that “nature and the world do not tell stories: people do” (Riessman (2002, p. 2). Narrative analysis is interdisciplinary by nature and therefore there is single uniform method or step-by-step guide to say how to do narrative analysis, but rather an umbrella term for a mix of methodological approaches. It is informed by numerous theoretical orientations (e.g. hermeneutics, existentialism, phenomenology and interactionism). It could be picked by different disciplines and concepts (e.g. sociology, psychology, political science, health, etc.). Each researcher has to find her/his own technique by reading about how other people have conducted the narrative analysis and thinking about how they can adopt those techniques to their own research topic and questions and their own data. Riessman (1993) describes the job of a narrative researcher as an interpreter of the stories people tell. The narrative researcher looks at the content, forms and structure of the stories to seek the answer to what the storyteller means and why the story has been told in that way (Franzosi, 1998). There are different ways of looking at the stories. Some

researchers examine the stories as a whole, and some researchers break the stories down into elements (Lieblich et al., 1998). Therefore, each researcher takes on a specific methodology to make an interpretation to link how and what a narrator has included or excluded. The narrative research does not have automatic starting or finishing points, as Andrew et al. (2013) point out.

In narrative, language constructs reality. The focus of narrative analysis is on meaning and interpretations to the experiences and events; the meanings that people give to their experiences and how people interpret the events, experiences and social realities. From this point of view, it is important to take into consideration who is doing the narrating. People do the narrating from a particular social position and it is important to consider this as well as who they are narrating to. The narrative analyst needs to know for what aim the narratives are constructed and view why the people are telling these stories about that particular sequence of events (Riessman, 2002).

Narrative analysis is similar to discourse analysis in the way that language is used to do things, for example to categorise, name and label things and people, and to make things happen. In social science, language is not understood as directly mirroring and underlying reality but rather as a social tool. However, Shenhav (2006) and McBeth et al. (2005) have a different approach to narrative analysis. Another view of narrative analysis is that language is connected to power and is not neutral. Certain people in society have more power to name things, for example “regimes of truth”.

### **3.6.1.2 Approaches to Narrative analysis**

In contrast to thematic approaches or analysis of particular components of language, in narrative analysis, there are no self-evident categories on which to focus. As Riessman (2008, p. 23) has argued, narratives “come in all forms and sizes, ranging from brief, tightly bounded stories told in answer to a single question, to long narratives that build over the course of several interviews”. Lieblich et al. (1998) divide approaches to narrative analysis along two axes:

1. Holistic-categorical: Holistic means analysing each narrative as a whole and categorical means looking at the categories and themes and then analysing these themes across cases (i.e. cross-sectional analysis).
2. Form-content: Form means looking at the narrative structure and form and how it has been told. Content means focusing on the contents and what has been told.

Riessman (2008) adds two more types to Lieblich et al.'s (1998) approaches; the performative or dialogical aspect, which means to look at the interaction between narratives that have been produced; and the visual narrative, for example a photograph. Most narrative studies are holistic focusing narratives, which mean they preserve the whole story "preserving the sequential and structural features that are hallmarks of narrative" (Riessman 2008, p. 12). In a holistic approach, the focus is on the sequencing of themes within narratives.

There is another type of narrative; the collective narrative. Collective narratives are the stories that institutions or politicians might tell. The social world is storied, representing who 'we' (in a constructive way, for example myths about who we are as a nation) are as a group of people, for instance nation, class, culture, and gender (e.g. Shotter, 1993; Weedon, 2004). It is a collective way of understanding how things should work, for example political and policy narratives. Narrative researchers are interested in understanding how these narratives are linked with institutions, expert knowledge and power (e.g. the medical profession).

Narrative can be analysed within contexts, for example narrative could reflect and shape the social contexts that have been created. Narratives are used to shape the world to do things, to name and label things. Narratives can reflect power relations, for example certain groups of society have the power to label things in society. They have their own particular version of events. In the meantime, there might be some people whose narratives may be excluded from certain events, for example the discussion about the United Kingdom as a multi-cultural country and what that

means (whose narratives ‘stick’ and why, whose narratives are excluded, and what are the effects of this?). Narratives are also used to accomplish particular social ends “such as the sanction of modes of knowledge accumulation, the exclusion and inclusion of social groups, the enactment of institutional routines, the perpetration of social roles, etc.”, or construct social identities (De Fina and Georgakopoulou , 2008, p. 382). There are power inequalities in relation to who gets to do what with narratives, so not everyone in society has the same power to have their narratives shape the world (Squire et al., 2008).

### **3.6.1.3 Narrative approach in organisational studies**

Czarniawska (1998) argues that narratives play an important role in qualitative research aiming to respond to an organisational agenda which is generally recognised to be that of obtaining a better understanding of organisational phenomena. Similarly, Rhodes and Brown (2005) point out that organisational stories and storytelling research have been able to produce a rich body of knowledge, and have the potential to increase organisational knowledge scholarship. Narratives “enable practitioners and researchers to understand people more holistically because they provide a meaning and context to the person’s story” (Greenhalgh and Hurwitz, 1999, p. 1279). The narratives are focused on values implied in a particular text. People make sense and reflect a particular understanding of the world and places around them through narrative form, and individuals communicate their ideas by telling stories. Freeman (2004, p. 69) claims that narratives allow us to achieve insights into collective meaning: “In addition to serving as vehicles for understanding the unique trajectories of individuals’ lives, they [narratives] also serve as means of access to social reality, signifying the worlds through which people have moved”. Narrative also enables us to understand culture. Sarbin (1986, p. 14) articulates that: “There is no way to give us an understanding of any society including our own, except through the stock of stories which constitute its initial dramatic resources”. To achieve this understanding, stories “act as guides” (Myrsiades, 1987, p. 104) “through the social and psychological processes that constitute culture” (Abbey, 2010, p. 33). Through exploring the narratives, it gives

us new insights into the relationships between members in organisations. Members of organisations express their understanding and commitment through storytelling. Boyce (1996, p. 6) asserts that: “The degree of member familiarity with the dominant story of the organization might indicate the member’s level of adaptation to the organization”. Boyce (1995, p. 107) further explains that “Storytelling is an effective form of communication for the construction of a collective sense and for connection with deep meaning”. Witten (1993, p. 109) states that this collective sense of meaning “may take the form of organisational values, which can be unobtrusively and persuasively communicated through narrative”. Boje (1991, p. 106) builds a strong link between culture, identity and individual sensemaking and the creation of collective memory; he articulates that in a collective storytelling system,

*“the performance of stories is a key part of members’ sense-making and a means to allow them to supplement individual memories with institutional memory”*

Table 3.6 demonstrates the key researches carried out in the area of organisational studies, demonstrating the importance of this approach to collective sensemaking.

**Table 3.6: Key Researcher Using Organisational Storytelling**

<b>Author(s)</b>	<b>Research Area</b>
<b>Peters and Waterman (1982)</b>	Companies as ‘collectors and tellers’ of stories
<b>Weick (1995); Boje (1991); Czarniawska (1998)</b>	Have investigated how stories contribute to collective sensemaking
<b>Brown and McMillan (1991)</b>	Organisational culture
<b>Brown (2006); Brown et al., (2008)</b>	How narratives constitute individual and collective identities
<b>Mumby (1987); Boje (1995); Smith and Keyton (2001)</b>	How narratives are implicated in power relations
<b>Dunford and Jones (2000); Doolin (2003); Beech (2011).</b>	How narratives manifest themselves in situations of organisational change

#### 3.6.1.4 The Spectrum of Narrative

There is no universal established definition of narrative in organisational studies. The spectrum of narrative is constituted from small stories and antenarratives to master stories and grand narratives. Alvesson and Kärreman (2000) define a spectrum of discourse of narratives; one end of which is discourse with a “small d” with the other end being Discourse with a “big D”. At the beginning of the spectrum, “small d”, the notion of narrative defined in terms of whole stories with definitive beginnings, middles and ends and coherent plots (Czarniawska, 1998) has been challenged by some scholars (Georgakopoulou, 2007; Boje, 2001; Barge, 2004). For example Boje disagrees with Czarniawska’s definition of story in an organisational studies context. Czarniawska (1997, p. 78) defines story as consisting of “a plot comprising causally related episodes that culminate in a solution to a problem”. Boje views this definition as the definition of a ‘narrative’. Therefore, he coins the word ‘antenarrative’ and gives a double meaning to it; “First, story is ‘ante’ to narrative; it is ‘antenarrative’. A ‘narrative’ is something that is narrated, i.e. ‘story’. Story is an account of incidents or events, but narrative comes after and adds ‘plot’ and ‘coherence’ to the storyline. Story is therefore ‘ante’ to story and narrative is post-story. Story is an ‘ante’ state of affairs existing previously to narrative; it is in advance of narrative. Used as an adverb, ‘ante’ combined with ‘narrative’ means earlier than narrative. Secondly, ante is a bet, something to do with gambling and speculation. “Story resists narrative; story is antenarrative and on occasion even anti-narrative (a refusal to be coherent). [...] Antenarrative is never final; it is improper” (Boje 2001, p. 2).

Organisational stories are messy and do not fit within rationalised narrative spaces. Boje (2001, p. 2) states that members of organisations “inhabit storytelling spaces outside plot” while academia replace these stories with tidy academic narratives and construct a description of organisations that is fictively rational, free of tangled contingency and against story. Boje (2001) quotes Ricœur’s (1984, p. 150) definition of story:

*“A story describes a sequence of actions and experiences done or undergone by a certain number of people, whether real or imaginary. These people are presented either in situations that change or as reacting to such change. In turn, these changes reveal hidden aspects of the situation and the people involved, and engender a new predicament which calls for thought, action, or both. This response to the new situation leads the story toward its conclusion”.*

Boje (2001, p. 2) states that “even this definition of story has for me too much closure”. He adds that “the concept of the followability of story allows us to look at antenarration before the emplotment of story, and to search for pre-understanding before the story becomes followable”. However, Boje agrees on Czarniawska’s (1998, p. 2) definition of narrative where she defines it thus: “For them to become a narrative, they require a plot, that is, some way to bring them into a meaningful whole”. Boje articulates that “I prefer to think of narratives as the theory that organization and other theorists use with stories, to see how narratives and prenarratives are acts of ‘commodification, exchange, and consumption’” (Clair et al., 1996, p. 255), (Boje, 2001, p. 2). “They are narratives dressed as theory” (Clair, 1998, p. 20).

Although stories and narratives are occasionally employed interchangeably, Frank (2008) asserts that they are analytically different. Stories are generated by people whereas narratives originate from the analysis of stories. Stories are “fragmented and multi-layered experiences of desire” (Boje, 2001, p. 2). As a result, a researcher deciphers the stories to examine the stories that a narrator may not be able to express. White (1987, p. 251) puts forward that narrative theory is a finalisation that “transforms events into historical facts by demonstrating their ability to function as elements of completed stories”. An organisational story “incorporates the feelings, goals, needs and values of the people who create it” (Robinson and Hawpe, 1986, p.115).

However, at the other end of the spectrum, “big D” Discourse, another group of scholars moved from narratives of interviews to study broadly institutionalised “master stories” (Deuten and Rip, 2000) which can be distinguished from analysis of sets of texts at particular times in history, and that provide meaning within a community of practitioners or a field of organisations. “Discourse is less about the everyday linguistic interaction, and more about historically developed systems of ideas that forms institutionalized and authoritative ways of addressing a topic, to ‘regimes of truth’” (Alvesson and Kärreman, 2011, p. 1129).

### **3.7 Data Collection Methods**

There are different techniques for data collection in both qualitative and quantitative approaches. Researchers need to carefully choose and allocate the correct strategy in data collection. The following is a list of different methods suggested by various authors: (Hussey and Hussey, 1997; Bryman, 2008; Saunders et al., 2009)

1. Secondary Data collection: Existing data and data which have already been collected for other purposes are defined as secondary data. The main types of secondary data include: documented and recorded data, survey-based secondary data and multi-source secondary data.
2. Interviews: This is a discussion between two or more people. This type of data collection helps the researcher to collect valid and reliable data that are relevant to the research questions and objectives. Moreover, it helps the researcher to formulate the research questions and objectives. It includes three types: structured, which means a prepared set of standard questions for each interviewee; semi-structured, which are non-standardised questions but with a list of prepared questions to be covered; and unstructured, a free discussion related to the research topic (Saunders et al., 2009).
3. Questionnaire: This is a set of questions designed to produce appropriate data to achieve the research objectives. The question can be divided into two types: closed question and open-ended question. This type of data collection is associated with both qualitative and quantitative research.



4. Observation: This type of data collection is more suitable for research focusing on people's behaviour. Observation is always associated with qualitative research and involves the systematic observation, recording, description, analysis and interpretation of people's behaviour.

### **3.8 Reliability and Validity**

Reliability is concerned with the reliability of findings of the research that are repeatable in another similar research setting (Hussey and Hussey, 1997, Saunders et al., 2009). The following three questions can be posed to evaluate the reliability of the research (Easterby-Smith et al., 2008, p. 109):

- “Will the measures yield the same results on other occasions?”
- “Will a similar observation be reached by other observers?”
- “Is there transparency in how sense was made from the raw data?”

Validity refers to the extent of accuracy of presented findings of research. It is “concerned with whether the findings are really about what they appear to be about” (Saunders et al., 2003, p. 101). On the other hand, it is concerned with whether the true reflection of the studied subject is given in the data. It is essential that researchers ensure the questions do measure what is planned to be measured, even in highly reliable data. As a result, the significance of the questions to the proposed topic of study is important. Fraenkel and Wallen (2006, p. 165) assert that “The term validity, as used in research, refers to the appropriateness, meaningfulness, correctness, and useful of any inferences a researcher draws based on data obtained through the use of an instrument”.

### 3.9 Methodological Debate in Construction Project Management Studies

In project management, less effort has been made to assess the ontological underpinnings of the research (see e.g. Blomquist and Lundin, 2010; Hodgson and Cicmil, 2006; Linehan and Kavanagh, 2006). Bredillet (2010) highlights the importance of ontological consideration, alongside the epistemological and theoretical levels, as a preambular condition for management research. In fact, the realist conception is a dominant ontological thinking taken by most popular textbooks and bodies of knowledge in management studies. Through this, scholars hold a “taken for granted” approach assuming that “it is prominent to efficiently reach a single, tangible, clear, and quantitatively measurable project goal and to identify the ‘one best way’ to deliver a predetermined solution or option for the project” (Gauthier and Ika, 2012; Bresnen and Marshall, 2001). Likewise, most of the studies in innovation management are grounded ontologically in the assumption that innovation can be interpreted from a quantitative approach in the form of measurable new products and market activities as explained widely in chapter two (i.e. R&D measurement, technological innovation and construction building materials). Poole et al. (2000, p. 29) criticise variance methods approach in studying organisational innovation and point out that:

*“While the variance approach offers good explanations of continuous change driven by deterministic causation, this is a very limited way to conceptualize change and development. It overlooks many critical and interesting aspects of change processes. However, because most organizational scholars have been taught a version of social science that depends on variance methods, and because methods for narrative research are not well developed, researchers tend to conceptualize process problems in variance terms. One can see the “law of the hammer” in operation here: Give a child a hammer, and everything seems made to be hit; give a social scientist variables and the general linear model and everything seems made to be factored, regressed, and fit.”*

The traditional realist approach has been extensively adopted by many researchers to associate the tangible difficulties (e.g. lack of R&D) in the study of innovation in the construction industry. This is mainly due to the dominance of a 'mechanist' perspective on organisational and management studies which considers projects as applications of tools and techniques to getting the job or project done (Pollack, 2007). Reviewing the literature on construction innovation, both process and variance methods are studied in a range of interpretative and quantitative studies, however, it is striking that the adopted methodology is usually quantitative methods (typically the self-perception questionnaire survey) in order to identify the factors causing the construction industry to be non-innovative or developing models to describe the diffusion and process of innovation in the mode of production and technology. The quantitative approach, as is explained previously in this chapter, is about selecting a specific response alternative among three or so possibilities, which may say little of what the participant feels or thinks. Alvesson (1996, p. 461) states that "social reality and the psychology of people cannot be translated into abstract" through this method. As seen in chapter two, there is a predominant rationalistic assumption of the positivist paradigm adopted by scholars in studying innovation, and similarly in construction innovation. This discussion was previously put forward by Seymour and Rooke (1995), who criticise this research methodology taken by the majority of the construction management research community. Their argument while studying the culture of the construction industry was to promote the interpretivist approach:

*"[...] The rationalists take for granted the interpretative frameworks that are used to organize and communicate perception, thus effectively ignoring them. Instead of investigating the interpretations of others, they simply assert one of their own."* (Seymour and Rooke, 1995, p. 513).

They further argued about this problem:

*"[...] the rationalist paradigm [...] does not require researchers to question their own position. Instead, rationalists put their faith in the use of particular*

*methodological routines to guarantee their impartiality. The researcher's values are regarded as either irrelevant or self-evidently correct". (Seymour and Rooke, 1995, p. 521)*

To summarise Seymour and Rooke's (1995) argument, the rationalistic paradigm appears to be dominant in the construction research community and within the practitioners' community. It results in trivialising human relations along with the many peculiar characteristics of the construction industry. Recently, there has been progress in using qualitative methods and analytical techniques in explaining the dynamics of social relations in construction, but quantitative research is still predominant (Bresnen and Marshall, 2001; Amaratunga et al. 2002). Seymour and Rooke's (1995) critique was a turning point in the way construction research was undertaken. Some examples of prominent researches using "strong qualitative methods" are shown in Table 3.7.

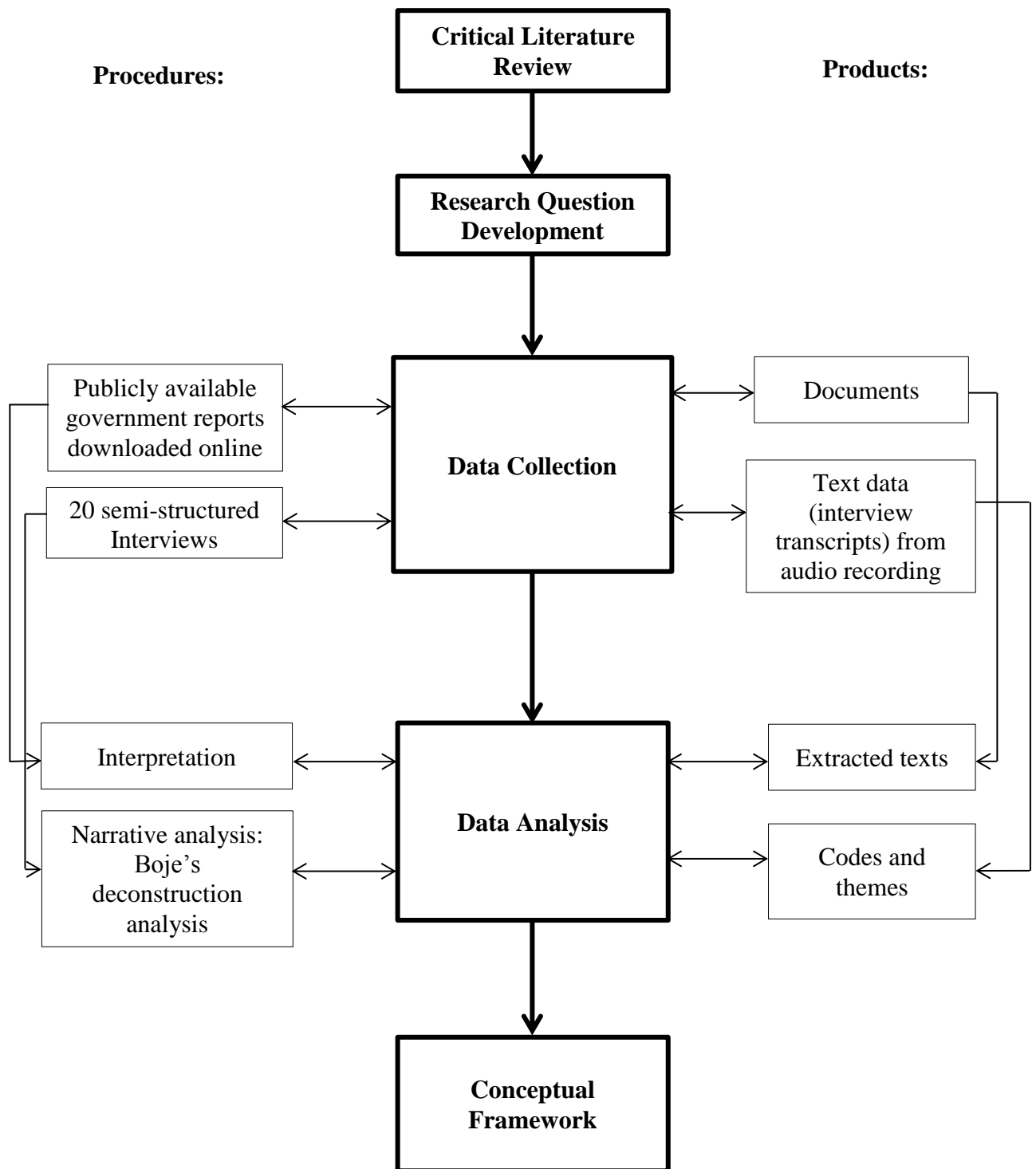
**Table 3.7: Examples of Researches Using Strong Qualitative Methods in Construction Management Studies**

<b>Author(s)</b>	<b>Research Area</b>	<b>Purpose</b>	<b>No. of Participants and Type</b>	<b>Acquisition</b>	<b>Analysis</b>	<b>Outcome</b>
<b>Dainty et al. (2000)</b>	Organisational career development	To understand the limitations of diversity in the construction agenda	41 males and females working in 5 out of the top 20 construction firms in the UK	In-depth interviews	Grounded Theory	Theory of women's career development was constructed
<b>Hare et al. (2006)</b>	Health and safety in construction	To investigate the integration of health and safety with  Pre-construction planning	4 groups and 3 expert panels	Focus group method	Grounded Theory	Development of a conceptual model that integrated health and safety considerations in construction planning

<b>Baiden et al. (2006)</b>	Team integration in construction	To examine the extent of team integration needed for successful projects	9 project managers from 9 award-winning projects in the UK	In-depth interviews	“Framework Analysis”	Highlighted the sources and nature of challenges in team integration
<b>Lingard et al. (2008)</b>	Work-life balance within construction workers	To explore adaptive strategies of working families in the Australian construction industry context	31 participants	Semi-structured interviews	Thematic analysis	Developed a model of work-life balance in construction
<b>Swan et al. (2001)</b>	Trust manifests in construction	To identify key players where trust matters and to examine the interactions between people in construction	Unknown	Semi-structured interviews	Social Network Analysis	Explored how trust manifests in construction in their quest to develop a trust inventory for construction

One of the major critiques that can be discussed regarding the qualitative approach in the examples in Table 3.7 is that the voices of all players in the construction industry remain silent. For example, Hare et al.'s (2006) choice of research sample from experienced managerial practitioners to participate in a focus group discussion about health and safety of construction sites, has excluded less experienced workers who would actually benefit from improvements in health and safety. Likewise, Baiden et al. (2006) interviewed managers from award-winning projects, and might have neglected richer stories of what might really happen in practice from those who delivered those very projects at the grassroots level. Alvesson (2002) condemns relying on interview techniques as one of the methods in qualitative research, and states that this runs the risk of having participants contribute an idealised account, thus hiding the details that matter in reality.

**Figure 3.5: Outline of the Research Process**



Source: Fieldwork



### **3.10 Methodology of the Research**

#### **3.10.1 Reflexivity of the Research**

In reflecting the researcher's own perspective, some of the underlying assumptions that the researcher brought to this work are acknowledged. The preliminary direction of research was profoundly influenced by the 'positivist' view, and the educational background of the researcher as a civil engineer; as she searched for ways to mathematically model the construction management problems (see e.g. Antucheviciene et al. 2006; Samsura et al. 2010). At the beginning, the researcher was aware of two big challenges ahead which were how to conceptualise human nature and to understand what discipline 'project management' belongs to in order to position herself in a particular school of thought. The researcher strongly advocates that the pre-understandings of the research subject impact on the result of the research. The researcher is informed by six years of experience working as a structural designer, quantity surveyor in a consultancy company and as a project manager involved directly on the construction site in Iran. In addition, the researcher spent one year on reviewing the relevant literature in order to understand the theoretical and practical studies on the subject before entering the data collection process. It is also worth acknowledging that the researcher is a female of Iranian nationality and English is her third language. The next section will explain more about the research philosophy (ontology and epistemology) as well as positioning the researcher's philosophical stance and the approaches on which this research is based.

#### **3.10.2 Ontological and Epistemological Assumption of the Research**

The ontological assumption of this research is based on a social constructionist world view in which 'innovation' is subjectively understood by human beings. In the constructionist worldview, the interpretation of reality is constructed by institutionalised cultural norms (Giddens, 1984). The ontological stance of constructionist research implies that "realities are constructed entities" and emphasises the subjective nature of its epistemology (Lincoln, 1992, P. 379).

Lincoln and Guba (1989) acknowledge that constructionist methodology is a useful approach to achieve people's understanding of their lives and of situations and issues that are complex and multiple. Constructionist research is fundamentally based on interpretive principles and hermeneutics is crucial in this methodology. Gadamer (1975) argues that hermeneutics requires the interpreter to grasp the meaning and significance that is transmitted from the original story or text.

The researcher is aware that the analysis of data is based on "the presumption that we live in a social world characterised by multiple interpretations and that as people tell stories these numerous interpretations are manifest in multiple and sometimes conflicting logics" (Feldman et al. 2004, p. 151). This study has been approached from within the interpretive paradigm, which is "informed by a concern to understand the world as it is, to understand the fundamental nature of the social world at the level of subjective experience. It seeks explanation within the realm of individual consciousness and subjectivity, within the frame of reference of the participant as opposed to the observer of action" (Burrell and Morgan, 1979, p. 28).

Therefore, by adopting a constructionist philosophical stance, this research points toward a different interpretation and construction of innovation among different practitioners (Berger and Luckmann, 1991). This research investigates how innovation concepts and acts are constructed rather than establishing 'objective truths' on psychological traits (Lindgren and Packendorff, 2003). Therefore, this involves ascertaining who and what are included and/or excluded in/from these conceptual groupings and that these may vary according to the group of people interviewed (Lindgren and Packendorff, 2009). Methodologically speaking, they argue that the underpinning of the constructionist approach is to collect data in a "dialectic (reflective)" and "hermeneutic (jointly constructed)" manner (Guba and Lincoln, 1989).

In the contemporary philosophy view, scientific knowledge cannot be known objectively in a 'true absolute sense' (Suppe 1977, p. 649). There is a world "out

there” changing independent of what we think, so our endeavour to understand it is limited and approximate. Pettigrew (2001, p. 62) exemplified this view as follows:

*“Imagine the universe as having a definite structure, but exceedingly complex, so complex that no models humans can devise could ever capture more than limited aspects of the total complexity. Nevertheless, some ways of constructing models of the world do provide resources for capturing some aspects of the world more or less well than others.” (Giere 1999, p. 77). ‘In the absence of unambiguous foundational truth in the social sciences, the only sensible way forward can be conscious pluralism.’”*

This research uses the narrative approach to make sense of practitioners’ experiences related to innovation in the construction industry. In a constructionist worldview, there is no clear distinction between fact and interpretation, and people select what is included and excluded in narratives as well as what they mean. The narrative approach undertaken in this research, as Riessman (1993) states, is based on the interpretative perspective and belonging to a constructionist research design in which the researcher does not have direct access to others’ experience but must deal with ambiguous representations thereof (Boje, 2001). The narrative’s ontological element indicates that that stories and myths are a crucial part of organisational reality and organisational research should focus merely thereon (Easterby-Smith et al., 2008). Riessman (2013, p. 181) articulates that “the approach does not assume objectivity; rather, it privileges positionality and subjectivity”. Narratives allow people to make sense of their own experiences within the organisation for which they are working.

### **3.10.3 Design of the Research**

This research criticises the dominance of quantitative approaches in studying innovations in the construction industry. As the aim of the research was to investigate the individuals’ experiences and thoughts in relation to innovation in the construction projects, it was ensured that the quantitative research design would not be able to provide proper data for this study. The qualitative approach was chosen to

achieve the opinion of the practitioners through direct conversation with them. The selection of qualitative research would help the researcher in explaining the practitioners' behaviours more explicitly based on the statements of their experiences and thoughts. It would allow the researcher to immerse herself within the environment under study to analyse the participants' participative activities and obtain clear details of their intentions, feelings, and desires.

### **3.10.1 Approach adopted to the Research**

A mix of inductive and deductive approaches (the abductive approach) was chosen with the primary objective of the research being to explore how sense is made of construction innovation. According to Pinnegar and Daynes' (2007, p. 4) statement, "qualitative researchers are interested not in prediction and control but in understanding", the intention of this research is to focus on *what* and *how* questions rather than *why* questions (Gubrium and Holstein, 2001). Adopting the abductive approach, an iterative approach was applied from the data derived from the literature, sensemaking framework and emergent data. The narratives of research participants are unpacked deductively as micro-stories and then by adopting a sensemaking perspective, they are analysed inductively.

## **3.11 Interview Planning**

### **3.11.1 Sampling Strategy: Purposive and snowballing sampling**

The goal of purposive sampling is to sample participants in a strategic way, so that those samples are relevant to the research questions that are being posed (Bryman, 2008). Purposive sampling does not allow the researcher to generalise to the population because this study does not seek to sample research participants on a random basis. The non-random sampling basis is called non-probability sampling. The sampling strategy of the research is explained in the next section. Another sampling approach selected in this research is snowball sampling. Snowball sampling is an approach that helps to grow the research sample from just a few

participants. Bryman (2012, p. 202) explains that in snowball sampling, “the researcher makes initial contact with a small group of people who are relevant to the research topic and then uses these to establish contacts with others”. It is a useful method for building networks and increasing the number of participants by asking each participant to suggest more potential participants.

### **3.11.2 Research Sample**

The rationale behind selecting the research participants was to choose the individuals who were involved and interested either themselves or through their organisations in improvement and driving innovation in the construction industry. In order to recruit the research participants who were most likely experienced innovation in their daily activities, an investigation of a forum called Movement for Innovation (M4I) was begun. The reason was that the projects demonstrated within this forum are claiming to be innovative in some manner and the potential existed to encourage the individuals to be innovative.

The “ginger group” called movement for innovation (M4I) which was established following The Government Task Force report “Rethinking Construction” (Egan report). M4I was formed in 1998 to implement, industry-wide, the recommendations contained in the Egan report. The report proposed the creation of a ‘movement for change’ which would be a group of dynamic people inspired by the need for change (also see chapter 5). It was intended to identify the members and organisations involved in this group. However, it was found that since the beginning of 2004, the group had been a part of another group known as Constructing Excellence. In 2003, M4I along with eight other cross-industry bodies advocating construction sector improvement which came into being during the 1990s, united as Constructing Excellence to form a powerful, influential voice for improvement in the built environment sector (<http://www.constructingexcellence.org.uk/aboutus/>) (Accessed: 14 February 2014) . According to their website, the purpose of forming Constructing Excellence was to drive the change agenda in construction and improve industry performance to produce a better environment. Green (2011) argues that Constructing

Excellence have an important role to play in promoting construction improvement and localised innovation. The Constructing Excellence Club is a forum for individuals who are in the construction industry to learn about the principles of Best Practice, while creating a culture and local network of continuous improvement. It offers the opportunity for an informal group of forward thinking, innovative people to learn from each share that knowledge ultimately improves their business bottom line. They claim:

*“We exist to improve industry performance in order to produce a better built environment. We are a cross-sector, cross-supply chain, member led organization operating for the good of industry and its stakeholders. At Constructing Excellence we believe that industry improvement will be driven by all sectors sharing learning, working together and driving innovation to deliver a demonstrably better built environment.”*  
(<http://www.constructingexcellence.org.uk/aboutus/>)

Constructing Excellence has 46 clubs in 11 regions across the UK. Research participants were recruited from practitioners who were currently engaged in a construction project in the UK and their organisation were member of the Constructing Excellence group. The participants were sourced from a variety of firms; SME, large, and consultancies. The table below shows the list of participants. The names of participants have been anonymised as the part of the ethical agreement. The table also shows the length of each interview and the number of words counted. The total time of all interviews is almost 14 hours and the length of all transcribed interviews is 92,079 words (See Table 3.8).

**Table 3.8: List of Participants of the Research**

<b>Participant</b>	<b>Role</b>	<b>Type of organisation</b>	<b>Length of interview (hr:min:sec)</b>	<b>Words counted</b>
<b>Participant 1</b>	Designer	Contractor	00:40:01	4,901
<b>Participant 2</b>	Design Consultant	Consultant	00:47:38	5,069
<b>Participant 3</b>	Site manager	Contractor	00:29:24	2,610
<b>Participant 4</b>	Planning engineer	Sub-contractor	00:29:47	3,184
<b>Participant 5</b>	Best practice innovation	Sub-contractor	00:24:23	2,801
<b>Participant 6</b>	Director and design manager	Contractor	00:54:35	6,645
<b>Participant 7</b>	Independent consultant	Consultant	01:14:33	7,911
<b>Participant 8</b>	Architect practice Consultant	Consultant	00:34:10	2,424
<b>Participant 9</b>	Supply chain procurement	Sub-contractor	00:36:00	2,523
<b>Participant 10</b>	Quantity surveyor	Contractor	00:56:35	6,852

<b>Participant 11</b>	Commercial director	Consultant	01:12:20	7,680
<b>Participant 12</b>	Quantity surveyor	Sub-contractor	00:34:00	4,182
<b>Participant 13</b>	Chief Innovation Officer	Contractor	00:46:00	5,658
<b>Participant 14</b>	Architecture	Consultant	00:26:15	3,172
<b>Participant 15</b>	Site manager	Sub-contractor	00:29:32	3,561
<b>Participant 16</b>	Sustainability director	Consultant	00:41:22	5,043
<b>Participant 17</b>	Operations director	Contractor	00:40:21	4,820
<b>Participant 18</b>	Strategic project director	Contractor	00:32:24	3,936
<b>Participant 19</b>	Project manager	Sub-contractor	00:28:40	3,451
<b>Participant 20</b>	Innovation knowledge	Contractor	00:45:05	5,656
<b>Total</b>	<b>20</b>	<b>-</b>	<b>13:43:05</b>	<b>92,079</b>



### 3.11.3 Interview Designing

There were three phases involved in the process of data collection; interview planning, interview designing, and interview process. The planning of the interview involved the selection of the participants for the interview and arranging their participation. The interviews were designed to be semi-structured in format. The interviews were audio-recorded and transcribed word by word in order that full representation of the discussion could be obtained. Silverman (1993, p. 108) describes the formal interviews as “situated narratives”, Burgess (1984, p. 102) describes them as “conversation with purpose” intending to obtain the “construction or reconstruction of knowledge rather than the excavation of it” (Mason 2002, p. 63). Charmaz (2000, p. 514) discuss that “qualitative researchers should gather extensive amounts of rich data with thick description”; as “thick description makes thick interpretation possible” (Janesick, 2000, p. 391). ‘Thick description’ is essential to the appreciation of context and the critical outcome of data collection (Geertz, 1973). Selecting the narrative approach, Mishler (1986, p. 69) states that “telling stories is far from unusual in everyday conversation and it is apparently no more unusual for interviewees to respond to questions with narratives if they are given some room to speak”. There are two main forms of interviews in the qualitative research - ‘unstructured’ and ‘semi-structured’ (Bryman, 2008). In unstructured interviews, the interviewer may ask a single question to allow the interviewee to respond freely. Unstructured interviews have similar characteristics to a conversation (Bryman, 2008). In semi-structured interviews, the interviewer has a list of questions specified to cover the research subject. Bryman (2008) refers to this as the interview guidelines, and the interviewer has a great deal of scope in how to reply. Semi-structured interviews are flexible. The interviewer might not follow the guidelines of the interview exactly and may ask questions that are chosen with regard to points stated by the interviewee as well as pursue areas spontaneously initiated. The interviews were designed to be semi-structured in order to encourage the participants to state freely their views on the concept of innovation within the construction industry and among the stakeholders of a construction project. However, in order to keep track of the narratives of participants, a list of questions were prepared.

**Table 3.9: The Research Interview Questions**

Questions	Justifications
Can you tell me a bit about your work and the company you are working for?	To understand who they are, who they work for and their position within the hierarchy of the company and within the project.
In your view, what do you understand about innovation? How would you define innovation? Do you have any stories about innovation within your projects? Can you explain your role and your contribution in the mentioned innovation? Where did the initial idea come from?	To make the interview more narrative in order to avoid the participant being influenced or misled by the interviewer's questions.
Is innovation part of the strategic thinking of your organisation? Do you think innovation is important for your company's business?	To understand the context of innovation within the company.
How is innovation practiced in your organisation? How do you support innovation in your company?	To understand how innovation is practised within the company according to the definitions given. To make the interview more narrative in order to avoid the participant being influenced or misled by the interviewer's questions.
What record do you keep of innovation/ new ideas in your company? Where do new ideas normally come from? How is innovation encouraged between the individuals in your company? How do you determine which ideas have the most merit and which to fund? Who is responsible for the success or failure of these ideas?	To open up the discussion and move on from the term 'innovation' to idea generation. To focus on the micro-level of a construction innovation individual's role in generating new ideas and understanding the source of stimulations and motivation drivers. To understand the flow of ideas within the projects in the company. To describe the culture within the project concerning the generation and sharing of ideas.

	To identify the main decision makers in rejection or acceptance of the new ideas.
How do you capture and manage/track improvement ideas in your organisation? Do you use any innovation management frameworks or any specific methodology for managing new ideas? Do you have any success measurement metrics for new ideas within your organisation? If yes, how do you measure the value added by the innovation?	To focus on the macro-level and hard phase of idea generation management within the company.
In your opinion, how is the innovation encouraged in the construction sector? How is the competition in the market? Are there many competitors? Is there any dominant leader in the market in which your company is operating?	Wrapping up the conversation by asking questions at the industry level (macro-level) in order to understand the issues concerning construction sector policies and legislation in the UK.

#### 3.11.4 Interview Process

The first participant, a member of Constructing Excellence, was met in a seminar organised by the Association of Researchers in Construction Management (ARCOM) at The University of Manchester. By using a snowball sampling technique, the next participant was contacted via email. In the first email, the researcher briefly introduced herself and the reasons why the participant had been chosen to be interviewed. Following the first email, a Participant Information Sheet (PIS), interview questions and consent form were sent to the participant. The interviews were held in mutually agreed locations which were mostly at the firm of the participant or at the university. The interviewees were asked to sign a hard copy of the consent form on the interview day. In the interview process, the participants were asked to give a story of a recent innovation that they had experienced. All participants were encouraged to give their views freely on innovation within the company for which they were working. The entire interview process was audio-recorded and then stored on the personal computer at the university. All interviews were conducted in English. The interviews were transcribed word by word in Microsoft Word in order to ready them for uploading to the NVivo software.

### **3.11.5 Use of NVivo Software**

Managing coding transcripts and analysing coding results within a sensible time-frame is difficult (Saunders et al., 2012). The reason, as Basit (2003) argues, is that qualitative data analysis is not “fundamentally a mechanical or technical exercise”. “It is a dynamic, intuitive and creative process of inductive reasoning, thinking and theorizing”. The term computer-assisted qualitative data analysis software (CAQDAS) was coined by Lee (1991) to refer to the programs that facilitate the analysis of qualitative data (Bryman, 2008). Bryman (2008) states that CAQDAS can reduce the number of clerical tasks involved in searching and retrieving data. Webb (1999) argues that the use of software within qualitative analysis would add to the objective nature and systematic nature of the process, allowing for a more trustworthy, transparent and rigorous approach to the research. Bryman (2008) articulates that CAQDAS requires the researcher to think about codes that are developed in terms of ‘trees’ of interrelated ideas, and as a result it can provide the opportunity to consider possible connections between codes. In contrast, Morison and Moir (1998) call for researchers to be cautious and aware that the use of such programs can change the nature of the analytical process in unexpected and perhaps unwanted ways. The potential influences of automatic coding in the software create concerns to stifle the creativity in the process of coding in a way that the researcher might not notice (Morison and Moir, 1998). Corbin and Strauss (2008) describe that the traditional approach to qualitative data analysis involves a large amount of stationery and papers using a series of symbols and colours representing and developing codes within the transcripts. They recognised that this process was messy, which a significant amount of time spent on transferring information from one sheet of paper to another. The use of software facilitates changes and automates the linkage between information and codes. The ability of software to provide multiple screens speeds up the process of coding and allows the researcher to flick back and forward instantaneously between screens.

The software also facilitates keeping track of codes and patterns among a large amount of data and makes the process of analysing easier. There are a few software

packages available in the market for analysing qualitative data, and these are Atlas.ti, NUD\*IST, and NVivo. In this research, the software package supported by the university was NVivo, version 9.

### **3.11.6 Ethical Consideration and Approval**

Before pursuing the data collection, the researcher was informed by the 'Management of Projects' group in the school that it was necessary to meet the essential requirements of ethical standards for qualitative research. The first issues concerning protecting the research participants were to ensure openness and maintain confidentiality. Therefore, several steps were taken in protecting participants. First, for each interview, an email was sent explaining the aim of the study, why they had been nominated to participate in the research and how the confidentiality of the data collection would be maintained. Second, after the participant's agreement to take part in the research, the participant information sheet along with the consent form was emailed to them for consideration. On the interview day, participants were asked if they would sign the consent form to give permission for audio-recordings of the interviews to be made. An example of this introduction is included in Appendices A, B and C. There were some potential participants who withdrew their participation from the interview because of the confidentiality of the project in which they were currently working.

Another main concern was to maintain confidentiality as far as possible in the write-up while providing a reliable account of what happened. The names were changed to pseudonyms, including those for participants, companies and institutions. Furthermore, any quotes included from interviews were sent to the participant, who then had the choice of withdrawing all or part of their quote. There were some participants that could not be reached, as they had left the relevant company.

Ethical approval for the study was granted by the University of Manchester ethics committee (See Appendix D). As part of the approval process, information sheets and a consent form were developed for the participant observation and interview

phase of the study according to the University of Manchester standard forms (See Appendices A, B and C). In the process of fulfilling the ethics committee's requirements, meetings were arranged with the supervisors to discuss the potential ethical issues in conducting the research as well as those stated in the forms. In order to control and provide secure generated data access, the transcripts and audio recordings were stored only on the personal computer provided by the university and accessible only by the researcher. The participants of the research were referred to only by their initials, to protect the confidentiality of the statements made. In addition, another potential risk raised in the ethics application form was the risk related to a lone worker, since the researcher conducted the research by herself. The researcher would travel to interview participants in their workplace or public place, and as a result the researcher and supervisor agreed on a protocol according to the university policy on health and safety.

### **3.11.7 Analysing the Data**

Taking the interpretive paradigm, the researcher is looking for realities that the participants' stories generated in the interviews, not a reality outside the individual stories. The research acknowledges that the researcher is unable to gain any form of privileged access to 'outside reality'. However, the researcher is able to interpret the individuals' stories that they have shared during the interview.

In analysing the interview transcripts, this research has drawn on Boje's analytical data analysis options in his *Narrative Methods for Organizational and Communication Research* book (Boje, 2001). Deconstruction analysis and thematic analysis are applied in order to interpret the data. Boje emphasises that deconstruction is not a method, but a strategy, while he articulates that: "deconstruction is a post-structuralist epistemology, not a formula-method with steps and procedures", and outlines 'eight moves' in applying a deconstruction approach (Boje, 2001, p. 19). The eight moves suggested by Boje (2001, p. 21) are as follows:

- 1) “Duality search”: this concerns making a list of bipolar terms and dichotomies in storylines.
- 2) “Reinterpret the hierarchy”: this concerns interpretation/reinterpretation of the hierarchy of an event. Boje (2001) emphasises that there is normally a hierarchical thinking in storytelling from one’s own point of view.
- 3) “Rebel voices”: this denies the authority of one voice. It is concerned with tracking which voices are not being expressed in storylines and which voices are subordinate or hierarchical to other voices.
- 4) “Other side of the story”: stories always have two or more sides. This move is about looking for the other side(s) of the story - the side(s) of stories that are usually marginalised, under-represented, or even silent.
- 5) “Deny the plot”: “Stories have plots, scripts, scenarios, recipes and morals. Turn these around (move from romantic to tragic or comedic to ironic).”
- 6) “Find the exception”: “Stories contain rules, scripts, recipes and prescriptions. State each exception in a way that makes it extreme or absurd. Sometimes you have to break the rules to see the logic being scripted in the story.”
- 7) “Trace what is between the lines”: this move is about tracing what is not said and filling in the blanks and the alternative ways of telling the stories.
- 8) “Resituate”: “The point of doing 1 to 7 is to find a new perspective, one that resituates the story beyond its dualisms, excluded voices or singular viewpoint. The idea is to reauthor the story so that the hierarchy is resituated and a new balance of views is attained. Restory to remove the dualities and margins. In a resituated story there are no more centres.”

### 3.11.8 Stage of Analysis

The first stage of data analysis involved generating initial codes as a range of possible dualities in relation to innovation. The second stage was to categorise the codes under a main theme. These included line-by-line reading of transcripts for each of the twenty interviews. Initially, a total of 162 codes were developed, which were later grouped and categorised into seven main themes with a total of four sub-themes based on the similarities of the concepts. The coding steps were not a consistent process as the researcher had to shuffle backward and forward between the coding stages until new themes stopped emerging. NVivo software played a significant role in facilitating the organisation of the codes into a hierarchical structure. At the early stage of the coding process, the emerging themes were examined. The emergent codes were organised into a hierarchical structure facilitated by NVivo and are shown in Table 3.10.

The initial findings from the research participants were carried out by using thematic analysis. Three phases of the thematic analysis of Braun and Clarke (2006, p. 87) were applied in the interview transcripts. This process consisted of five phases; “1) familiarizing yourself with your data 2) generating initial codes 3) searching for patterns 4) reviewing themes 5) defining and naming themes”. The initial coding of the data is represented in Table 3.10. The codes are presented in the first column and the second column summarises the examples expressed by the participants. In the initial analysis, it was revealed that there was a striking difference in the conceptual definition of innovation stated by the participants. This means that the interviewees express different storylines depending on their role within the company.



**Table 3.10: Codes and Concepts Emerging from Empirical Data**

<b>Codes</b>		<b>Illustrative Examples</b>
<b>Scale and types of innovation</b>	<b>Radical</b>	<ul style="list-style-type: none"> <li>• “Big technologies and methodologies which would include modular construction transferring” (Participant 11)</li> </ul>
	<b>Incremental</b>	<ul style="list-style-type: none"> <li>• “Minor particular technologies that have not been used before” (Participant 6)</li> <li>• “Simple things and minor things are new to everyone on site” (Participant 4)</li> </ul>
<b>Competition</b>		<ul style="list-style-type: none"> <li>• “We buy the competitors in the market” (Participant 15)</li> <li>• “We eliminate the competitors by buying them” (Participant 13)</li> <li>• “Your opportunity to compete in your market is significantly limited. Because your supply bases are significant and it is largest part of your delivery and operation capability. Not many other industries have the same contributions.” (Participant 20)</li> </ul>
<b>Culture</b>		<ul style="list-style-type: none"> <li>• “In our company the ‘value plus’ as an innovation is embedded in our culture” (Participant 2)</li> <li>• “Maybe it is part of our culture” (Participant 8)</li> <li>• “The barrier is the culture in the industry” (Participant 1)</li> </ul>
<b>Drivers and incentives</b>		<ul style="list-style-type: none"> <li>• “It is not the encouragement. It is like a target” (Participant 12)</li> <li>• “how to put together the selection process that motivate company to want to try” (Participant 13)</li> <li>• “a little pressure on you but it is very rewarding at the same time once you have done and I solved this problem and I did it myself so that is a good side of it” (Participant 10)</li> <li>• “maybe recession triggered and created competition for companies” (Participant 7)</li> </ul>

<b>Government policies</b>		<ul style="list-style-type: none"> <li>• “The energy sector allow them to go ahead with that development” (Participant 12)</li> <li>• “the local authority is that one of the problems with the industry” (Participant 9)</li> <li>• “the government could help by legislating it” (Participant 6)</li> <li>• “in private sector is not like that there is not much politics involved but when you are with the local authority or the government bases” (Participant 16)</li> </ul>
<b>Hierarchy level</b>	<b>Sub-contractor</b>	<ul style="list-style-type: none"> <li>• “we were forced to allow the supplier to reduce the price” (Participant 17)</li> <li>• “different levels of relationship often get in the way of the subcontractor” (Participant 13)</li> <li>• “The type of business that we are in it is always sub-contractor. So we don't get to collaborate with the end client enough or an early of opportunity.” (Participant 8)</li> </ul>
	<b>Clients</b>	<ul style="list-style-type: none"> <li>• “client is the boss” (Participant 3)</li> <li>• “client requirements has certain attachment to it and certain specifications which those has to be followed as part of specifications” (Participant 19)</li> <li>• “No matter how innovative the design is. If the client says no; so that's it” (Participant 17)</li> </ul>
<b>Project performance</b>	<b>Quality</b>	<ul style="list-style-type: none"> <li>• “quality is coming after cost” (Participant 14)</li> <li>• “The quality is very low and the people's expectations are low” (Participant 9)</li> <li>• “it is a greener material low maintenance better quality” (Participant 5)</li> </ul>
	<b>Cost</b>	<ul style="list-style-type: none"> <li>• “value plus is about saving the money for the client” (Participant 11)</li> <li>• “For big organisation I think I am sure it will cost more but if it is done properly” (Participant 20)</li> </ul>
	<b>Time</b>	<ul style="list-style-type: none"> <li>• “Saves time and provides us better quality. Any idea fitting in that range is innovative idea” (Participant 12)</li> </ul>

<b>Emotional intelligence</b>	<b>Self-confidence</b>	<ul style="list-style-type: none"> <li>• “I think it was my self-confidence was growing and I had my words to say” (Participant 13)</li> </ul>
	<b>Self-satisfaction</b>	<ul style="list-style-type: none"> <li>• “It is the self-satisfaction you get that while you did a good job. It was a difficulty that you were stuck with it and you struggle” (Participant 14)</li> </ul>
	<b>Personal Capability</b>	<ul style="list-style-type: none"> <li>• “I am capable of doing that I can actually deliver the whole project like that” (Participant 20)</li> </ul>
<b>Dualities</b>		<p>Big team vs. Small team  Big technology vs. Tiny technology  Big organisation vs. Small organisation  Challenging vs. Beneficial  Conservative vs. Open mind  Construction Industry vs. Engineering Construction Industry  Cost vs. Quality  Cost vs. Willingness to innovate  Experience vs. Contemporary thinking  Experience vs. Unwillingness to change  Experienced vs. Inexperienced  Fashion trend vs. Cutting edge ideas  Human interest vs. Financial risks  Idea sharing vs. Financial reward (bounce)  Industry’s product view vs. Company’s waste reduction  Low expectation vs. Difficulty  Motivation vs. Disappointment  New ideas vs. Status quo  Outsourcing vs. Mitigating risks  Passion vs. Apathy  Personal interest vs. Company’s financial interest  Pressure vs. Reward  Respect vs. Rejection  Routines vs. Failure to improve  Success vs. Risk  Traditional mind set vs. Right mind set</p>

Source: Fieldwork

The participants expressed many different storylines, even throughout one single interview, in response to interview questions and in general to the concept of innovation. The themes ‘positive’ and ‘negative’ are attributed to the highly fragmented responses from the participants. However, there were patterns when the data were considered at a group or organisational level. It was significantly evident that the negative responses were expressed towards group and organisational level (we) whereas positive responses were at the individual level (I, mine, myself, and me). The way each participant made sense of innovation was shaped by their own organisational self-identity. A commonly expressed storyline to innovation was to blame the company’s system (e.g. “boss” or “line manager”), and even at a higher hierarchical level; the whole industry (e.g. local authorities and regulations, etc.).

### **3.11.9 Validity and Reliability of the Research**

The traditional sense of reliability and validity in which are sought repeatability and methods to objectify the subjective in order to confirm the results of the research, does not sit comfortably within an interpretive paradigm where no objective truth exists. The notion of data validity and reliability in the case of the current research is not thought of in terms of whether or not the results can be proved, but whether or not the research is defensible, and the research process and ultimate claims of knowledge are trustworthy (Lincoln and Guba, 1985). From the viewpoint of interpretivism, researchers are more concerned with analysing and presenting the data generation which has been achieved with thoroughness and accuracy. This study did not lend an objective verification of findings in the coding process, for example cross-checking the findings with a second coder. This was because it was intended to keep sight of the coding aims in order to reflect on what was observed by the researcher. It was believed that coding should build upon the contextual knowledge and understanding developed during the process of gathering data. Since second coders had not taken part in the interview process, their findings would be conducted in isolation; as a result the richness of research context would be lost. The coding of this research is built on the researcher’s contextual knowledge and her direct observation of the process of data gathering. This allowed the researcher to enhance

sensemaking of the participants' sensemaking process of the concept of the research. However, the consistent meetings with the academic supervisors as well as occasional group meetings with the Management of Projects group within the MACE school gave the opportunity for the researcher to discuss the raw data and extracted codes in order to receive and contribute the feedback.

The audio-recorded interviews were carefully listened to and transcribed by the researcher word by word immediately after the interviews. Because some of the participants were speaking English as a second language, there were occasions in which the researcher amended some of their quotes in order to make them readable and more comprehensible. As a result, the participants were asked to review and confirm their interview transcripts and edited quotations, which had previously been highlighted in a Word document. However, it was decided that the participants' verification would not be pursued, as the interpretation of the researcher was considered to be significant, once the procedures to achieve thoroughness and accuracy, as previously explained, had been met.

The researcher is highly committed to take responsibility for the data rather than situating that responsibility with the participants. In addition, although the participants had some interest in the general theme of the research subject, the researcher had no intention to assume that any of the participants had adequate knowledge of the concepts being examined such that they would be in a position to make a judgement about the interpretations made. As Skeggs (2001) points out, the research participants should not control the analysis and outcome of the research. Likewise, Mason (2002) articulates that even had the participants had sufficient knowledge of the research subject, it would have been inappropriate to privilege participants to make judgments about the research. It is crucial that researchers clearly demonstrate the routes and methods by which the interpretations are made, in ways that are sensible to the readers, and this is possibly the best means of conferring validity upon interpretive research.

### **3.12 Summary**

This chapter explained the overall research process, provided justifications for the chosen research methodology, and explained the method that used to analyse the data. This chapter is organised in two main sections. The first section reviewed the existing research methodologies, and the second section justified the chosen methodology and explained its detailed processes from interview planning (i.e. sampling strategy, research sample, interview designing, interview process, ethical consideration and approval) to analysing the research data.

Initially, reflexivity, research philosophy including research ontology, research epistemology, and research paradigms were evaluated in order to demonstrate how the philosophical assumptions behind this research were articulated along with how the researcher perceives and ‘views’ the world. Consequently, the social constructionist was chosen as the research philosophy since the main concern of the author is to provide an interpretation of construction of meaning of innovation among the individuals who are practitioners in the construction industry. Different research approaches, including abductive, inductive, and deductive, were discussed in order to make better-informed decisions about the research design and data collection method. The abductive approach was selected since it provides more in-depth understanding of the data and allows the researcher to move back and forth between data sources and the existing theories in order to make sense of events.

Two main research designs, qualitative, and quantitative were evaluated in order to determine their appropriateness for this study, and qualitative design was selected, as it provides a more comprehensive picture of the research aim and questions. It was followed by reviewing research strategy such as experiment, survey, case study, action research, grounded theory, ethnography, archival, and narrative inquiry as well as different approaches to qualitative research. The narrative inquiry was chosen as the research strategy, and different approaches to narrative analysis were extensively explained. Moreover, different data collection methods and techniques such interview, questionnaire and observation were reviewed. In order to collect the

qualitative data, the face-to-face semi-structured interview approach was chosen. Finally, the reliability and validity of the research were explained in order to assure the quality and rigour of the research. The following chapter explains the first phase of the study which is the review of publicly available published reports regarding the UK construction industry performance.

# **Chapter 4 Review of Government**

## **Reports**

### **4.1 Introduction**

This chapter presents an institutional overview of innovation studies in the construction industry with a particular focus on the UK. The aim of this chapter is to meet two objectives of the research presented in section 1.4. First of all, this chapter carries out a historical overview of publicly available UK government reports regarding review of construction industry performance. Reviewed are the reports since 1987, which was the milestone year calling for change in the industry. Secondly, this chapter analyses the way the discourse of innovation is articulated within the key published reports including Latham, Egan, and Fairclough as the most cited reports in innovation studies in the construction industry, along with Wolstenholme's report published by the Constructing Excellence group.

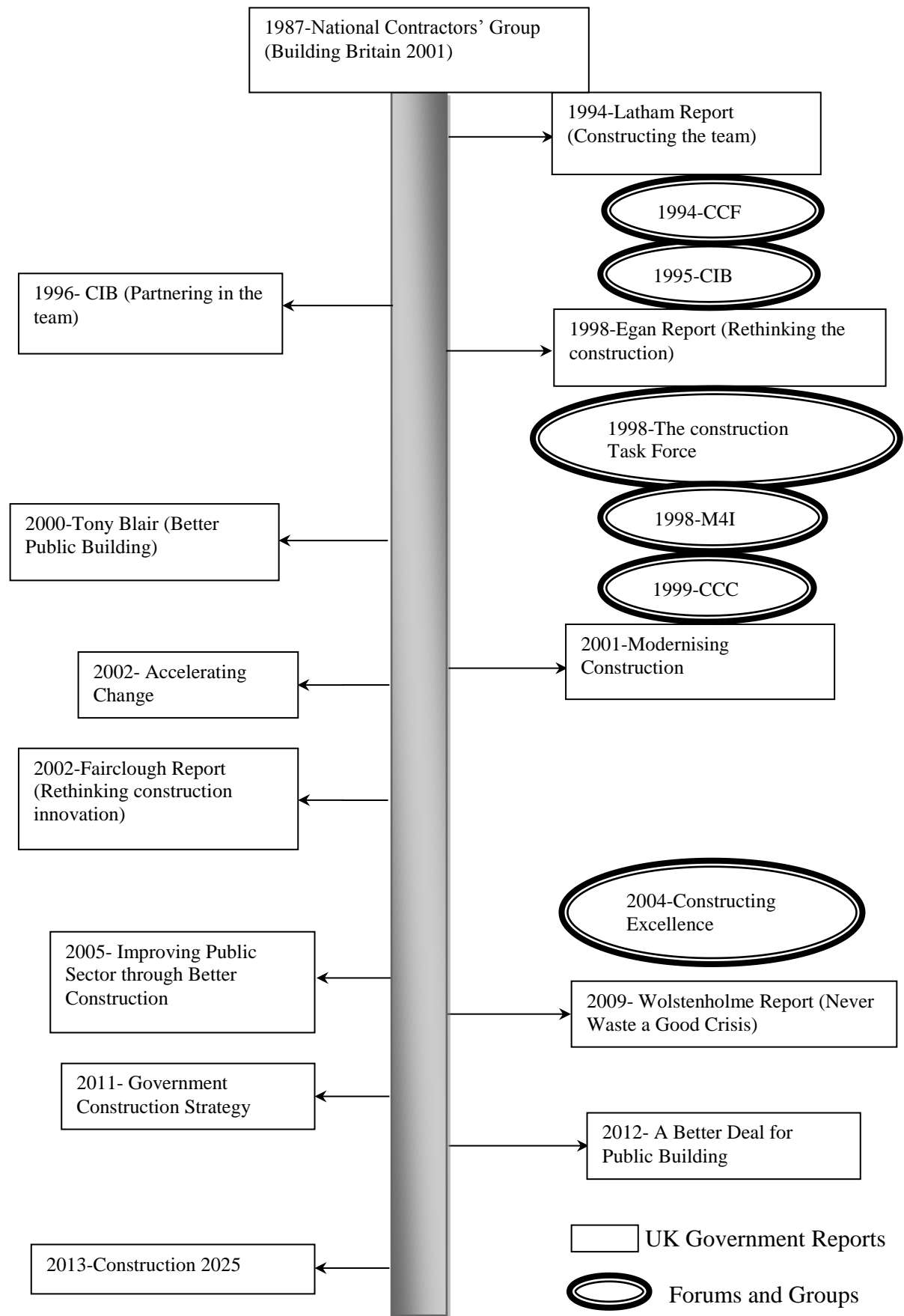
### **4.2 The History of the Publication of UK Government Sponsored Reports**

In terms of the national economy, UK construction plays an important role in contributing Gross Domestic Product (GDP), government revenue and employment (Thompson et al., 1998; Cox and Ireland, 2002; Ofori, 1990; Gruneberg, 1997; Ruddock and Ruddock, 2009). According to HM Government in the UK, the construction industry contributes over £90 billion to the UK economy, which is 6.7% of the total, and is the sixth largest contributor in the UK in terms of gross domestic product (GDP). Every £1 spent in the construction industry leads to an increase in GDP of £2.84 (Department for Business, Innovation and Skills, 2013).



Backward, old, traditional, and non-innovative are common labels that are given to the industry by policy makers and often scholars (e.g. Toole et al., 2013; Zawdie, 2012; Aouad et al. 2010; Naaranoja et al., 2008; Gann, 1997). These issues are cited repeatedly as a problem by the researchers which need to be addressed through ‘innovation’. Woudhuysen and Abley (2004) in their book entitled ‘Why is construction so backward?’ argue the case for innovation in the construction industry needs to be heightened because of the increasing demand to increase competitiveness of activities across the industrial spectrum. In the last couple of decades, concern about innovation in the construction industry has increased, in the wake of initiatives, including the Latham Report (1998) and Egan Report (1998), and more recently, Constructing Excellence (2009). One of the main aims of these initiatives was to stimulate innovative activities in the construction industry “through change in organisation and management system, and also through their consideration of the implications of these changes for the competitiveness of industry and for the design of institutional mechanisms and policy frameworks to underpin innovation and organisational learning” (Zawdie, 2012, p, 20). This section reviews the key UK government reports on the construction industry which most stimulate academia to research the innovation problem in the sector. (See Figure 4.1)

**Figure 4.1: Timeline of Key UK Construction Industry Reports**



#### **4.2.1 Internationalisation of the UK Construction Industry (1960-1970s)**

According to Winch (2000) and Adamson and Pollington (2006), the main reasons to call for an urgent change and innovation in the construction industry were the impact of World War Two (WWII), recession, the internationalisation of the world economy, and the fiscal crisis of the state throughout western economies. The emergence of a great internationalisation occurred in 1973 after the oil crisis when the clients who were largely international corporations compared the performance of the national industries of different countries. Foreign firms' investment, particularly by Japanese manufacturing firms who brought to the projects the usual Japanese style construction management methods, led to pressures for change. Meanwhile, the boom in work in the Middle East led to British firms working with actors and professionals from other nations. Due to the popularity of the US-style procurement methods and practices in the Middle East, projects adopted the American style, so British firms experienced similar opportunities. Throughout the internationalisation of clients and firms, managers became aware of their strengths and weaknesses.

#### **4.2.2 Call for Change in the Construction Industry (1990-1994)**

The poor image of the industry began to take shape when once again recession hit the UK in 1990 and lasted for 1.25 years, output declined by 39 per cent between 1990-1993 with half a million job losses (Adamson and Pollington, 2006). The UK Conservative Government decided to take action and requested an independent report in response to internal and external criticism of the construction industry. The criticism was that the construction industry had not met the clients' requirements (i.e. challenges faced by the private and public clients). There was a notion that the construction industry might follow the British car and automotive industry. The National Contractors' Group (NCG) commissioned a report called 'Building Britain 2001' from the 'Centre of Strategic Studies in Construction in the Department of Construction Management and Engineering' at the University of Reading in 1987. The report was submitted to Downing Street in 1989 alongside another report

“Investing in building 2001” which examining many areas of the construction industry including market operation, management, R&D, education and training and building industry’s contribution to output and employment (Green, 2011). The Building Britain 2001 report stimulated the debate for change in the construction industry. Soon after the publication of the report, Margaret Thatcher (the then prime minister) requested a series of actions to keep informed of the progress of the industry within 12 months. The task of a full review of the construction industry was appointed to Sir Michael Latham in 1992. The story behind the appointment of Sir Latham is explained in detail in the ‘change in the construction industry’ book by Adamson and Pollington (2006).

#### **4.2.2.1 Latham Report (1994-1995)**

In 1994, the result of the review of Latham was published as a report called ‘constructing the team’. This was a joint review of procurement and contractual arrangement in the UK and was jointly funded by the Department of the Environment (the UK construction ministry), the Construction Industry Council, the Construction Industry Employers Council (a grouping of associations for general contractors); the National Specialist Contractors Council (representing trade contractors); and the Specialist Engineering Contractors Group (representing services engineering contractors) (Winch, 2000). The report consists of 12 chapters, 30 recommendations and 8 major categories. The main theme of the report was “clients” and “clients’ interest” aiming to help clients achieve the high quality projects they desire. The concept of ‘clientship’ was formed due to the high emphasis of the Latham report on clients as leaders in the construction process and the necessity of a construction clients’ forum to represent private clients (predominance to clients). The Construction Clients’ Forum (CCF) was established consisting of public clients to follow up the main issues acknowledged in the Latham report as a comprehensive single voice for the industry’s clients. Later on in 1999, CCF transformed into the Confederation of Construction Clients (CCC) in order to bring together both public and private sector clients, to provide a comprehensive single voice for the industry’s clients. Another achievement of the post-Latham

review was to take forward the recommendation of the report concerning a ‘permanent pan-industry strategic organisation’ and to establish a permanent strategic body for the industry called the Construction Industry Board (CIB) in 1995. One of the Board’s core activities was ‘research and innovation’. All members of the CIB were from a construction industry background. CIB implemented action programmes in order to apply the Latham recommendations. Latham once again advocates the cause of partnering and close collaboration between the client and the ‘whole’ construction team.

The term *innovation* and its derivatives appears only briefly in the 52,198 word long report - just once in the main content and four times in the footnote references.

*“The client commissions a project which involves a high degree of innovation and many new design details”.* (Latham, 1994, p.17)

#### **4.2.2.2 Egan Report (1995-1998)**

Although the CIB’s responsibility was to take forward the existing structure for the period of 1995-1998, it was decided by the Minister of the time, Robert Jones, to install a follow-up committee (Construction Task Force) in order to identify the achievements and improvements of the industry. “The CIB was perceived as having lost momentum in pushing the Latham agenda forward, and as having only an indirect effect on the performance of individual firms” (Winch, 2000, p.147). Sir John Egan, chairman of British Airways Authority (BAA), was asked to chair the Construction Task Force to “improve the quality and efficiency of UK construction” (Adamson and Pollington, 2006, p. 84). The Task Force was largely undertaken by BAA staff and the representation of the CIB board was purposely kept to a minimum. One of the objectives of the Task Force was to examine current practice and the scope for improving it by innovation in products and processes. The Task Force was unimpressed with the achievement of post-Latham industry and suggested that a more dynamic approach was necessary. Its report, entitled ‘Rethinking

Construction', was published in July 1998; the Egan Report. Sir John Egan's terms of reference were:

*"To advise the Deputy Prime Minister from the clients' perspective on the opportunities to improve the efficiency and quality of delivery of UK construction, to reinforce the impetus for change and to make the industry more responsive to customer needs."* (Egan report, 1998, p. 6)

Latham's view on the Egan report was not very positive. He believed that the report was largely a reflection of his own already-published report and Egan's approach was 'antagonistic', which would lead to inhibiting the industry's promotion of a collaborative environment. In November 1998, almost three months after the Egan report's publication, Movement for Innovation (M4I) was established in order to work in five main areas of performance improvement; "key performance indicators (KPIs)", "training, education and research", "culture change", "design and development of knowledge centre" and "client and supply side relations" through demonstration of best practice and innovation. "The members of M4I needed to ensure that the demonstrations of projects are truly innovative. [...] The M4I Board is tightening the criteria but in the future should ensure that not only are the projects truly innovative but that they can also measure their performance." (Modernising Construction, 2001, p.12). M4I has been a part of Constructing Excellence since 2004. The aim of establishing Constructing Excellence and their mission is explained in the previous chapter.

In contrast to the Latham report, innovation was on top of the agenda in the Egan report. The terms 'innovation' and 'innovative' appeared in the report 31 times in the 15,779 words of the document. Innovation was discussed in a more object-entity orientation, for example with regard to product and component development and technology. One of the terms of reference of the Egan report was to "examine current practice and the scope for improving it by innovation in products and processes". The main concern of the Egan report was to highlight the lack of innovation in the construction industry and identify the inhibitors and drivers of

innovation. He emphasised innovation necessity in the construction industry and pointed to a ‘need to modernise’, “the client view”, “drivers of change”, “product development and components” and “technology as a tool”. The Egan report gives examples of specific types of innovation such as “simple innovation”:

*“[...] all Tesco sites have identical blue hoardings and workers on them wear branded overalls with both Tesco and their employer’s name. The increased team spirit and commitment engendered by these simple innovations have contributed to Tesco’s achievement of a 40% reduction in construction costs”. (Egan report, 1998, p. 25)*

*“it [the construction industry] invests little in research and development and in capital. In-house R&D has fallen by 80% since 1981 and capital investment is a third of what it was twenty years ago. This lack of investment is damaging the industry's ability to keep abreast of innovation in processes and technology;” (Egan report, 1998, p.7)*

*“In our view, the supply chain is critical to driving innovation and to sustaining incremental and sustained improvement in performance.” (Egan report, 1998, p. 21)*

*“Component production also includes the sustained commitment to innovation in the design of components, and development of a range of standard components which are used in most projects.” (Egan report, p. 22)*

*“Upgrading, retraining and continuous learning are not part of construction's current vocabulary. There is already frustration amongst component suppliers that their innovations are blocked because construction workers cannot cope with the new technologies that they are making available. This has to change.” (Egan report, 1998, p. 26)*

*“We propose that this core of projects and the housebuilding forum should become the basis of a movement for change and innovation in construction, established to pool experience among major clients and construction companies, develop ideas and drive improvement in quality and efficiency.”* (Egan report, 1998, p.35)

*“But, we must do so to secure our future. Through the Task Force, the major clients have committed themselves to driving forward the modernisation of the construction industry.[...]. But, we are also issuing a challenge to the construction industry to commit itself to change, so that, working together, we can create a modern industry, ready to face the new millennium.”* (Egan report, 1998, p. 3)

*“The industry recognises that it needs to modernise in order to tackle the severe problems facing it.”* (Egan report, 1998, p. 7)

*“Modern building techniques require fewer specialist craftsmen but more workers able to undertake a range of functions based around processes rather than trade skills. This is being addressed by overseas companies but the UK is in danger of being left behind.”* (Egan report, 1998, p. 26)

*“[...] an essential pre-requisite to the achievement of a modern efficient, world-class house building industry.”* (Egan report, 1998, p. 33)

#### **4.2.2.3 Fairclough Report (2002)**

In 2002, Sir John Fairclough was appointed to review the role the UK government should play in supporting construction research and innovation. Fairclough’s main recommendation was R&D programmes and encouraging the industry to invest in education and collaboration between industry and the academic world. Another focus was competitiveness and productivity improvement issues concerning the industry in order to achieve sustainability and design quality. The review criticises



the industry for its lack of setting a strategic vision and the weak links between industry and academia. It recommends putting more effort into the take up of R&D and adopting a more “interdisciplinary approach to encourage and promote innovation through learning and research” (Jones and Saad, 2003, p. 125).

The Fairclough report consists of 41,363 words. The word *innovation* and its derivatives appear 133 times in this report.

*“Everyone in the country stands to benefit from a modern, efficient, high quality and good value construction industry. Innovation, driven by well founded R&D, is the best way forward.”* (Fairclough, 2002, p.5)

*“The innovative capacity of an industry influences its long-term competitiveness and effectiveness. R&D is an important driver of innovation. No valid argument was presented to justify the construction industry being any different – R&D is as important to the construction industry as any other.”* (Fairclough, 2002, p. 6)

*“The construction industry organises its resources around projects and although it is evident that considerable innovation occurs and is funded within projects there is a problem with institutional learning to capture this innovation for future projects.”* (Fairclough, 2002, p. 6)

*“As client, Government has a vital role to stimulate innovation by demanding better value and fitness for purpose from public buildings, and particularly to take account of the interests of the eventual users of these buildings.”* (Fairclough, 2002, p. 6)

*“There is probably more scope to improve the quality and image of construction by innovation and change in this most conservative segment of the industry than in any other.”* (Fairclough, 2002, p. 13)

*“There is also an issue about the industry’s capacity to absorb innovation and new research knowledge. The best in the industry are as good as any in the manufacturing sector at undertaking and gaining knowledge from research.”* (Fairclough, 2002, p.13)

*“Rethinking Construction has been widely accepted, is beginning to have a profound influence on the industry, and has helped to bring forward and encourage innovation.”* (Fairclough, 2002, p.15)

*“But it [the construction industry] must simultaneously tackle the skills issue – bright people are needed to push innovation in the industry.”* (Fairclough, 2002, p.17)

*“We need a closer ongoing working relationship between the academic research world and the practitioners on the ground. It’s all a symptom of the classic British disease – research and innovation takes too long to filter through to industry, by which time Germany, the USA, have already done it.”* (Fairclough, 2002, p. 69)

#### **4.2.2.4 Wolstenholme Report (2009)**

Another key government sponsored report was published by Constructing Excellence in 2009 with the title of “Never Waste a Good Crisis”, chaired by Andrew Wolstenholme. The aim of the report was to review the progress of the industry in practice 10 years after the Egan report was published. Wolstenholme was formerly Capital Projects Director at BAA where he was responsible for Terminal 5 and the Heathrow Express rail link project. He was “one of few clients who could speak individually of client led change with any degree of conviction” (Green, 2011, p. 349). It is articulated that BAA has led the construction industry to a number of excellent innovative approaches. However, Green (2011, p. 41) argues that it was because BAA took advantage of a so-called privatised quasi-monopoly and stayed

safe from the “harsh wind of competition”. In an open competitive market, it would have been unlikely for BAA to have achieved this success.

Wolstenholme was appointed to promote an innovation agenda in the construction industry in the UK. Having the main body of the report in support of Egan’s improvement agenda, the report cites 500 demonstration projects including the London 2012 Olympics as evidence of approving Egan’s report principles. The main part of the report is similar to Egan’s report, focusing on KPIs; ‘if we cannot measure it we cannot manage it’. This feature is apparent in the following extracts from the report:

*“People are now measuring performance, and it is heartening to look at the demonstration projects to see that some very good work has been done.”*  
(Wolstenholme report, 2009, p. 3)

*“It felt that better results could be achieved through long-term relationships based on clear performance measures and sustained improvements in quality and efficiency [...].”* (Wolstenholme, 2009, p. 7)

*“The KPIs allow individual firms to benchmark their performance with other firms. They also enable Constructing Excellence to measure improvement across the industry in its annual Industry Performance Report.”*  
(Wolstenholme, 2009, p. 10)

*“First is the promotion of environmental and social issues as the key drivers for measuring long term success.”* (Wolstenholme, 2009, p. 25)

As Green (2011) describes, the Wolstenholme report is a “rallying call to arms rather than an objective appraisal of merits of Rethinking Construction”. The report was completely uncritical about the Rethinking Construction report. Green (2011) states that when it comes to the construction improvement debate, previous reports are either supported uncritically or forgotten. However, the report has clearly indicated

that the clientship era, which was as one of the distinctive aspects of the Egan report, is over and much of the attention is now drawn to the supply side. In the meantime, innovation is still stated to be one of the key elements of economic contribution. Nevertheless, a significant feature of innovation as a key in the development and improvement of the economy of the country is evident in the narratives of the report. The extracts below highlight the supply chain and consultant relations to innovation as a main driver of innovation among other actors involved in projects. Here, innovation is associated as a generator of long-term value.

*“Challenge your consultants to develop more options for risk transfer. Passing the risk down the supply chain effectively turns off the innovation tap. The more innovative the solution the closer you will need to get to the supply chain and the greater the potential to generate long-term value. Work with the supply chain to understand where they are really best placed to manage risks on your behalf, and to deliver best value when they do so.”* (Wolstenholme, 2009, p. 27)

*“To achieve these ambitious targets [...] using the supply chain to drive innovation and performance improvement, with the opportunity to share in the rewards.”* (Wolstenholme, 2009, p. 7)

*“We believe that the era of client-led change is over, at least for the moment, and that it is now time for the supply side to demonstrate how it can create additional economic social and environmental value through innovation, collaboration and integrated working”* (Wolstenholme, 2009, p. 4)

*“For the last decade, the industry has been sheltered by a healthy economy. This has enabled construction to prosper without having to strive for innovation. The current economic crisis is a perfect opportunity for us to think again. We cannot afford to waste it.”* (Wolstenholme, 2009, p. 4)

The recession and the credit crunch in the UK in 2009 created a different environment to address the financial problems faced by the industry. It shows that a satisfying contribution of the industry has happened since the last recession and the following narratives show that there is still a concern for the future of the industry, as a new recession has hit the UK. As a result of an investment cut by clients, the motivation for change and innovation in the future is expressed.

*“Looking ahead, there are major challenges on the horizon. Most clients have already cut their long-term investment plans, and capital budgets will be at risk for many years to come as we anticipate a long period of recovery from the current recession. For Government, there is huge pressure to reduce public spending. But perhaps the greatest challenge is how we can deliver a built environment that supports the creation of a low carbon economy for the UK. So while there is no crisis yet in our industry, we are approaching a time when UK plc can no longer afford to build and maintain the infrastructure capable of supporting our future needs as a society.” (Wolstenholme, 2009, p. 4)*

*“As we emerge from global recession, we should be concerned, therefore, about the prospects for future improvement in the absence of a fresh impetus for change.” (Wolstenholme, 2009, p. 8)*

*“Government, as a client, needs to understand the enlightened thinking that better and more intelligent designs improve patients’ recovery in hospitals and learning outputs in schools. [...] For Government as a policy maker, the challenge is to create an environment that incentivises innovation and speeds up the modernisation process.” (Wolstenholme, 2009, p. 4)*

As it can be seen, the above extract offers more details about innovation in terms of tangible perspective of what innovation is able to do and contribute to the industry. This reflects on academic writing of construction innovation as one of problems of the industry for being traditional.

The writing of Wolstenholme consults different events including review team meetings, a review of “the last decade worth of industry reports” (Wolstenholme, 2009, p. 5), online industry surveys from Constructing Excellence and other audiences of Construction News and Building magazine, and workshops. These events can be incorporated with discourse and meanings within the report. As a result, Wolstenholme’s report is embedded in a combination of policy makers, academic and spoken discourse.

This report is a 32-page, 17,499 word document. The word “innovation” is mentioned 19 times and “innovative” 3 times in the document.

### **4.3 Summary**

This chapter presented an institutional overview of innovation studies in the UK construction industry. Initially, a historical overview of UK government reports regarding the construction industry were carried out from 1987 up till now. Secondly, an analysis of the the discourse of innovation is articulated within the key published reports such as Latham, Egan, Fairclough, and Wolstenholme’s report were conducted.

From an institutional perspective, the Latham, Egan, and Fairclough reports have been influential agenda-setting reports in the UK construction industry for recognising the essential need to encourage the construction industry to engage in innovation. However, the Latham review did not seem to stimulate many academics to produce publications concerning innovation in the industry. This was evident from the low level of publications on the subject between 1994 and 1998 (see Figure 2.1). In contrast to the Latham report, the term *innovation* enjoyed almost an iconic status in Egan’s report (Green, 2011) and was a dominant terminology which amplified academic publications to address the low levels of innovation. The use of innovation in government reports was related to suppression of differences such as modernising, world-class, and efficient. Innovation is used to promote a ‘preference structure’ in order for the readers to maintain communication through agreements (Potter and

Wetherell, 1987). Examples of these were seen where the reports asserted that economic elements such as recession, credit crunch, investment cuts and cost increases caused damage to the industry. There were strong truth claims in which what innovation can do and what must the actors in the industry do. Fairclough (2003) states that it is a way to legitimise predictions about the future. The next chapter will explain sensemaking theory as the theoretical framework which will help in describing the narratives of practitioners in chapter 6 and 7.

# Chapter 5 Theory of Sensemaking

## 5.1 Introduction

This chapter presents the theoretical perspective of the research where the empirical data from interview transcripts are framed. The first section of this chapter explains Weicke's theoretical framework, which is based on seven properties. The second section describes the two different epistemological approaches to sensemaking, and the last section reviews the application of sensemaking in organisational studies.

## 5.2 Sensemaking perspective

"Sensemaking involves the ongoing retrospective development of plausible images that rationalize what people are doing" (Weick et al., 2005, p. 409). Brown et al. (2008, p. 1038) define sensemaking as "a generic phrase that refers to processes of interpretation and meaning production whereby individuals and groups interpret and reflect on phenomena". The sensemaking literature covers a profusion of contexts, for instance project management (Wright et al. 2000), marketing (Hopkinson 2001), health care (Boreham et al. , 2000) and weather forecasting (Klein et al., 2006), and epitomises some of the subjects that have attracted scholars. Weick (1995) describes 'sensemaking' as a process of seven identifiable properties: (See Figure 5.1)

1. Identity: Sensemaking grounded in identity construction. This means that the sensemaking begins with the need for identity of the sensemaker. The situation perceived by the sensemaker is implemented in her/his identity. Weick suggests that it is the self that is in need of interpretation rather than the environment. The implications of a situation for any individual or organisation are dictated by the identity adopted by the organisation (toward that situation).

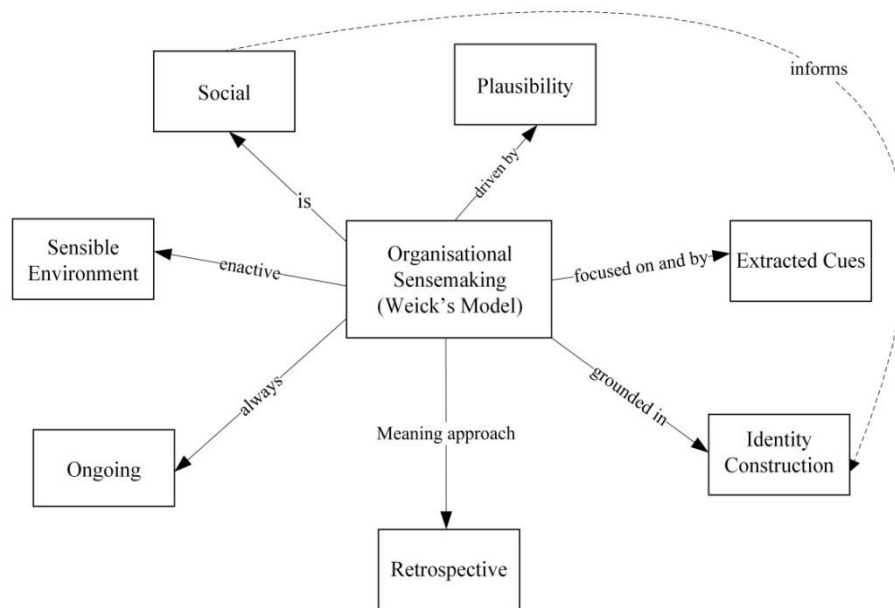


2. Retrospection: Sensemaking is retrospective, which means that it is based on people's experiences. People only know what is going on and what they are doing once they have done or experienced it. Weick (1995, p. 25) states "the creation of meaning is an attentional process, but it is attention to that which has already occurred".
3. Enact: Sensemaking is enactive of sensible environments. Sensemaking enables the actors to act confidently by enacting constraints and creating rules. The rules and constraints are themselves created consciously or unconsciously to help in understanding and dealing with issues created by the rules of the environment. To demonstrate this statement, Weick gives an example about the action taken by the USA in 1987 in the Persian Gulf. The United States put American flags on Kuwaiti ships and surrounded them with US combat ships in order to prevent attack by Iran. By doing this, the USA created a reality in which they could legitimately respond militarily to any attack on Kuwaiti ships.
4. Social activity: Sensemaking is social. This means that in a group discussion, everyone's statements contribute to the direction the outcome of the conversation takes. Each individual person denotes a sensible statement or questions that are in turn used by the others as the discussion proceeds. The conclusion stated by an individual "at the end of the discussion may not reflect the opinions of the entire group, but as long as he listened to the discussion, then his mental frameworks incorporated stimuli from the discussion and contributed stimuli by generating and contributing statements" (Seligman, 2006, p. 113).
5. Ongoing: "Sensemaking never starts. The reason it never starts is that pure duration never stops. People are always in the middle of things, which become things, only when those same people focus on the past from some point beyond it" (Weick, 1995, p. 43). "Sensemaking is ongoing because sense is continually being made and remade" (Seligman, 2006, p.114). The

environment and conditions around people change over time. A system or an event recognised as important and invaluable may seem trivial and wasteful under different conditions.

6. Extract cues: According to Weick (1995, p. 50), “Extracted cues are simple, familiar structures that are seeds from which people develop a larger sense of what may be occurring”. Cue extraction implicates noticing and classification which are both subjective and subject to plausible reasoning. Cue extraction is the comparison of what is noticed to what is understood. The noticed subject can be mentally classified as being “like”, “unlike”, and “an example of”. Noticing refers to the activities of filtering, classifying, and comparing, whereas sensemaking refers more to interpretation and the activity of determining what the noticed cues mean. “If events are noticed, people make sense of them; and if events are not noticed, they are not available for sensemaking” (Starbuck and Millikan, 1988, p.60).
7. Plausibility over accuracy: Sensemaking is driven by plausibility rather than accuracy. In sensemaking, the truth is relative and does not depend on accuracy. Sensemaking does not see it necessary to offer explanations for complex situations. Weick’s concept is based on the fact that human cognition is limited and the environment of an organisation is constantly changing, and with it so too is the nature of relationships. For that reason, it is not possible to say precisely what is going on at any given time. As a result, the majority of organisations prefer speed over accuracy in their organisational actions. Weick points out that a good story and a coherent and reasonable explanation is preferred over accuracy.

**Figure 5.1: Weick's Sensemaking Model**



Source: adapted from Weick (1995)

The process of sensemaking involves verbal communication of people that enacts or creates the social world by communicating and negotiating (Berger and Luckmann, 1966; Garfinkel, 1967). The process involves searching for coherency and plausibility that is sensible and notable, which incorporates past experience and expectations, and sustains the self while interacting and reflecting on others. Sensemaking is “constructed retrospectively yet used prospectively, and captures thoughts and emotions” (Brown, et al., 2008, p. 1038): “To engage in sensemaking is to construct, filter, frame, create facticity [...] and render the subjective into something more tangible” (Weick, 1995, p. 14). When there is an inadequate understanding of an event by organisations or individuals, sensemaking can assimilate the event into a plot and make it plausible in association with the context of what has taken place (Klein et al., 2006). Moreover, Weick (1995) explains that sensemaking is the existence of something that can be examined, so it is not a

metaphor. He further clarifies that “sensemaking is about such things as placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in pursuit of mutual understanding and patterning” (Weick, 1995, p. 6). Weick emphasises that sensemaking is not interpretation or decision making, but rather it incorporates how cues are internalised in the first instance and how individuals decide to focus on specific cues. Craig-Lees (2001, p. 515) has given six characteristics to Weick’s sensemaking theory:

1. “People can know what they are going to do but can only have understanding and meaning of the event or thought once it has been experienced”.
2. “Thinking and knowing occurs in the immediate past—once you have a thought it is in the past—a nanosecond constitutes the past”.
3. “Thinking, knowing, and sensemaking do not occur in a vacuum—they affect and are affected by the external environment”.
4. “The process has no start or finish in a living entity”.
5. “The process is individual and subjective”.
6. “It cannot be judged—meaning making is individual.”

The focus of this research on the sensemaking approach is Dervin et al.’s (1983) definition which defines sensemaking as behaviour, both internal (i.e. cognitive) and external (i.e. procedural), which allows the individual to construct and design his/her movement through time-space. There are two main schools of thought in developing the sensemaking theory; cognitivist and social constructionist.

### **5.2.1 The cognitivist approach**

This approach explains sensemaking in terms of mental models, frames and cognitive repertoires. These models are meant to be shaped from the sensemaker's previous experience and applied to the existing situation, so that researchers may understand it. In a cognitivist approach, sense has a realist nature, which is reflected in the research method used - for example surveys and analytic coding or content analysis. One of the obvious examples of the cognitivist approach is SWOT (strengths, weaknesses, opportunities and threats) analysis in conducting strategic planning by labelling events in organisations. Narratives and discourses are recognised as important means in sensemaking by both cognitivist and social-constructionist researchers. The difference is the treatment in language and discourse. For cognitivists, languages and meanings are a straightforward manner, allowing an understanding of a situation to be readily communicated. In the cognitive approach, narratives are viewed as representations of cognitive reality or means by which a sensemaker classifies her/his experience according to various cognitive schemata. On the other hand, narratives are not observed as correct and concrete reports of a situation or event.

From the viewpoint of a cognitivist approach, a story or narrative is a realistic report from the cognitive eye of the storyteller. Dougherty (1992, p.191) clarifies this by stating an example. "It is (more) like the tales of eye witnesses at an accident or of individuals in a troubled relationship – each tells a complete story, but tells a different one". In order that the storyteller can make sense of an event, she/he brings to bear on the subject a specific cognitive schema. As a result, a researcher can use directly quoted narratives in order to establish viewpoints and make comparisons of opinions of different groups with respect to a particular event. One of the practical examples of a textual approach is Gephart's (1993) work, which was involved with an ethnography study and sensemaking of public enquiry concerning a fatal pipeline accident. In the analysis he used all the sources associated with the accident, such as newspaper articles and field notes, searching for the language rules and structures

which people used to make sense of their world and identify how these are made meaningful to those involved.

The following section explains the social constructionist approach which is opposed to the cognitivist approach in the aspect of presenting the stories. In the cognitivist approach, participants' stories are presented as understood and readily construed sense whereas in the social constructionist approach, the process of storytelling is the ongoing and active construction of sense and organisational life.

### **5.2.2 The social constructionist approach**

The social constructionist sensemaking approach, in contrast to the cognitivist approach, is not concerned with making sense through the sharing of common mental maps or schema, but rather it regards sensemaking as being shaped and produced through a flux of ongoing negotiation between individual and group identity (Weick, 1979). Sensemaking is a cyclical process, which means that sensemaking starts at "the individual level, then mutual or social sensemaking takes place, moving on to understanding, followed by actions, then a new cycle begins again with individual sensemaking" (Taylor, 2010, p. 48). Sensemaking is a continuous process of construction and re-construction to make sense of language (Watson, 1995).

From a social constructionist perspective, sense and reality are constructed within language and discourse, rather than independently of and communicated through language. Weick et al. (2005) state that when people think narratively they attempt to label their sense. From a narrative position, this labelling is continued rather than static, and ironically, the use of language makes a perfection communication from one person to another person difficult (Weick, 1995). "The multi-vocality produces meaning, and hence sense and meaning that is situated, fragile and negotiable" (Hopkinson, 2001, p. 428). According to Foucault (1977), human beings use language to construct reality and demonstrate levels of power by granting authority to specific voices and excluding others (Fairclough, 1989). Hence, identity or

possible identities are constructed at both individual and group levels. According to the concept of positioning, identities or concepts of self are dependent upon those they are related to or compared with. Identity construction is a key theme in social-constructionist sensemaking, which significantly influences actions of individuals or groups.

Narratives are considered as means for sensemaking and creating reality (Orbuch 1997; Weick, 1995). The narrators are viewed to be the author and creator of their reality who are responsible for choosing the different environmental items that are brought together to form the plot. To explain the events, the narrator uses the story to form the relationships between items and seemingly causal associations. Through the narrative, the narrators and listeners place themselves within the social order of the story in order to confirm their identities and gain knowledge of how to interact with the world. Sensemaking carefully observes who the narrator considers herself or himself to be and how they see the world and how that sense of the world was developed. Similarly, a researcher might significantly move her/his views from one classification to the other. Alternatively, a researcher may interpret other researchers' work in relatively different ways. All these examples show the dynamic nature of the sensemaking process, in which the researchers themselves are taking part.

### **5.2.3 Implication of sensemaking in organisational studies**

The sensemaking perspective has been adopted in many organisational studies. One of the examples is by Maclean et al. (2012), who studied the perception of self-legitimising of being a banker through life history storytelling. By application of a sensemaking theoretical perspective, they explored what actions they carried out in order to obtain the work identity of elite bankers. Another example is Coopey et al. (1997), who studied the narratives of managers in an IT company who claimed to be innovative. They observed that innovation is socially enacted within the organisational context. By considering the effect of power relationships, innovation narratives assisted managers to confirm or re-construct their identities within the ongoing interactive organisational activities.

In project management contexts, Veenswijk and Berendse (2008) indicated ongoing challenges over the meaning of 'change' in organisations in the Dutch public infrastructure sector by studying the narratives of 30 project managers on a particular project development. Thiry (2001) studied the importance of stakeholders' rhetoric within the sensemaking context. He challenged the positivist approach and advocated a constructivist approach in defining 'problems or situations' which leads to 'improved solutions or processes'. He argued that application of the sensemaking approach in a social context of conflicts and interactions can be beneficial in understanding practitioners' own individual viewpoints. In a more theoretical context, Seligman (2006) argued seven properties of sensemaking in relation to the innovation-decision process. However, he called for an empirical investigation to explore the understanding of the notion of innovation by practitioners by using the sensemaking theoretical framework. In a construction project management context, a number of studies have been carried out by researchers. For example, Fernie et al. (2003) studied how and why knowledge sharing is implemented in diverse ways, and challenged the accumulative concept of shared knowledge. They state that the notion of knowledge is highly individualistic; instead of measuring the amount of knowledge shared, it is more meaningful to ascertain to what extent individuals find the knowledge sharing significant.

Green (2011), in his book called 'Making Sense of Construction Improvement', argues the nature of reality of construction meanings are embedded in the 'sensemaking mechanism' adopted by the practitioners. It is often argued that construction practitioners mobilise their storylines of discursive terms by the discourse of enterprise culture, government reports and policies (Larsen, 2011; Bresnen et al., 2005). Green and May (2005) note that practitioners legitimise those narratives that assist them to make sense of the reality that they experience. Green indicates that narratives of individuals may be directed in towards the dominant stories which may not be plausible for practitioners who mobilise. For example, managers in the organisations may possibly promote themselves as successful innovation champions in the work environment (Leiringer and Cardellino, 2008). Within the sensemaking context, they create (enact) meanings to persuade particular



listeners to agree with their arguments or messages. Innovation narratives can be constantly repeated and sustained over time, so a storyteller may recall and propagate them over time to maintain legitimacy (Green, 2011). Green (2011) asserts that each generation of practising managers can re-narrate the stories and re-label events and activities instead of following tried and tested activities. In construction projects, the labelling activities may be carried out throughout the lifecycle of projects; planning, designing, execution or maintenance. It is crucial that the connection between different phases of projects is understood in both retrospective and prospective time. Chan's (2012) work on sensemaking mostly focuses on the time aspect. He argues that sensemaking for the actors in the projects at the present time and the future can often be challenging. The representatives of the practitioners from a large unit of an organisation respond to questions in a way that emerge from the past experiences retrospectively. This is why the projects become highly clear as they unfold over time.

### **5.3 Summary**

This chapter explained the theoretical perspective of this research where empirical data from interview transcripts in the next chapter are framed. The seven properties of Weick's sensemaking theoretical framework was described. Two main different epistemological approaches to sensemaking, cognitive approach and social constructionist approach were described. Moreover, the application of sensemaking in the organisational studies was reviewed. The following chapter will present the findings of interview data by providing the interpretation of what the research participant interpret from the innovation perception.

# **Chapter 6 Interview Findings**

## **6.1 Introduction**

The aim of this chapter is to present construction practitioners' perception of innovation and their different responses to the activities and events that they described as innovation in their narratives. This chapter engages with questions concerned with understanding the practitioners' perspective of construction innovation by presenting the empirical data constructed from interviews with construction practitioners; that is senior, middle and line managers at various levels within contractor and subcontractor construction firms across the UK. This will be done by an examination of how these practitioners make sense of innovation within the project and company in which they are working by providing the definition and a list of examples of innovations.

## **6.2 Innovation Definition Mobilised By Interviewees**

The question that the researcher asked in the opening phase of the interview was 'how do you define innovation in the construction industry'. A straightforward question was chosen to begin with, to allow the participants to start telling the story of innovation. It turned out to be the beginning of the emergence of differing views on the nature of innovation. A diversity of perspectives on the definition of innovation stated by the participants was evident. In this section, it was intended to demonstrate different definitions of innovation mobilised by the participants of research. A number of themes and sub-themes emerged in the definition storylines. The majority of the participants associated innovation with newness, and it was often described as one of the key distinguishing characteristics of innovation. The striking elements and codes that emerged from the definition of innovation provided by the participants were object-entity, processual, novelty, new ideas and beneficial. An

independent consultant who was previously working as a supply chain procurement director articulates a conventional definition of innovation.

**“Well, I wouldn’t define innovation related to the construction industry. I would define innovation as the new beneficial application of an idea but that's what stuck with me from training in the past so the concept is doing something that wasn’t done before that helps whatever the organisation it is, get better in something. Whether or not the idea is absolutely new is less relevant. It’s that something wasn't done in that environment before.” (Participant 7)**

From the above quotation, it is evident that innovation is viewed as ‘something’. According to the Oxford English Dictionary, ‘something’ means “some unspecified or indeterminate thing which could be material or immaterial”. Moreover, the participant contended that innovation may be perceived by people as being new to the environment. Similarly, a planning engineer from water the construction company opined:

**“Innovation is something new that nobody has done it before. It is something that is implemented for the first time. It could be a technique or might be a new idea in design or procurement”. (Participant 4)**

The newness in “something” is associated in both definitions. However, Participant 4 views innovation in the manner of its practical aspect whereas Participant 7 refers to both “processual” and “object-oriented”. The definition of innovation provided by an independent architect is described as an object (artefact) and technology that already exists. He associated innovation with human creativity and focused on individual thinking.

**“Innovation is actually very interesting word. I have this debate very recently with colleagues. They like the word. My feeling is it tends to mean technology whereas in my profession in architecture we need to be out creativity with how we use technology. Creativity is much broader concept really. So you can be very innovative and imaginative but their [company’s] technology could be still quite old”. (Participant 8)**

He goes on and clarifies the meaning of innovation within the construction industry by giving some examples. The examples given are products produced in manufacturing.

**“So when we think about innovation in construction industry, it is about the use of the latest materials or the latest methods of making and utilising manufacturing components. To be more specific, the large contractors who also involve in design and manufacturing building pre-fabricated components, they get the contract they come on sites with the design where they can rapidly assemble the building complete with pre-fabricated components and pre-cast concrete components with the insulation and glazing or other fitted components in a modules system is probably what we mean by innovation in construction at the moment.” (Participant 8)**

Likewise, a Chief Innovation Officer’s view on innovation is new technology in both the design and implementation phases of construction.

**“Well, it depends. If we are talking about the design part of projects or we are talking about the construction part of projects. When it comes to the design part, innovation is more about using the new technologies. This is the first thing that comes to my mind which is very similar to the construction**

**part of it. Talking about specifically design part of it innovation I think it is quiet vast.” (Participant 13)**

The director and design manager associated innovation with object-entity, problem solving and existing systems. However, not only the newness and novelty of an idea was highlighted in his definition, but also the ‘degree’ of newness was emphasised (i.e. a ground-breaking idea). He also connected the concept of innovation to a processual aspect and a shift in time from accepting the idea to implementing it.

**“Well, in just a simple way innovation is a different way of thinking. In our company it doesn’t mean a groundbreaking idea or something that could make a big difference. We like to adopt any changes and alterations, to take any new ideas and apply them in our projects. Innovation for us is to open about new ideas; have them, manage them, track them, and use them in our products. It is a very broad concept but to me it is simple way of thinking and to see different solutions for different problems or different opportunities. That’s the way we would like to think in our company” (Participant 6)**

A site manager who also introduced himself as a project management assistant describes innovation as a novel act which is mostly individual-oriented. He viewed innovation as an act of differentiating himself from others.

**“Innovation means thinking out of the box. For me, it means to think differently from others and to use novel methods in your daily job instead of just obeying the rules and thinking like others. Innovation is to try to find something different to solve problems.” (Participant 3)**

Participant 11 associated innovation with problem solving, which is one of the common potentially mistaken concepts that confuses practitioners discussed by Tidd

et al. (2003). Firstly, a new piece of thinking is an essential requirement of innovation, whereas it is not essential in problem solving. Innovation could apply to different situations whereas problem solving could apply only to a specific situation (Thomson, 2006).

**“It just once we have some problems with our job we have to find a way to solve them and it depends when we have problems. If the problems are minor there is no need to think about it and to go for innovation but sometimes when we have major problems then we need to find a way. ” (Participant 11)**

Finally, a strategic project manager from a contracting firm articulated that:

**“It is about applying new methods, products and process into the business by allowing us to do the job more effectively and preferably more quickly” (Participant 18)**

Meanwhile, a participant who is a site manager from the same organisation specified that:

**“I would define innovation to find a new way or improved way of doing a job that you already were doing. It is not necessarily inventing something new; it’s just finding in a better way.” (Participant 15)**

A quantity surveyor describes innovation in a simpler way, associating it with money and time:

**“Innovation is a new idea that makes my job going in an easy way with saving time. Time is money and money is everything at the moment.” (Participant 10)**

The examples of definitions expressed by the participants show inconsistencies and misalignments of storylines. Although some participants defined innovation as some sort of object-entity and as a “thing”, they frequently indicated innovation as an act and process of events. However, the crucial characteristics of novelty and exploitation featured in the innovation literature appeared to be incorporated by the participants’ storylines (see sections 2.5 and 2.6). The participants commonly associated the innovation in their definitions with some sense of “newness”. In fact, the majority of participants mentioned the word “new”. In addition, the participants recommended that innovation often stemmed from some kind of “improvement”, “change”, and a sense of “moving forward”, “different ways of doing things” and “refining current practices”. At a broad level, it was apparent that the participants’ understanding of innovation did not diverge considerably from conventional definitions of innovation, regardless of their level in the hierarchy within the different organisations. It was also prominent that the participants reflected that innovation was crucial for doing their job “better”, “easier”, “more efficiently” and “more quickly”, thereby emphasising the rhetorical performance effects of innovation. Nevertheless, when participants were asked to give examples of how innovation occurred in reality, disparities began to appear in the examples provided, which tended to be more explicit, localised and connected with their respective lines of responsibility. The next section explains how the different examples of innovation are narrated by the participants.

### **6.3 Examples of innovations reported by interviewees**

Nevertheless, apart from the definitions, the exemplified innovation(s) for each participant and the way innovations materialised were somewhat different. The examples of innovation described by the participants represented a range of contrasting views. Table 6.1 summarises a list of innovation examples that participants pointed out in their narratives.

**Table 6.1: List of Innovation Examples**

<b>Participants</b>	<b>Innovation Examples</b>
<b>Participant 1</b>	BIM
<b>Participant 2</b>	Value Plus
<b>Participant 3</b>	Truss delivery method Waterproof window frame
<b>Participant 4</b>	Off-site (pre-)fabrication for pumping station
<b>Participant 5</b>	Logistics models; “Focused win”
<b>Participant 6</b>	Waterproof Basement material
<b>Participant 7</b>	Procurement Practice Method
<b>Participant 8</b>	BIM
<b>Participant 9</b>	Under floor heating system
<b>Participant 10</b>	BIM; “lesson learned”



<b>Participant 11</b>	BIM
<b>Participant 12</b>	BIM ; Green roof
<b>Participant 13</b>	BIM; “total station”
<b>Participant 14</b>	BIM
<b>Participant 15</b>	Use of gas and explosive power nail guns in the use of concert screws
<b>Participant 16</b>	Energy purchasing strategy
<b>Participant 17</b>	Top-down construction and jump-lifts
<b>Participant 18</b>	Lean management; ‘green roof bag’
<b>Participant 19</b>	Groundwater cooling system
<b>Participant 20</b>	BIM

Source: Fieldwork

Participant 18 directly provided an example of a product as an innovation and asserted that they have an IP team in their company to protect their licencing.

**“We have produced ‘green roof bag’ so basically looks like compost but it is in a material that it is going to last. So we take it to up to the roof unzip it and then it is all planted. It all the plants that are going to survive on that environment so you can**

**mesh those compost bags and put them all together. They are very easy to transport you can take them to the lift and bring them up. So we have IP group in the company to make sure the products are licensed out for us. So that is one relatively new thing that we have been doing.” (Participant 18)**

According to Participant 15, the reason for innovation is to speed up the job and for Participant 10 it is to make the job easier. The “reduction of labour” and “cost saving” are other examples of the *raison d’être* for innovation.

**“Within construction phase of the projects, I can give you examples ranging from very detail that some people might call it minor elements of using fixings that faster to install. So in construction site for example the use of the gas and Explosive Power Nail Guns to put nails in, the use of Concrete Screws rather than traditional plugs. So there is whole host of minor technologies that are innovative from point view that they haven’t been used before and if you use or exploit it correctly you can get significant saving or reductions in use of labour to do a particular task.” (Participant 15)**

For Participant 13, the exploitation of new technology was critical and important, as he asserted:

**“We do occasionally show it [company’s internal website] to clients and as an example of being innovative to prove that we are not saying it we are doing it. [He shows the company’s internal website on his laptop and says]This particular example is called Total Station which is an electronic instrument to use in surveying.” (Participant 13)**

The majority of participants described applications of Building Information Modelling (BIM) as innovations or as being innovative. BIM was one of the highly referred to innovation examples described by the participants. For example, a designer from a housing construction company described BIM as a very innovative way of designing building and a very useful programme. He described the replacement of BIM with the old- fashioned method of sharing the drawings.

**“I will tell you about a new programme that we use which is called BIM modelling. BIM is very innovative way of designing buildings in the construction industry and also architecture. What happens is that rather than doing all the drawings separately from each other you just develop one model and then extract all the drawings from that. It is a very new way of looking at the whole construction design and development. Recently, I started one project working on BIM system which I quite find it very useful. It is really great in compare to old fashion drawings. It is something new and very useful. We are using it on our new project which is a residential project, but we have started to develop the BIM model for the whole project and then stage by stage we are extracting the information from that model according to the planning, building and drawing regulations”. (Participant 1)**

An architecture from a consultancy company explained BIM as an advanced technology in the industry. However, he expressed the uncertainty that he is experiencing towards BIM in terms of sensitivity of sharing information and understanding BIM as a system.

**“Actually, the technologies and innovation within it [the construction industry] really very advanced and moves very rapidly and the institutions keep up. I am the member of RIBA and we keep well abreast of new technologies and one of the**

**key technologies that is effacing the whole construction industries is BIM and how information is shared and we are all extremely sensitive to that you know for all sort of reasons and copyright and all sort of stuff and we need to understand how it works and what our role is within that. What I am trying to say is that to say old and backwards is not correct".**  
**(Participant 8)**

In contrast to Participant 8, a quantity surveyor who also introduced himself as a part-time PhD researcher, expressed a different storyline regarding BIM. He criticised the unclear roadmap in the adoption of BIM in the UK in comparison to other countries, for example the United States. Furthermore, he highlighted the importance of understanding the challenges that universities are currently facing in the UK in order to educate students in the future application of BIM in the industry.

**"In our company the innovation team has quite changed. They have a BIM team. They look at innovation as developments of software. Now they are trying to develop everyone individually by training them on BIM, engineering team training them on engineering technology aspect of BIM architecture engineering training on software, but as I said you find a lot of problems in real life because everyone has to be using BIM by 2016 in the UK on public sector projects, so all the big companies they want to do it, but if you go to the big companies as I gave an example of the architect who does not even know how to open the email. You cannot expect them to go into a course and train that is number one problem. Number two, you cannot expect them to have the time to come in for training courses so the innovation somehow in these big companies who still use pen and paper and call themselves innovative and say we good in innovation and we want to go ahead with innovation from different point of view individually, software or even process**

**they even push for it but because the way their culture is it is hard. I mean the culture of industry.” (Participant 8)**

Similarly, a chief innovation officer emphasised the effort that needs to be put in to engage all stakeholders in the process of using BIM:

**“BIM is a new technology in this industry and still there are some problems involved with that. One of the major issues is the amount of geometric data and information coming from all the stakeholders including consultant, suppliers and different sub-contractors.” (Participant 13)**

Participant 20 explained BIM as a radical innovation in the construction industry technology development world. He explained how the industry has come from a very traditional way of designing construction structures to high-tech technology.

**“The easiest way to explain BIM is that before we used to draw lines on papers and then we went to drawing lines in the computers now we actually put the information on products came into computers so at the end of the day when we have 3D model. It represents not only the physical structure but all the intelligence about component part that go into that structure.” (Participant 20)**

Participant 9, procurement director, expressed the ability of BIM to conduct 3D modelling for the rail industry as being innovative. Participant 8, an architecture consultant, on the other hand, considered the application of BIM for the first time in their company as being innovative. He identified the gap in the current progress of their company and articulated:

**“BIM is a new technology. Although there is no guarantee that it will actually increase our productivity but we need to keep**

**up with the market. Currently, many companies are using it; we need to encourage everybody in the process to get engaged and to move forward in the business.” (Participant 8)**

In contrast, Participant 14 pointed to the process of engaging in BIM as an innovation in their company which involves training staff who are sometimes not willing to become engaged in the process.

**“You can imagine if we want to develop ourselves is going to be quite different and not having the time as I said so. The ‘innovation team’ cannot call me and say ‘oh we know that you are working on this project but can you come in for a week and go on a training and that’s part of the innovation process?’. I would said no I am too busy for this. I can’t take a week off especially for an engineer.” (Participant 14)**

Likewise, Participant 16 shared his concerns regarding the training courses:

**“If our innovation team say let’s all do the training course. It is not easy to get all the staff, to go for the training courses. They will have to be there for two weeks or three weeks to be trained on something that they have never seen especially with the development of softwares like BIM. We have the graduate scheme. Graduates are probably more focused people as individuals, if you want to talk about innovation as individuals.” (Participant 16)**

It is apparent that the examples of applications of BIM are described in two different contexts; tangible and intangible. The tangible aspect of BIM is material and is the object-entity feature of BIM as a technological software product whereas the intangible aspect is process- oriented and is the managerial element of BIM where the stakeholders of projects have to be involved.

## 6.4 Risk and Uncertainty

The introduction of something new and all novelty involves some degree of risk; whether it is organisational or social (Mohr, 1969; Burns and Stalker, 1961). It has almost become taken-for-granted that risk and innovation are connected. Where risk-taking is encouraged, this has often been associated with an innovative environment. The willingness to take risks is broadly considered at the individual level, group and organisation level (Casson, 1993; Bommer and Jalajas, 1999; West, 1990). In the situation of proposing new ideas or new ways of working, individuals are sensitive to moral and ethical risk factors compared to the group and organisational level, unless they perceive a supportive and non-threatening environment. At the group level, risk-taking is more likely when there are new idea proposals (West, 1990). Risks are also involved in the ultimate application of new ideas as well as development and processes. One of the commonly expressed reactions by the participants to innovation was risk. The storylines mobilised regarding risks were often associated with uncertainty and the financial aspect of innovation. The greater uncertainty of the outcome, the greater the degree of perceived risk (Zaltman et al., 1973; Bommer and Jalajas, 1999). The storylines extracted from the narratives of participants show that new ideas and innovation are inherently risky or threatens individuals. For example a designer describes the financial risk of purchasing new software for the company:

**“For example if we want to buy a software and then we realise that the software it is not useful for the company then we will lose the investment so it is risky for him [the managing director]. It is not something that he wishes to take it. It is important that he understands the importance of taking the risk. It is all about understanding the return of investment in the future. For example if we spend 2,000-4,000 pounds now it will save up to 40,000 pounds in near future” (Participant 1)**

Resistance to innovation related to willingness to maintain the traditional way of doing things in the construction industry was echoed repeatedly. Some of the storylines generated a bigger picture by using the pronoun ‘they’ to refer perhaps to the external environment (e.g. other organisations and institutions) or the industry as a whole in order to explain the situation where risks are involved in innovation. For example, Participant 6 articulated:

**“They don’t want to do it themselves probably they don’t want to take the risk they are some risks involved in that. Always there is risk involved when you are taking [...] I think they don’t want to take risk. They want to see done for ten years. It is done and proved and working”. (Participant 6)**

The sense of uncertainty for the future was echoed by Participant 1, who said:

**“For 200 years everyone is doing traditional way and everyone knows it and they are aware how the end result will be like. Applying new ways and ideas, always involves risks so you never know you will be successful or not” (Participant 1)**

On the other hand, Participant 6’s feeling of uncertainty was related to new ways of doing things where the cost of failure comes to attention due to the companies’ outsourcing.

**“I think because construction companies haven’t got all the different skills in-house. They have to outsource the different skills to different companies. The sub-contractors only get paid for a specific task, for example structure design so they don’t want to take risk. They carry on doing in a traditional way, the way that they are used to do for many years. There is no reward for being innovative in the industry. You just want to get the job done. I think it should be in the company’s culture**



**to encourage going down a different route. Otherwise you just follow the rest and not to be involved in a new structure.”**  
**(Participant 6)**

Participant 2 explained the uncertainty involved with the new ideas coming from different engineers as follow:

**“Our staff never stop coming up with new ideas. Sometimes they go off to all down different paths so sometimes we have to get a little bit of control over that because we all could end up spending all an awful lot of money going down to all dead alleys that they don’t add much value. They might be kind of great solutions but in terms of academic quality but it is not saleable. We want something that we could actually take it to the market. We need to be careful about that. At the same time, we don’t want to push the enthusiasm because that is where new ideas come from. So there is a real difficult balancing out there.”** (Participant 2)

## **6.5 Blame It on The Industry’s Nature**

Brown et al. (2008, p. 1040) state that each individual narrates their own stories to enhance self-esteem and they create their own version of events (self-serving) that are positive outcomes to the self and negative outcomes to external factors. This phenomenon is generally referred to as “attributional egotism” (Brown and Jones, 1998). “They were narratives that permitted people to attach themselves to ‘desirable’ ends, think well of themselves in moral terms, supported their needs for autonomy and control, and promoted feelings of self-worth” (Brown et al., 2008, p. 25). From this viewpoint, the participants reflected on the characteristics of the construction industry as one of the barriers of their actions towards innovation. Different storylines were identified in relation to the characteristics of the

construction industry. For example, a designing director pointed out the multi-stakeholder characteristic of the industry:

**“I found people developers, builders, clients, and the whole housing building industry very resistant to changes and new ideas. That is what I found, me, personally.” (Participant 6)**

Similarly, a site manager articulated the resistance of accepting his new ideas from sub-contractors on the construction site. They are keen to carry on the old-fashioned way of doing things because of the experience that they have gained through the same job. For example, the site manager explained his experiences in dealing with sub-contractors on the construction site:

**“Sometimes innovation especially in construction sites I don't know about the other businesses or other industries but if you are trying to do something new you have to persuade all the individuals you are working with. They usually resist and for example say ‘we have 20 years of experience in ‘joining’ and have never seen someone doing this way’ so you need to have sufficient reason. It is very hard to get them to do something new when they are doing the same thing for many years.” (Participant 3)**

Participant 5 mentioned the same problem with a different approach. He explained the obstacle they experienced throughout the promotion of innovation in their projects. The new ideas are rejected in the hierarchal supply-chain process. He stated:

**“Sometimes what happens is that we can prompt all the things we want to do but we quite often don't get to deliver the things we want [...] because the main contractors, the supply-chain process remains barrier the way [...] so for instance one of the**

**other elements of innovation that we prompt is collaborative planning where we feel it is much improved process”.  
(Participant 5)**

The government legislations had a significant impact on the demotivation of practitioners. The design director articulated that local authorities imposing government legislations are one of the barriers to innovation:

**“A new way of doing things is often in conflict with local authorities’ guidelines. So you have to appeal and wait for a year or so in most cases we win because some of the points they raise are not relevant but somehow they resist. I think one of the reasons is actually there is not any incentives for local authorities and the planning officers to encourage them to let those projects to happen.” (Participant 9)**

Participant 9 pointed out the lack of a reward system in government policies for encouraging contemporary designs in construction. Government policies and local authorities being the main barriers in accepting new ideas was a storyline that was echoed very often by the participants, an example of which is presented below:

**“There is no reward for them [planning authorities] to approve contemporary and modern designs. They are conservative. I am very surprised still in this very difficult market. The new ideas still are not welcome”. (Participant 9)**

**“The officers of local authorities don’t want to take the risk. They just take the easiest route”. (Participant 15)**

**“The main part is when you are applying for the planning permission. They are just checking if your case is following the**

**guidelines or not. These guidelines are very objective.”  
(Participant 12)**

Likewise, participant 8 pointed out that local authorities are faced with too many government reports which need to be translated into practice.

**“The local authorities, their role are to interpret and deliver the central government policy in planning is very complex area. There are volumes of regulations of different forms of different sources as the planning regulations, local area frameworks. We have got building regulation and sustainable codes and these all get filtered through the local authorities who have to interpret all these documentations when they get submissions in the architects and developers. And again I think the leading edge of it from technological point of view it is sustainability”. (Participant 8)**

In contrast, the Best Practice Innovation Officer criticised the culture of the industry. He articulates that the government legislations have largely been supporting innovation but the embedded culture in the industry prohibits it. He pointed out:

**“I think that legislation could be quite supportive. It is supportive as well if you look at the green agenda from sustainability perspective. There is lot of legislations that supports the industry to be more conscious of the environment and that is itself the products have to be innovative to meet those demands. I think it is the more cultural that is embedded. Culture of the industry which is constrains not really the government. Well, I suppose the government could help by legislating it was done in a different way stop being commercial-led and being value-led”. (Participant 5)**

He further describes the industry as being traditional and performing poorly.

**“We do it traditionally and that is why the industry has very poor productivity. Typically, 40 percent is value-add and then the rest commercialised. The productivity is just very low.  
(Participant 5)**

Another common storyline extracted from the interview transcripts was the movement of the industry on a ‘commercial’ basis.

**“Sometimes in the industry because things are commercial oriented. They will manipulate situation not maliciously but they will do it to make commercial advantage of innovation”  
(Participant 7)**

**“This [waterproof basement material] has been tried in everywhere in Europe even in the UK in the commercial properties but not in residential. People in the industry are so reluctant to take alternative methods. They want to stick to what they know traditionally.” (Participant 6)**

## **6.6 Rewarding and Recognising Innovation**

The likelihood of occurrence of innovation within a group is high when “innovative attempts are rewarded rather than punished” (West and Anderson, 1996, p. 684). There were disparate storylines in recognition and incentives used to encourage the participants to innovate. The participants appeared to be rewarded for their innovative behaviours through different schemes. Examples of these are presented in Table 6.2. The rewards and recognition for each participant were a mix of individual and organisational levels.

**Table 6.2: Reward and Recognition of Innovation**

<b>Participants</b>	<b>Reward and Recognition</b>
<b>Participant 1</b>	“Management bonus schemes”
<b>Participant 2</b>	“Profit Related Pay”
<b>Participant 3</b>	“Promotions”
<b>Participant 4</b>	“job done”
<b>Participant 5</b>	Shareholders: “rewarded as outcome their decision”
<b>Participant 6</b>	“may feel that they somehow out of the team they are not bringing any new ideas”
<b>Participant 7</b>	“personal preference to share new ideas”
<b>Participant 8</b>	“success and progression”
<b>Participant 9</b>	“survive and keeping job”
<b>Participant 10</b>	“meeting the deadlines”
<b>Participant 11</b>	“to make jobs easier”
<b>Participant 12</b>	“getting your job done”
<b>Participant 13</b>	“to give confidence to deliver what we made promise”

<b>Participant 14</b>	“To get noticeable”; “getting a certificate”
<b>Participant 15</b>	“differentiation from others”
<b>Participant 16</b>	“to be promoted in the market”
<b>Participant 17</b>	“to keep up with the market”
<b>Participant 18</b>	“to get job done quicker”
<b>Participant 19</b>	“pat on the back”
<b>Participant 20</b>	“to gain profit”

However, some participants did not associate innovation with any form of reward, but rather more as a prerequisite to getting the “job done”. Examples of this were given by Participants 4, 11, 12, 17, and 18.

**“The only motivation is getting the job done.” (Participant, 4)**

**“Implementing those critical activities to make sure that the job is done on time and target and we are not in delay.”  
(Participant, 11)**

**“At the end of the day, you want to see the result of your work. You want to finish and get your job done.” (Participant, 12)**

**“It just once we have some problems with our job we have to find a way to solve the problem and get the job done”  
(Participant, 17)**

**“I’d like to think reward as getting my job done quicker without any problem.” (Participant 18)**

**“For me, I am not expecting any financial award when I share my new ideas. I believe this is what I get paid for. At the end I might get a pat on the back!” (Participant 19)**

Another example of indirect association with rewards was given by Participant 15. He had a much broader view by looking at the luxury market in which they operate. The concern about market competition was evident in the storylines of Participant 15. His reward for being innovative is to be differentiated from competitors in the market. He further pointed out a sort of financial reward as he implicitly talked about the business aspect and sharing the profits that shareholders obtain from being innovative and different in the market. The following excerpts are examples of his storylines:

**“[...] when we build a house we know that we are competing against other house builders in the luxury market, we need to bring into account the type of product and the end result as well as the type of marketing we need to do and the type of estate agent to deal with, what sort of media press release to use in order to promote ourselves in the market.” (Participant 15)**

**“We want to differentiate ourselves from the others especially in this difficult market. Everyone brings new ideas to the table and at the end they will be rewarded.” (Participant 15)**

**“I think there are different elements to that [reward] but we are working as a team. In the end, we all will be rewarded not only because of the specific innovation. Everyone in this**



**business is somehow shareholder. We are rewarded as the outcome of our decision.” (Participant 15)**

Participant 14 explicitly did not consider there to be any incentive other than “to do the best job” and he was emphasising that a financial incentive was a prerequisite for innovation. However, he related incentive to a form of “getting noticed”.

**“There is no motivation, money-wise or something like that. The only motivation is getting the job done. So I don’t care if they had to get the ‘lesson learned’ or something like that. As long as I get the job done and tick the box, that’s it, I am fine.” (Participant 14)**

**“Some people are not interested in money, they want to get noticeable, what architects want is when you look up projects you say that architect has built this or the architect, he has designed this.” (Participant 14)**

Likewise, Participant 14 also pointed out a new way of motivating individuals at work and gave an example of getting noticed through a form of acknowledgment such as a certificate:

**“If there was a system in a way that it could tell individuals that if you follow this or if you do that, you will get promoted and you will get noticed, or you will get a certificate.” (Participant 14)**

Participant 17 referred to the issues of the industry as being project-based, which results in demotivation towards sharing knowledge between different actors from one project to another. He articulated that:

**“With considering innovation there is no motivation to exchange the knowledge with others as you finish the project, you never see them [referring to actors involved in project] again. If there was a system to tell you to pass on the information from project to project or follow the guys previously, I would personally do that.” (Participant 17)**

Participant 19 draw attention to the size of the companies and the potential of individuals’ improvement was highlighted. Motivation for improvement in a smaller company is much higher than in a large company, as there is room for development, as he stated:

**“If I was in a small company I would personally think I would get developed myself in the company. In a big company you would be thinking I am not going to anywhere I am just going to become a chartered engineer. There is nothing higher than a chartered engineer. So that’s how I am going to work for 10, 13, 20 years.” (Participant 19)**

Participant 20 by articulating a product view of innovation pointed to the shared financial benefits of the team member. Innovation is about cost saving, he said:

**“We build the product with a certain cost and we sell it. Based on everyone’s contribution, there is a profit for everyone. It is not specifically targeted the innovation. In the middle of the project, maybe someone comes with a new idea that saves costs for the company. We say it is innovation.” (Participant 20)**

The bonus scheme appeared in the storylines of some participants. For example, Participant 4 shared his view about motivation to share ideas in the company by stressing that it is a personal preference and a financial bonus would not encourage him to be innovative.

**“In our company, there is not any bonus for someone who brings new ideas. Someone might say ‘why would I do that and spend some time on developing that idea?’ At the end of the day, there is nothing for me. I am not like I want bonus to do that otherwise I am not going to do that. I prefer to share my ideas if I have something new in my mind.” (Participant 4)**

Likewise, Participant 17 referred to the idea of sharing as a form of personal preference, as expressing “feeling rewarding”. Similarly to the majority of participants, participant 17 associated innovation with problem solving.

**“It could be a little pressure on you but it is very rewarding at the same time. Once you have done the job and you have solved the problem by yourself that is the good side of it.” (Participant 17)**

From the above quotations, it is evident that the incentives come in the form of informal recognition. The informal phrases such as “success and progression”, “meeting the deadlines”, “getting the job done”, “getting the job easier” and “being promoted and noticeable in the market” are some of the examples that participants considered to be a sufficient reward (See Table 6.2). It was also noticeable that at the managerial level, innovation was observed to be a tool for market promotion and at the operative level, innovation came from problem solving which seemed to be a necessity of the participants’ job.

## **6.7 Pessimistic and Optimistic Attitude towards Innovation**

There were certain levels of commonality in the responses proffered by the participants. The participants acknowledged two contrasting views; the resistant and staid attitudes of the participants towards innovation and the optimism and desire of the participants’ attempts to make things happen to enable innovation.

### 6.7.1 Pessimistic Attitude

One of the typical responses was from Participant 13, who articulated the attitude of people in a construction project as a barrier:

**“People are naturally resistant to change. They say we have always done it this way so why we should do it different way.”  
(Participant 13)**

Participant 3 specified resistance to change in the context of construction projects. In terms of personal experience and at the individual level, the majority of participants expressed, either explicitly or implicitly, a tension during the sharing of new ideas within the company or hierarchy level. For example, a site manager explained how he struggles to share his ideas with senior colleagues on the project site.

**“You have to persuade all of your colleagues in the office and on top of it the external subcontractors. They [sub-contractors] usually say we have 20 years of experience. They don’t want to change the way they do their job.” (Participant 3)**

The Innovation Knowledge Manager and the Sustainability Manager asserted a similar view, as they pointed out:

**“Some people are pessimistic. If a new ideas or new ways of doing things come in, they would say this will never work. How about give them a chance!” (Participant 20)**

**“There are too many obstacles on your way. Many people don’t like to change and don’t listen, ‘do it my way or highway’. (Participant 16)**

Apart from the fragmented characteristics of the industry itself, it was observed that the participants often pointed out the fragmented nature of their workplace in the company. This is attributed to lack of communication between different employees within the organisation (i.e. managers and workers) when setting up a systematic approach to managing innovation. There were storylines where the participants articulated that they were sometimes unaware of some of the facilities that are set up by the company to exchange knowledge or encourage innovation. The Best Practice Innovation Manager particularly drew attention to an intranet system within his company that was formally set up to facilitate innovation. He explained about an “Amazon style” internal website:

**“We always prompt ourselves being innovative. We are interested in new products but it is generally our supply chain partners we build relationship with who come to us and show us new products. We have cabinet next door where we have all the new stuff that comes in. We also have an online catalogue in our business tracker so this is just list of products and businesses here that we believe that add value. This is kind of Amazon style website where everyone in the company can see the products and get further information.” (Participant 5)**

As the stories were told during the interviews, the participants provided examples of Slaughter’s (1998) model of innovation and Stewart and Fenn’s (2006) notion of innovation i.e. process and product innovation (See Chapter 2). Participant 4 explained about the application of products and technology manufactured by another industry.

**“We sometimes reach the market and identify a technology product to bring to our company. There is no quality assurance and actually no guarantee whether this will improve the process that we are engaged. We need to bring everyone into**

**the process and validate the information and move forward.”(Participant 4)**

In contrast to Participant 4, Participant 13’s view of product innovation was not managing the process of application of the new product. He criticised the dominant approach of low cost over quality in the industry:

**“Basically you are going for a lower cost product and quality comes after. Cost is main factor for every single company because at the end of the day it is the profit for the company and in order to increase the profit they have to minimise the cost so again in the industry most of the customers or clients are looking for cheaper price product.” (Participant 13)**

By criticising the nature of construction projects, Participant 17 pointed out the knowledge sharing from one team to another team:

**“Some companies do change the process from especially lessons learned and but it is hard especially if the process is not continuous as I said from the culture and nature of the construction projects. It’s not the same team that’s taken it from pre-construction to hand-in the building. You want to talk about the building environment it’s not the same team.” (Participant 17)**

However, the participants pointed to an opposite statement as well. They acknowledged the optimism and desire of people to make things work and facilitate the occurrence of innovation. From the established storylines by the participants, it appeared that in knowledge sharing, the bottom-up approach is implemented in the organisations. The information sharing, either formal or informal, is often made possible by meetings.

**“We have meetings every week. We sit together and discuss our ideas.” (Participant 18)**

**“For example we have a weekly meeting. We sit together and talk about the new projects. We let everyone to talk 15 minutes about something different or the issues around their task. Personally, if I am in the meeting and don’t say anything I may feel I am out if the team. This triggers everyone to think about new concepts and bring something new to the meeting. Maybe 90% of new ideas can be materialised but with other 10% we can make a big difference.” (Participant 2)**

### **6.7.2 Optimistic Attitude**

There were some positive attitudes reflected in the storylines of the participants in facing challenges they described in pursuing new ideas. For example, Participant 1 from an SME firm described an innovation as a new system which involves challenges and pressure to convince the members of the design team.

**“There is always quite a bit of challenge when you switch to a new system but it pays off in near future. It could be a little pressure on you but it is very rewarding at the same time. Once you have done it successfully, you get a good feeling that you have solved the problem and the company has benefited from your new idea and the new system. It is a good side of the challenge.” (Participant 1)**

Enthusiasm was another common storyline from the participants. Enthusiasm along with passion was one of the visible positive responses towards innovation. A designer from a consultancy company stated his passion concerning his job, sharing his new ideas within the company:

**“[...] it is mostly about your high interest and passion about your work. Because you have passion about the job; you are doing to be best at the end.” (Participant 1)**

Participant 16, a sustainability director, also described his enthusiasm regarding his daily job. His positive attitude was reflected in his description of the daily challenges at work:

**“You could enjoy and satisfy from the work you have done. I would like my work to be very precious. It is enjoyable for me to see that all pays off. It is also true that you work to survive to pay your bills.” (Participant 16)**

However, the director and design manager expressed his positive response at the organisational level (“we”). He had a broader view and described their creativity and positive approach to the tangible innovation and how they differentiated themselves from other competitors:

**“We can stick to only the standard way of doing things and traditional ways but we change them and introduce new materials, new methods and techniques. That is the way we think. Our products are different from that respect. Using innovative materials and innovative methods makes us to be different from what it is practised at the moment in the industry.” (Participant 6)**

The positive perceptions of innovation, resistance and enthusiasm alongside progress were evident in the storylines of participants. Below are illustrated some of the positive storylines explained by the participants. The sustainability director asserted that:



**“We wouldn’t stop doing that I would go somewhere else. In each of our project we just change. It is a constant change. We will not stay with what we do. I would do something else.”**  
**(Participant 16)**

Participant 5 had a positive view on sharing new ideas and innovation:

**“There is very little point in trying to keep it (new ideas) as a secret, if you can't protect it as an intellectual property.”**  
**(Participant 5)**

There were also some positive responses to risk and uncertainty.

**“In our team we have different skills for example all other developers are just outsource everything. In our team we have different engineers with different backgrounds; civil engineering background and different management background. We have got all the skills here. We are confident that we can mitigate the risks and problems. We are convinced that we have enough capacity to deal with any risk.”**  
**(Participant 6)**

Participant 10 and 2 had relatively positive thinking as they articulated:

**“We are thinking out of box. Only humans make the boxes. For example, the young kids in schools are so uninhabited they just come up with these ideas, they are not boxed they haven’t gone through process where they come with an ideas and no one says ‘no they are not going to work because of this because of that. We would like to have this kind of approach.”**  
**(Participant 10)**

**“We strive to be in front of what we do. There is a lot of emphasis on research and we used to have research and development department but actually that closed down about six years ago. Everybody said ‘oh no why did they close down?’ but what it was decided that point was everyone in [name of the firm] does research and that actually what it was needed and what has been set up since then. There is very small group of six people who are responsible for the strategic direction of our research but actually everybody in [the name of firm] are encouraged to undertake research projects and collaborate with academia.” (Participant 2)**

## 6.8 Power

According to the Oxford English Dictionary, organisation means “an organised group of people with a particular purpose”. Salzer-Morling (1998) discusses, however, that organisations are characterised as being homogeneous, consensual and integrated, but they are also more often characterised as being heterogeneous, differentiated and harbouring conflicting interests.

Conflict happens when there are different ways of seeking resolutions within a team or group. Robinson and Hawpe (1986, p. 115) argue in a narrative of organisational stories that each narrator tells the stories in a way that incorporates the “feelings, goals, needs and values of the people who create it [organisation]”. Likewise, Vaara’s (2002, p. 238) study in organisational change articulated that “the narrators [of the organisational change], in general, used the narratives to justify and legitimise their own actions” where the stories were also used to exert power. The individuals use a defensive power to “re-present past events in such a way to defend their conduct” (Buttny, 1993, p. 16). In an organisation, everyone has a voice; some “more powerful and louder” than others (Hazen, 1993, p.16), and some have powerful advantages to manipulate others through discourse (Reed, 2000). From a social constructionist perspective, this power to shape the dominant narratives within an organisation is the power to define the ‘reality’ as perceived by members.

Rhodes (2001, p. 9) refers to such narratives as a phenomenon of “crisis of representation” and draws attention to “the politics of representation in terms of who gets to play a part in the constitution of meaning”. The exercising of power in the storytelling is not only at the individual level but also in groups, using myths and stories in a way to legitimise privileged power relations to provide acceptable and plausible explanations in order to preserve their interests. This view is explained in broader terms by Wilkins (1983, p. 83) who states that “most of the functions which have been attributed to narratives like myths, sagas or stories have to do with the maintenance of social order”. Elias (1991) has a different view of power. He asserts that power is not related to the characteristics of the individuals, but of human

relationships. Power arises from the interaction between individuals. The basis of power is need and this is a dynamic, shifting affair.

### **6.8.1 Managerial and Institutional Power**

Damanpour (1991) argues that creating a tolerant environment, fearless of change, is key to the formation of a climate conducive to innovation. A supportive attitude in the initial stage of sharing ideas where conflict resolution might be necessary is important. Dougherty and Cohen (1995) emphasise that the behaviour of a senior manager is influential. The introduction of a new way of doing things in a work environment is influenced by managerial commitment and the norms of the organisation. West (1990) indicates that formal and informal verbal support inside and outside of group meetings and high tolerance of error culture in organisations provides an environment in which to develop the new ideas. Nevertheless, the senior or top management has a key role in setting the opportunities for the organisation's strategic orientation for innovation. Strategy sets goals and objectives which define the factors so that innovation is likely to take place, including a supportive attitude towards innovation (Ramanujam and Mensch, 1985). Damanpour (1991) argues that the vertical relationship and hierarchal differentiation has a negative impact on organisational innovativeness and increases the links in communication channels. An increase in the number of hierarchal levels makes it more difficult for innovative ideas to flow. In contrast, a flatter structure facilitates inter-organisational communication (Packendorff, 1995).

There were two levels of power observed in the storylines of the participants; managerial organisational level and institutional level. At the managerial and organisational levels, the participants described storylines about their own power and the hierarchical power within the company. For example, Participant 11 explains his design team by giving categories of senior and junior to members of the team.

**“In our company at the moment, I am the only one who is in charge of the design department. I work directly with the**

**design manager but he has got the supervision sort of position that he always deals with the project informally. I mean he does not deal with the daily works and many things that involves in the project. For example, I had the idea that we can actually expand the design team and get someone who is a little bit junior but he/she can take the time to work on very drafting detail which always takes time.” (Participant 11)**

He began to show his power by stating that he has the authority of the design team. Meanwhile, he mentions a design director whom he refers to as his supervisor. The managing director’s role is explained in some sort of informal way of having control over the projects. The example that Participant 11 provides about expanding the team shows that he is not willing to have someone who might have the potential to dominate the design team and uses the “junior” term. Likewise, Participant 14 draws a form of hierarchy boundaries across his team. He explains that the new ideas come from more “junior” members of the team and are then confirmed by the senior members. Meetings are the tools used to get employees to share their ideas. Although a hierarchical power was evident in the storylines, a “no blame culture” is identified.

**“Whoever comes with the idea has got a level of responsibility but having said that, decision making always goes for the senior member of the team. In the situation of new ideas, you can get some suggestion from a senior member of team. If something went wrong with the new system or method, there would be a possibility that you could be blamed for that situation. In case of my company, everybody sits together in a meeting and discuss that and make a decision about it and how to go forward about it. I think it is more about the senior people who need to take the responsibility for that.” (Participant 14)**

Participant 14's storylines in the whole interview were mainly in a passive voice. He rarely mentioned "I" to express his experiences in dealing with new ideas. A vertical hierarchical structure is evident in his storylines since he mentions junior and senior members of the team and the possibility of blame if a new idea does not work out. Similar to the passive voice of Participant 14, the evidence of power can be seen in the storylines of Participant 2 as well. His view of power is related to the clients and government regulations.

**"Client is the boss. There are two types of clients either right in the beginning of the project or right after they have obtained the planning permission or they got the permission from let's say the energy sector allow them to go ahead with that development. The government forces the development to the specific area even if all the residents say no if the local authority and the government realise that is the benefit of the nation they can overrule". (Participant 2)**

Likewise, Participants 19 and 17 pointed out clients' power to reject or accept any ideas or proposals in projects.

**"At the end of day, clients want to build what has been passed on to us so we cannot just tell the client that Mr. Client! we want to do whatever we want because it saves the money. Everything has to be approved. If it is not approved we cannot go ahead. No matter how innovative the design is. If the client says I want you to do with that so that's it." (Participant 19)**

**"Unfortunately what that process does that that isolates us from the ultimate client so you have got client, design team, main contractor and then sub-contractor." (Participant 17)**

A voice of frustration in storylines of some participants was evident when they wanted to talk about clients. For example Participant 5, by placing his company in a hierarchical order, explains the lack of direct collaboration with clients. Isolation from the client is one of the impressions one might get from the storylines of this participant. He states the problems that arise from the lack of communication with the clients in the execution phase of the projects. Again, Participant 5 had a passive voice in his storylines and he has referred to “we” instead of “I” in sharing his experiences regarding the interview questions.

**“We are sub-contractors. We are very occasionally taking on the role of main contractor. So we don't get to collaborate with the end client enough or an early opportunity. So that results in the problems of changes that needs to happen through the process of design in construction. It amplifies problems. There is lack of collaboration and people are also not OK but sometimes in the industry because things are commercial [...] they will manipulate the situation not maliciously but they will do it to make commercial advantage of innovation”**  
**(Participant 5)**

He went on to further express his frustration:

**“It [not having a close relationship with clients] is rubbish! That is one of the problems in construction [...] we can help the client to understand what system they might want to install and how we want to build how it is going to maintain it”.**  
**(Participant 5)**

Participant 18 indirectly pointed out the existence gap between the hands-on and technical engineers with managers:

**“We always struggled with as people get promoted they get further and further away from what they actual technical ability is and perhaps they don’t necessarily want to manage a whole lot of people for example 200 people on the project they might actually want to keep furthering their technical knowledge and spread that within the company.” (Participant, 18)**

In Participant 15’s storylines, he mentions four levels of managerial positions: managing director, line manager, himself as a project manager, and builders in order to highlight his exercise of power on the construction site.

**“Our managing director sometimes tries to be inspirational and encourage me to have my say on the [construction] site and don't just obey them [builders]. Well, my line manager is not good at this; he tries but he is not good”. (Participant 15)**

In contrast to Participant 15 whose line manager is “inspirational”, Participant 3 describes his line manager as a barrier to expressing his new ideas.

**“To be honest, once I came up with a new idea and my manager said that is great I want you to have more ideas like this. (Participant 3)**

**“As far as I remember, he [the manager] hardly has said no without justifying it. He has always had his reasons and justifications. If his justifications don’t make sense to me I ask for more information. If they say no without any reason then I try to persuade them.” (Participant 3)**



There were also storylines of conflicting views between the internal team within a company. Participant 1 explained how the design and construction teams were working together.

**“I had this discussion with our team about the decision to increase the resources and add another person to the company and team. I tried to detail the works that the other person can do and how helpful he could be for the project team. It is something to do with the general manager and their plans for the future so that was one idea; expanding the design team. The second one was about the way that we run the supervision of the side of the things, because imagine the situation that you have the design department that basically they are responsible for the design of the drawings and detail drawings once everything is done it just goes to the other part. It goes to the construction team but in between of two processes we have few people who they actually oversee the drawings and then it makes it much easier for the construction team to understand all the drawings and actually to act between all the design team and construction team. I realised that links are missing in our company and because you don't have that you know a lot of things could through one department to the second one with little supervision so that might cause difficulties for the construction team at some point, so I had this discussion with the general manager and the design director that we need to look at that section and probably we need to improve that part of the company as well so that was the second thing that comes to my mind.” (Participant 1)**

## 6.9 Summary

This chapter presented the empirical data collected from practitioners and explained how they were analysed; the method and the stages. Boje's deconstruction narrative and thematic analysis was used to code the interview transcripts. The data analysis revealed that there were a variety of storylines attributed to innovation discourse. Practitioners' narratives were personalised and shaped by a situational context; a particular environment that they experienced. For example, the theme of "cost" and programming was highlighted in the project planner's interview data: "Everything is about the cost". Alternatively, a site manager who had more of a role in the execution of projects associated innovation with new construction materials, for example "prefabricated materials". The innovation projects described by the participants represented a variety of contrasting perspectives. Although the majority of participants described themselves as innovators by application of BIM, and described BIM itself as an innovation, but different storylines developed. The applications of BIM are narrated in different contexts by the participants. Some thought of BIM as tangible software and some thought of it as a new form of process, for example management of stakeholder relationships. It is evident that the storylines mobilised by the participants are linked to situations and their work experiences. However, the transcripts of interviews were interpreted under seven emerged themes; definition of innovation, examples of innovation, risk and uncertainty, blame it on the industry's nature, pessimistic and optimistic attitude and power. The interpretations of each of these themes have been reflected in the researcher's own biases. Without exception, participants claimed there was no systematic award system or managerial framework for innovation in their company. The situational innovation narrated by participants occurred in a form of informal managerial context. This means that in most of the cases, innovation remains hidden or unreported throughout the supply chain. Moreover, being a project-based industry disconnects the channel of communication from project to project because of different stakeholders' involvement. However, different storylines were mobilised in relation to knowledge/idea sharing in regular meetings and often through internal virtual networks. In the case of meetings, however, they were not specifically set up

to encourage creativity or innovation, but it was noted that participants unanimously considered such informal means to be a critical way of disseminating information and knowledge throughout the organisation. Meetings at this level are not necessarily recorded and therefore information could easily be lost. The next chapter further discusses the findings of misalignment of empirical data through the viewpoint of sensemaking theoretical perspective.

# Chapter 7 Discussion

## 7.1 Introduction

This chapter highlights the literature review, analysis of the government reports, and practitioners' perspectives from chapters two, four and five. Interpretation related to the social construction of innovation derived from data provided by the practitioners is placed within a conceptual framework of sensemaking. This chapter thus responds to the related research questions posed in the introduction chapter which are both concerned with understanding the practitioners' and policy makers' perspective of construction innovation. Finally, according to findings of analysis of government reports and interview data, a discursive conceptual framework is presented and explained.

## 7.2 Organisational, Managerial and Institutional Debate

The definition of the word *innovation* retained its connotations with deviant behaviour for four centuries after it first entered English texts in the 1500s. Since 1990, innovation has become a popular discourse among academic researchers and industry practitioners. The notion of innovation continues to be a contested term as scholars, corporate organisations and policy makers continue to develop different perspectives of the term. Since the 19th century, innovation has often been seen as something positive, improving long-term productivity and performance and resulting in an increase in competitiveness, customer demand and market areas (e.g. Fagerberg et al., 2006; Von Hippel, 1988). In other words, innovation is recognised as a driver of growth in the economy and a crucial aspect in determining the success of an organisation. Consequently, it has come to be realised that it is in governments' best interests to guide and create awareness to support organisations in their quest to become more innovative.

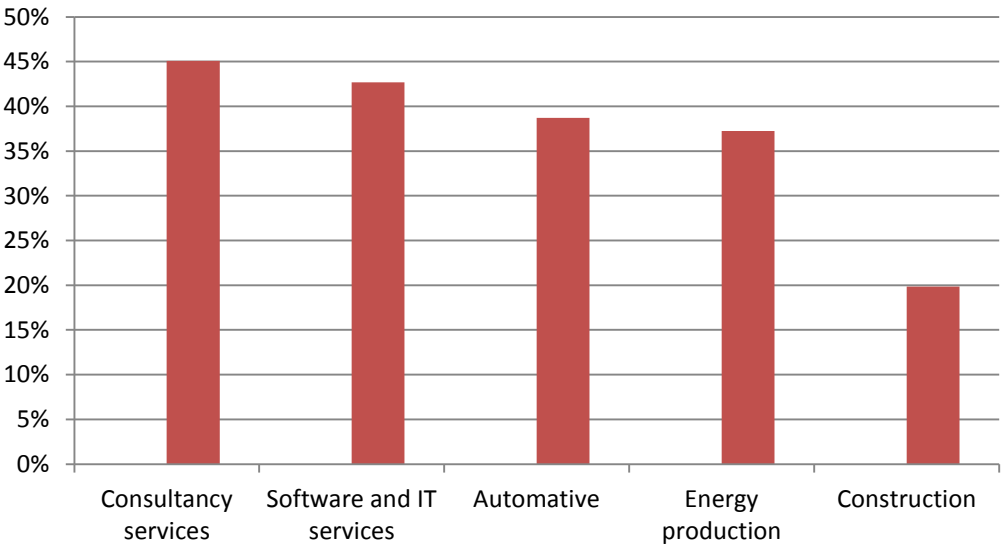
Of course, the study of innovation has not only been restricted to organisational studies. Likewise, innovation within the context of the construction industry has been studied extensively by construction community researchers. The number of publications increased after Latham and Egan's report called for change in the industry and criticised it for low profitability and having little investment in R&D. Ever since, various scholars from a diverse school of thoughts have adopted different ontological and epistemological positions to examine and report on a phenomenon that is complex and multidimensional.

As has been discussed before, there is a large body of studies criticising the construction industry for its lack of innovation, and being stubbornly resistant to new ideas. This attitude has hindered the process of modernising construction. This is despite the fact that many commentators have suggested that innovative practices in the industry can largely improve the performance of the industry (Dulaimi et al. 2005; Koskela and Vrijhoef, 2001; Slaughter, 1998). At the same time, UK government reports appeared to support this rhetoric. The underpinning of the discussion goes back to the 1994 Latham report, who called for change in the industry and this was followed by Egan, in 1998, who directly referenced the need for innovation in the industry (see chapter 4). The findings presented in the reports reflected the sector as an industry that was underperforming, as Egan typified it by "low profitability", and "too little investment in capital, R&D and training". As a result, Egan established hard-hitting objectives for the construction sector to accomplish in the domains of productivity, profits, defects and reduced accidents. Yet, critics such as Toole et al., (2013), Woudhuysen and Abley (2004), and Aouad et al. (2010) claimed that very little had changed in the way of innovation in this sector.

In terms of the national economy, UK construction plays an important role in contributing to Gross Domestic Product (GDP), government revenue and employment (Ruddock, 2009; Cox and Ireland, 2002; Thompson et al., 1998;

Gruneberg, 1997; Ofori, 1990). As stated in chapter four, the construction industry contributes over £90 billion to the UK economy, which is 6.7% of the total, and the sixth largest contributor in terms of GDP. Given the size of contribution of the industry, it is almost inevitable that the benefits of services of the industry will be ignored, that all the stakeholders will get it at some point as well as the government’s elaboration in implementing capital investment. Yet, when it comes to the construction innovation debate, numbers dominate, and of course the persistence of low rate innovation activities in comparison with other industries.

**Figure 7.1: Measuring Innovation by Sector**



Source: adapted from NESTA

The main reason for this £91 billion industry having a statistically low activity rate is the disparity between industries when measuring the factors of innovation. These statistics appear to follow a traditional metric and measurable sequence of events, so in the case of innovation, patents and expenditure on scientific R&D, for example (see Figure 7.1). Meanwhile, over a decade ago, Winch (2003) criticised the use of measurement output approaches as evidence to justify the construction sector being worse, or better, than any other industry. He drew attention to the peculiar characteristics and production processes of the industry, arguing that any

measurement of innovation output does not reflect the transience of project-based construction. There is almost no doubt construction innovation should be treated differently to other industries. Dale (2007) states that comparison of innovation in the construction industry with other non-transit industries such as manufacturing and the motor vehicle industry is not straightforward because of the distinctive nature of construction projects. Therefore, if it ever comes to the measurement or strategies of construction project innovations, a specific and appropriate perspective or framework of measurement of innovation need to be developed in terms of quality or volume. Meanwhile, while The National Endowment of Science, Technology and the Arts (NESTA, p. 15), criticises the lack of appreciation of the observation that “different sectors innovate differently” by policy makers, it coins the term “hidden innovation” in the construction industry. Despite the calls for the re-conceptualisation of the nature of construction innovation and the way innovation is measured by the likes of Winch, up until now, not much has been done within the construction management communities. Instead, the top-down fashion of policy makers has been the centre of attention for scholars.

Along with the call for the re-conceptualisation of construction innovation, the discourse of innovation and its definition are contested by different commentators such as government policy makers, academia and corporate organisations. Each of these definitions has its own nuance imposed upon it. Nevertheless, as the reviews in chapter two indicated, the common characteristics of innovation definitions are something “new” to be exploited so as to bring about change that adds value, and is profitable (DTI 2006; Dodgson et al., 2005; Fairclough, 2002). Categorically speaking, innovation studies can be divided into two broad categories; innovation as an “action”, and innovation as a “thing” which scholars have often referred to as product perspective and process perspective (Dodgson et al., 2005). Scientifically classifying innovation in a formal framework is another aspect of innovation studies that has been at the centre of attention for academia. Innovation has been distinguished according to different criteria such as degree of newness and radicalness. Modelling and mechanising managerial innovation was an area of great interest to many scholars, critics to such approaches such as Abrahamson (1991)

calls it “managerial fads and fashion”. Rogers’ models of innovation are one of the most well-known examples of modelling in innovation (See chapter 2).

At the political level, innovation has been considered as a physical “thing”. As pointed out earlier, much of innovation discussion in government reports has framed innovation in numerical terms and in measurements, i.e. number of patents and money spent on R&D activities. Indeed, the tendency of the top-down definition of construction innovation is the foundation of failure to value the potential of the construction industry to innovate. Critics such as Toole et al., 2013; Zawdie, 2012; Aouad et al. 2010; Naaranoja et al., 2008; Woudhuysen and Abley 2004; Gann, 1997 and many others are quick to recognise problems with the industry and label the construction industry as old, traditional, non-innovative, and backward. However, from a bottom-up viewpoint, incremental innovation takes place and is executed by all the stakeholders in the supply chain involved in a project, including the workers on site (Littlemore and Chan, 2009).

A recently published book “Construction Innovation and Process Improvement” is aimed at exploring the theory and practice of innovation and demonstrates the significance of studying innovation up to now. The purpose of this book is to examine the “future technology” and “formal business” needed to support innovation (Akintoye, 2012, p. 16). Reviewing the chapters of the book, innovation is examined at the macro-level, focusing mostly on technological improvement and delivering real tangible innovation. Nevertheless, there are few studies carried out at the “grassroots level” (Littlemore and Chan, 2009, p. 353) to investigate human agency’s role in the so-called “normal features of the business” (Koskela and Vrijhoef, 2001, p. 203). The construction innovation literature has been extensively opaque in terms of how innovation is defined in construction and enacted at the grassroots level. Therefore, the qualitative understanding of innovation as a process and the contribution of human agency is downplayed. As a result, this research, by conducting 20 in-depth interviews with practitioners and reviewing the construction industry progress review reports published by the UK government, attempts to unfold the reality of construction innovation featuring in normal business and



examine how innovation is recognised by practitioners and policy makers. The research samples from the practitioners, representing different hierarchical perspectives from different construction firms connected with the different processes of construction.

By adopting narrative approach, the practitioners were asked to express their views about innovation in their daily activities and generally within the organisation that they are working in (see table 3.6). Although all the practitioners presented themselves as idea generators, thereby claiming to be innovative, from the empirical data, it was evident that there were inconsistencies between different hierarchical levels of practitioners in defining, reporting, rewarding, recognition and communication of innovation. The crucial observation was that practitioners at every level of their organisation could easily relate to the perception of innovation and readily recognise an example of innovative practice for the researcher to consider. The following section explains the inconsistency of practitioners' narratives by using the viewpoints of sensemaking theory.

### **7.3 The Practitioners' Perspective from Sensemaking Theory Perspective**

As was observed in chapter six, there was inconsistency in the storylines of practitioners in relation to innovation narratives. From the viewpoint of sensemaking theory, there is a possible meaningful explanation of discrepancies and misalignments and the connection between the narratives mobilised by the participants. It was evident that the storylines of the participants were linked to a situational context and their work experiences. Bartel and Garud (2009, p. 111) explain the mechanism in innovation narratives:

*“[...] innovation narratives are flexible enough to allow individuals to generate different inferences that apply their unique context. Individuals translate narratives depicting past innovations through their own frames of*

*reference (e.g., identities, schemas, scripts, goals, and belief systems), real world experiences, and tacit knowledge of given tasks and actors.”*

In narrating innovation, participants responded and shaped the environment they experienced as a particular context. From the examples of innovation given, it was notable that practitioners’ actions and perceptions are attached together. They interpret the actions to shape the situational context. Furthermore, it was observed that reference of innovation to a construction-specific setting by practitioners was not a static entity but highly dynamic. This can be traced in the storylines of practitioners where specific contextual characteristics of the construction industry such as it being a project-based industry, discontinuation and its non-transit nature were asserted (See section 6.6). The multiple perceptions and ongoing circumstances were articulated in a way to respond to the needs and expectations of the interviewees. They looked for meanings and interpretations whenever situations were perceived to be different from their expectations.

Laughlin (1970) states that sensemaking of individuals is heterogeneous. This diversity is embedded in people’s ego-defences, such as denial and rationalisation. Brown et al. (2008) associate this to Coopey et al.’s (1997, p. 312) statement “[...] individuals attempt to make sense of ambiguous stimuli in ways that respond to their own identity need”. From sensemaking perspective, identities are constructed socially. The socially constructed identities argue that people may demonstrate different combinations of subjectivity and objectivity statement about the nature of organisational phenomena. As was demonstrated in the previous chapter, it was evident that the narratives of the participants and the situational context are shaped by participants’ own identities (see section 6.3). For example, the Supply Chain Procurement Director related innovation to new techniques in procurement, an architect associated innovation to objectivity and creativity in design, and the Planning Engineer’s dominating storylines were related to costing issues, and he even explicitly articulated; “Everything is about the cost”. In optimistic and pessimistic attitudes towards innovation discourse, apart from the organisational constructed identity (Brown and Phua, 2011) practitioners implicitly represented

themselves as problem solvers, improvers and often inventors (See section 6.3). This was not a static and constant account, as the participants were switching between the identities even throughout a single storyline. This could be traced in the storylines of the participants where innovation is described as being both processual and an object-entity. The narratives of individuals dealt “with memories of past actions by developing plots which imposed a formal coherence on equivocal happenings in ways which supported preferred versions of their selves, supporting self-esteem and perceptions of self-efficacy” (Brown et al., 2008, p. 1053). On the other hand, each individual has his/her own identity to protect in narratives (Brown et al. 2008). Coopey et al. (1997, p. 304) state that:

*“Personal identity is not static and defined in isolation but it is drawn dynamically from experience in historical, political, cultural and interpersonal contexts. It is concerned with being ‘an individual to and for oneself’, and how that individuality is presented in the sensemaking process through which shared meanings of events ‘out there’ are synthesised”*

From this standpoint, the narratives of innovation may change over time as situations unfold (Bartel and Garud, 2009). Weick (1995) states that sensemaking is not only a matter of individual sensemaking but also involves the interaction of the individual and the social (i.e. intersubjectivity). Individuals’ shared meaning and common language is influenced by organisations’ internal construction of meanings. Chatman et al. (1986, p. 211) state that:

*“When we look at individual behaviour in organisations, we are actually seeing two entities: the individual as himself and the individual as representative of his collectivity [...] Thus, the individual not only acts on behalf of the organisation in the usual agency sense, but he also acts, more subtly, “as the organisation” when he embodies the values, beliefs, and goals of the collectivity. As a result, individual behaviour is more ‘macro’ than we usually recognise”.*

Incorporating the view of Chatman et al., two forms of sensemaking were observed in the storylines of participants; individual and collective. In individual sensemaking, participants employed their individual beliefs and opinions. However, in collective sensemaking, the storylines emerged through social interaction. This means that apart from their individual stories, participants engaged in a mutual understanding in order to find common sense and a shared understanding. For instance, the majority of participants used BIM as a common example and labelled it as an innovation. In contrast to individual sensemaking, the activity or event in collective sensemaking is labelled after the act is completed. However in individual sensemaking, practitioners engaged in their own beliefs and opinions in their understanding of innovation. Individual sensemaking was informed by organisational culture, which caused a different construction of meanings. The construction of meanings is a dynamic process. Construction of meaning of innovation can be shaped and re-shaped over a period of time, which means that an event can be induced later and promoted as innovation while that particular event may not previously have been recognised as an innovation by the practitioners or organisations.

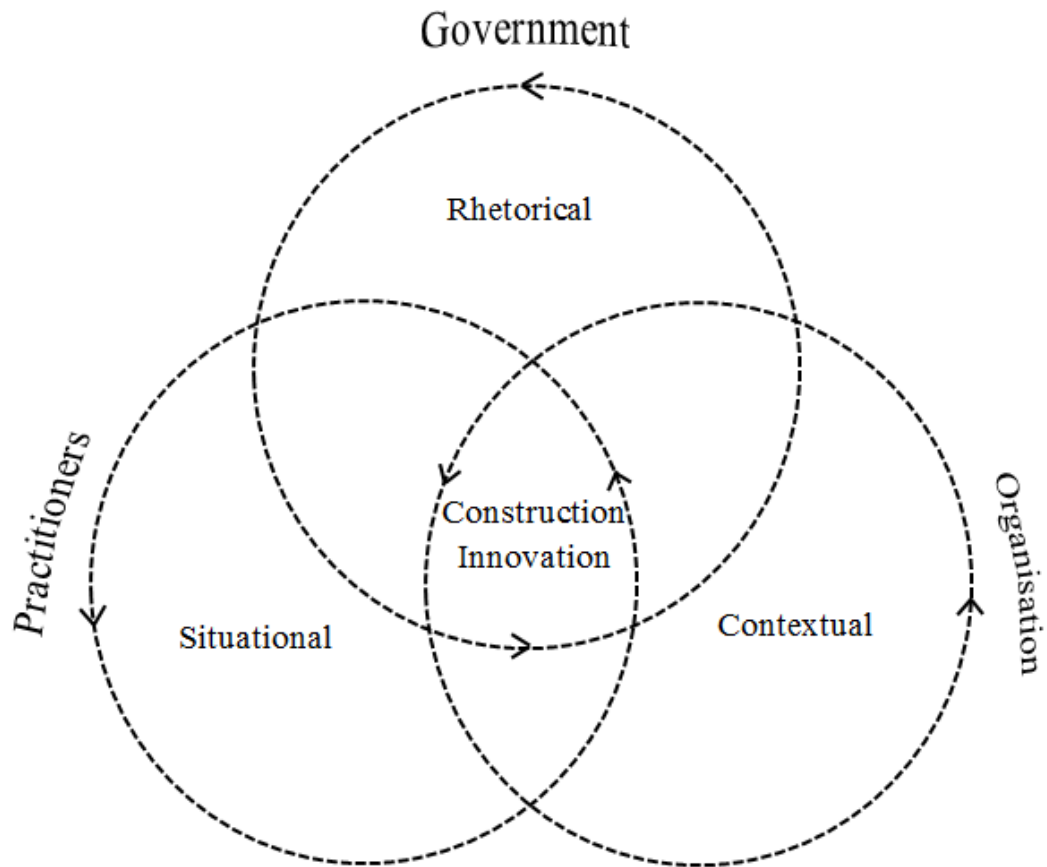
From Weick's seven properties of sensemaking perspective, the findings show that the retrospective and prospective viewpoints are also relevant to the narratives of practitioners (Weick, 1995; Weick et al., 2005). This means that the participants viewed innovation retrospectively and made sense of it prospectively. Sensemaking assumes that people try to understand or cognitively process their environment by looking back (retrospectively) (Louis, 1990). From a sensemaking viewpoint, individuals can clarify their performance, after they act, by using information from their surroundings and their own experiences. The narratives of participants demonstrated that the act of innovation is explained as an event by looking backward to the activities that happened before and then by looking forward, the completed activities are recognised and identified as innovations.

In the storylines of participants, innovation at the beginning is recognised as activities such as "risk mitigation", "keeping up with market competitors" "problem solving", "challenges", and "opportunities". The interpretation of activities as an

innovation occurs during organisation processes by paying attention to retrospective time. Weick's concept describes both past-oriented and future-oriented processes in sensemaking. From the viewpoint of sensemaking, the understanding of activities by individuals is from the knowledge and past experiences which are brought forward from the past and used in a new representation in the present, making sense of the future. Weick (1993, p. 635) states that social actors tell stories of and for themselves in order "to make things rationally accountable to themselves".

Based on empirical findings, this research proposes a discursive model of innovation within the context of the construction industry (See Figure 7.2). This framework demonstrates the dynamism and interaction of innovation narratives in three different accounts; micro-level narratives which are individuals (practitioners), meso-level narratives as organisations and macro-level as government initiatives and regulations. The discourse of innovation is labelled "situational" from the viewpoint of practitioners, "contextual" within an organisation or firm, and "rhetorical" from the point of view of policy makers and government reports.

**Figure 7.2: Discursive Model of Innovation in the Construction Industry**



**Source: Fieldwork**

In macro-level, the use of innovation in government reports is related to suppression of differences such as modernising, world-class, and efficient as discussed in chapter five. In addition, innovation is used to promote a 'preference structure' in order for the readers to maintain communication through agreements (Potter and Wetherell, 1987). Examples of these were seen where the reports asserted that economical elements such as recession, credit crunch, investment cuts and cost increases caused damage to the industry. However, innovation narratives in meso-level, within an organisational context, is aligned with the rhetoric of organisational culture. In other words, discourse of innovation is shaped by the effect of strategy setting of firms and

mutually supportive discourses by the actors who operate within the firm. The discourse of innovation in organisations is also often mobilised by policy makers and in the enactment of government reports. In micro-level, individuals draw on their own real-world experiences of a situation or prior situation they have been in. Individuals' innovation narratives is drawn on both novel ideas (e.g. self-beliefs, goals and concepts) which at the beginning are self-legitimised, and boundary objects (commercialised particular service or product) formed by the context of organisation in meso-level. Aligning with the contextual perspective of organisations, individuals' innovation narratives resonate with the characteristics of the operated organisations which could be often associated with the dominant existing popular examples of innovation mobilised in the government initiatives.

In practice, drawing on the empirical findings of this research, innovation is not seen in a positivistic and instrumental fashion. The current popularised theories of innovation and about the supposed objective nature of innovation are not grounded in practitioners' points of view. Ideas do not simply diffuse as has commonly been conceptualised in the innovation literature (See Roger's models of innovation in chapter 2). The main aspects of innovation include the creation of new ideas and the implementation of those ideas into profitable action(s) or object(s), and the process is not a linear one (Van de Ven et al., 1999). Practitioners' innovation narratives are "an unfolding discourse subject to continuous processes of flux and transformation, rather than an objective characteristic that can be possessed and measured." (Green et al., 2008, p. 434)

## **7.4 Summary**

This chapter highlighted the reviewed literature from chapter two, analysis of the government reports chapter four, and the research participants' perspective from chapter five. The interpretation related to the social construction of innovation derived from data provided by the research participants were placed within the conceptual framework of sensemaking. While this chapter criticised the focus of the construction innovation literature on the value from performance basis of policy and

the managerial perspective, it discusses the neglected perspective of innovation that occurs at the grassroots level of organisations. It is argued that because of the fragmented nature of the construction industry, innovation takes place frequently. The activities are either not recognised and labelled as innovation or are often not recorded at all. As a result, this research aimed to investigate the construction practitioners' viewpoint of innovation by conducting 20 in-depth face-to-face interviews with practitioners. The findings of the interview transcripts showed inconsistent storylines. By using a sensemaking theoretical perspective, it was noted that the narratives of practitioners are shaped by their self-identity in an ongoing social process. The practitioners reacted to a particular context and shaped the environment they experienced as innovation. In the narratives of practitioners, the perception of innovation is understood by referencing a situational context. The practitioners' interpretations of innovation were shaped by multiple individually and contextually-specific assertions. At the end, a discursive model of innovation was proposed and explained in three levels; micro-level (practitioners), meso-level (organisations) and macro-level (government). The labels of 'situational innovation', 'contextual innovation' and 'rhetorical innovation' are assigned to the innovation viewpoints of individuals, organisations, government policy makers.



# **Chapter 8 Conclusion**

## **8.1 Introduction**

This final chapter reflects on the overall study and presents the concluding thoughts of the researcher by providing an explanation of the stages carried out to investigate construction practitioners' understanding of the notion of innovation. First of all, it summarises the arguments presented in the thesis. Secondly, the empirical and theoretical contribution of the research is explained. In the last section, the limitations of this research as well as suggestions for further research are explained.

## **8.2 Summary and Key Findings of the Research**

Innovation has been extensively recognised as one of the key drivers of economic growth in each country and organisation in which the construction industry companies are not exceptional. Nevertheless, this study demonstrated that a shared set of concepts and definitions of innovation is lacking because of its complexity and multi-dimensionality. The review of literature revealed the domination of the structuralist, and the processual and positivist approaches in examining innovation. Researchers have taken the peculiar characteristics of the industry for granted and accused the industry of being non-innovative, old and traditional.

However, probing more deeply, an approach to understanding innovation from a social constructionist perspective studying construction practitioners' viewpoint is rare. Social relationships, especially in an industry with multiple actors and peculiar characteristics, have the potential to conceal reality from academic researchers. The dominating positivist and rationalistic approach in construction management studies, especially project-based organisations, is not able to acknowledge the hidden aspect of organisations. In studying innovation management in the construction industry, much of the attention of the construction innovation literature is from the

performance overview of the industry based on policy makers' views and government report perspectives. This approach neglects the reality of what is happening at the grassroots level of projects in the industry. The intention of this research was to uncover the potential innovation that remained hidden and was often not recorded at the grassroots level of construction organisations. In unfolding the hidden innovation in the construction industry, taking a narrative and interpretative approach, this research carried out a qualitative research by conducting 20 in-depth interviews with construction practising managers in the UK as well as reviewing UK government reports published regarding performance of the construction industry. This research approached innovation as narratives of the UK construction industry practitioners within the framework of sensemaking. Criticising the positivist approach in studying innovation, empirical data from the interviews showed that the positivist and variable approach is unable to provide plausible explanations for emergent contradictions, misalignments and inconsistent storylines of practitioners. However, using Weick's viewpoint of sensemaking, this research provided a possible justification for interview data; innovation is an ongoing process of sensemaking. The findings of the empirical data demonstrated that narratives of practitioners are personalised shaped by their own experiences and self-identity in an ongoing social process. The practitioners reacted to a particular context and shaped the environment they experienced. It has been observed that the participants in all levels of organisational structure could relate to the notion of innovation straightforwardly and readily recognise an example of innovative practice for the researcher to consider.

From institutional perspective, the analysis of the extracted texts from the government reports demonstrated that innovation gradually has become a dominant discourse in agenda setting. Although, there was an inconsistent storylines of meaning of innovation, the narratives of innovation discourse was related to a persuasion and promotion of a preference structure in order to legitimise predictions about the future.

The findings of the study indicate that there is a disconnection between managerial frameworks of innovation and practitioners' action which may embody hidden innovation in the construction industry. Finally, a model of innovation discourse was demonstrated, in three levels; micro as the practitioners' perception, meso as organisational perspective and macro as institutional viewpoint. The labels of situational assigned to individuals, contextual innovation to organisational innovation and rhetorical innovation from government report and policy makers perspective.

In macro-level, the use of innovation in government reports is related to a persuasive notion and suppression of differences such as modernising, world-class, and efficient as discussed. However, innovation narratives in meso-level, an organisational context, is aligned with the rhetoric of organisational culture. In other words, discourse of innovation is shaped by the effect of strategy setting of firms and mutually supportive discourses by the actors who operate within the firm. The discourse of innovation in organisations is also often mobilised by policy makers and in the enactment of government reports. In micro-level, individuals draw on their own real-world experiences of a situation or prior situation they have been in. Individuals' innovation narratives is drawn on both novel ideas (e.g. self-beliefs, goals and concepts) which at the beginning are self-legitimised, and boundary objects (commercialised particular service or product) which is formed by the context of organisation in meso-level. Aligning with the contextual perspective of organisations, individuals' innovation narratives resonate with the characteristics of the operated organisations which could be often associated with the dominant existing popular examples of innovation mobilised in the government initiatives. Drawing on the empirical findings of this research, innovation is not seen in a positivistic and instrumental fashion. The current popularised theories of innovation and about the supposed objective nature of innovation are not grounded in practitioners' points of view. Ideas do not simply diffuse as has commonly been conceptualised in the innovation literature.

### 8.3 Theoretical Contribution

This research investigated how innovation discourse is understood and practised from an academic viewpoint and in practice. This thesis makes contributions to research on narratives and innovation discourse within the construction industry. There has been limited application of a narrative approach to innovation in the domain of the construction industry. This research has provided a theoretical contribution through the application of narrative and innovation within the context of the construction industry. An in-depth interview with the construction practitioners has demonstrated the role of narrative in sensemaking of innovation and the multiple interpretations of discourse of innovation. Criticising the positivist approach, this research has highlighted the value of a narrative qualitative inquiry for exploring individuals' perceptions and lived experiences, as well as investigating phenomena which have been relatively under-investigated to date. In particular, this research highlighted the usefulness of narrative analysis. Moreover, this study contributed to project management studies by providing an in-depth understanding of discourse of innovation within construction projects in the construction industry. It also provided a fresh insight into the notion of innovation management in the construction project management field. The following is a summary of theoretical contributions made by this research:

- This research has contributed a novel perspective to the current knowledge of studying the concept of innovation and individuals' sensemaking in the construction industry.
- This research has made a contribution to innovation management studies through the application of narratives as a means of information sharing, and inspiring new ideas.
- A methodological contribution has been made concerning conducting qualitative research on construction project management researches,

particularly with regard to recognising and labelling an event as innovation or another similar situation within a company.

- The research has reframed the broad discussion on structural perspective by highlighting the role of practitioners' own sensemaking processes.
- This research has demonstrated the beginning of the era to call for change in the industry and shape the use of innovation discourse within the reports by historically reviewing the key UK government reports since Egan (1998).
- This research has contributed to understanding the official and academic discourse on innovation incorporated into the industry's discourse and practice; the construction management researchers' community can benefit by using the discursive conceptual framework of innovation in their research.
- This research responds to Green's (2011) call for more research into practitioners in construction and the way their actions are structured in an everyday context.
- This research highlighted the importance of distinguishing of discourse of innovation and being clear in adopting different perspectives within the theoretical discussions in the field of innovation construction management.

## **8.4 Practical Contribution**

This research provides practitioners an understanding of the inherent ambiguity and complexity of the notion of innovation within a project-based organisation. This research offers practitioners insights into the values of adopting a narrative perspective while seeking to operate as an innovative company. Narratives can help practising managers and consultants to make sense of individuals' stories to manage innovation in the company. It can also allow managers to engage with sound knowledge of an organisation, share understanding and mutual meanings. However,

it should be acknowledged that conflicts of interpretation are inevitable within organisations. As highlighted, the multiple voices and adoption of an interpretative, narrative perspective may enable practitioners to escape from the trap of their own construction and persuade them that other constructions are possible.

The research demonstrated that interpretation of innovation narratives could enable construction companies to appreciate their existing resources and draw on them to generate new services or novel ways of doing and delivering tasks in their own work context. Managers can help individuals in their daily sensemaking and learn about individuals' values and perceptions through listening to the organisational stories. This enables them to build a new understanding and new ways of thinking by focusing on commonalities and differences through dialogue. As a consequence, this makes it possible to discover new meanings or alter the existing meanings and promote the emergence of new meanings for the future strategic decisions of the organisation. This may affect how they act in the future and enable practitioners to interpret emergent situations that are uncertain and ambiguous so as to promote real-time problem solving. Furthermore, this research may assist organisations in the construction industry in recognising and labelling an activity or event as an innovation by interpreting ideas accumulated from specific instances of past innovation to notify present and future efforts throughout the organisation. This can also be important for consultants and other stakeholders who are interested in organisational change and innovation. Narratives can also assist managers to learn about hierarchical power relations, individuals' expectations and the company's degree of success (Taylor et al., 2002). The findings of the research further recommend implications for the construction industry policy makers. Policy makers can tap into the 'situational innovation' and 'contextual innovation' to promote government programmes and policies, especially those concerned with change and innovation in the industry.

## **8.5 Limitations of the research**

Relying on interview techniques as one of the methods in qualitative research runs the risk of having participants contribute an idealised account, thus hiding the details that matter in reality (Alvesson, 2002). The result of the research may be influenced by the participants' responses which were consciously or unconsciously tied to the preference of the participant rather than being closer to reality. Another potential problem associated with the participants' account is that it is subject to characteristics of sensemaking as explained in chapter three, such as plausibility and enactment. As Weick et al. (2005, p. 416) point out: "[...] sensemaking is incomplete unless there is sensegiving, a sensemaking variant undertaken to create meanings for a target audience. The refinement of this demonstration is the finding that the content of sensegiving (present versus future image) and the target (insider versus outsider) affect how people interpret the action they confront".

This research acknowledges that some aspects of participants including race, age and culture and other factors remain unknown to researchers. As an interpretative research, the meaning of analysis has been constructed based on the researcher's own interpretation of stories told by the participants. A different researcher might have a different interpretation and co-create different narratives to present it. Despite this specific characteristic of this kind of research being a fundamental limitation, it emphasises an important strength: that by acknowledging a reflexive account, the construction and interpretation of narratives can be made more transparent (See sections 3.2 and 3.9.1). This research makes no claim for the generalisability of research findings and as a result, any generalisation should be made with caution.

## **8.6 Recommendations for Further Research**

This research has contributed a narrative and project-based innovation discourse; however, there remains the opportunity for further research of this kind. In taking the interpretative analysis of narratives of practitioners, areas of study have arisen, but

have not been followed up on. In order to obtain a richer understanding of the narrative of practitioners, the following further research is recommended:

- A deeper ethnographic approach may cut across different levels of organisational stakeholders and the supply chain to uncover the social process through which innovations evolve within organisations.
- Any future research on the narrative of practitioners may enhance a more micro perspective of innovation to explain the effect of strategic setting of organisations in forming the individuals' narratives.
- Any further research may investigate deeper the institutional and managerial power in shaping the innovation narratives which implicitly appeared as one of themes in analysing the storylines of practitioners but not addressed explicitly in this thesis.
- A further research on another theme which appeared in the coding of transcripts as emotional intelligence such as self-efficacy, self-confidence, and self-satisfaction as a concept of personal identity of individuals may help to explain how the meanings and discourses are shaped from the position of individuals adopted in the organisations.
- Future research may investigate the role of Constructing Excellence in sharing knowledge and promoting innovation in the industry.



## References

- Abrahamson, E. (1991). 'Managerial fads and fashions: the diffusion and rejection of innovations', *Academy of management review*, 16(3), pp. 586-612.
- Abernathy, W. J. and Utterback, J. M. (1978). 'Patterns of industrial innovation', *Technology review. Ariel*, 64, pp. 254-28.
- Abbey, G. P. (2010). Making Sense of Organisational Change: a storytelling approach. PhD. University of Bath.
- Acar, E., Kocak, I., Sey, Y. and Arditi, D. (2005). 'Use of information and communication technologies by small and medium-sized enterprises (SMEs) in building construction', *Construction Management and Economics*, 23(7), pp. 713-722.
- Adams, R., Bessant, J. and Phelps, R. (2006). 'Innovation management measurement: A review', *International Journal of Management Reviews*, 8(1), pp. 21-47.
- Adamson, D. M. and Pollington, A. H. (2006). *Change in the construction industry: an account of the UK construction industry reform movement 1993-2003*. New York: Routledge.
- Akintoye, A., Goulding, J. and Zawdie, G. (eds.) (2012). *Construction innovation and process improvement*. UK: John Wiley & Sons.
- Alvesson, M. (2002). *Postmodernism and Social Research*. Buckingham: Open University Press.
- Alvesson, M. (1996). 'Leadership studies: From procedure and abstraction to reflexivity and situation', *The Leadership Quarterly*, 7(4), pp. 455-485.
- Alvesson, M. and Kärreman, D. (2000). 'Taking the linguistic turn in organizational research challenges, responses, consequences', *The journal of applied behavioral science*, 36(2), pp. 136-158.
- Alvesson, M. and Willmott, H. (1992). *Critical Management Studies*. London: Sage.

- Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R. (2002). 'Quantitative and qualitative research in the built environment: application of "mixed" research approach', *Work study*, 51(1), pp. 17-31.
- Anderson, N., De Dreu, C. K. and Nijstad, B. A. (2004). 'The routinization of innovation research: A constructively critical review of the state-of-the-science', *Journal of organizational Behavior*, 25(2), pp. 147-173.
- Andrews, M., Squire, C. and Tamboukou, M. (2013). *Doing narrative research*. 2<sup>nd</sup> edn. London: Sage.
- Antonacopoulou, E. and Tsoukas, H. (2002). 'Time and reflexivity in organization studies: an introduction', *Organization Studies*, 23(6), pp. 857-862.
- Antuchevičienė, J., Turskis, Z. and Zavadskas, E. K. (2006). 'Modelling renewal of construction objects applying methods of the game theory', *Technological and economic development of economy*, 12(4), pp. 263-268.
- Aouad, G., Ozorhon, B. and Abbott, C. (2010). 'Facilitating innovation in construction: directions and implications for research and policy', *Construction Innovation: information, process, management*, 10(4), pp. 374-394.
- Arditi, D., Kale, S. and Tangkar, M. (1997). 'Innovation in construction equipment and its flow into the construction industry', *Journal of Construction Engineering and Management*, 123(4), pp. 371-378.
- Ayer, A. J. (1971). *Language, Truth and Logic*. Harmondsworth: Penguin.
- Baiden, B. K., Price, A. D. F. and Dainty, A. R. J. (2006). 'The extent of team integration within construction projects', *International Journal of Project Management*, 24(1), pp. 13-23.
- Baregheh, A., Rowley, J. and Sambrook, S. (2009). 'Towards a multidisciplinary definition of innovation', *Management decision*, 47(8), pp. 1323-1339.
- Barge, J. K. (2004). 'Antenarrative and managerial practice'. *Communication Studies*, 55(1), 106-127.
- Barlow, J. (2000). 'Innovation and learning in complex offshore construction projects', *Research policy*, 29(7), pp. 973-989.

- Barrett, P. (2005). Revaluing construction: a global CIB agenda. *International Council for Research and Innovation in Building and Construction (CIB)*, Rotterdam, the Netherlands.
- Barrett, P. and Sexton, M. (2006). 'Innovation in Small, Project-Based Construction Firms', *British Journal of Management*, 17(4), pp. 331-346.
- Barrett, P., Sexton, M. and Lee, A. (2008). *Innovation in small construction firms*. Abingdon: Routledge.
- Bartel, C. A. and Garud, R. (2009). 'The Role of Narratives in Sustaining Organizational Innovation', *Organization Science*, 20(1), pp. 107-117.
- Basit, T. (2003). 'Manual or electronic? The role of coding in qualitative data analysis', *Educational Research*, 45(2), pp. 143-154.
- Beech, N. (2011). 'Liminality and the practices of identity reconstruction', *Human Relations*, 64, pp. 285-302.
- Berger, P. L. and Luckmann, T. (1966). *The Social Construction of Reality*. London: Penguin.
- Berger, P. L. and Luckmann, T. (1991). *The social construction of reality: A treatise in the sociology of knowledge* 6<sup>th</sup> edn. Penguin: UK.
- Bernstein, H. M. and Lemer, A. C. (1996). *Solving the innovation puzzle: Challenges facing the US design & construction industry*. New York: ASCE.
- Betts, M. and Wood-Harper, T. (1994). 'Re-engineering construction: a new management research agenda', *Construction Management and Economics*, 12(6), pp. 551-556.
- Bingham, P. (2003). 'Pursuing innovation in a big organization', *Research-Technology Management*, 46(4), pp. 52-58.
- Birks, M. and Mills, J. (2011). *Grounded theory: A practical guide*. London: Sage.
- Blayse, A. M. and Manley, K. (2004). 'Key influences on construction innovation', *Construction Innovation: Information, Process, Management*, 4(3), pp. 143-154.
- Blair, T. (2000). *Better Public Building*. London: dcms.

- Blomquist, T. and Lundin, R. A. (2010). 'Projects—real, virtual or what?', *International Journal of Managing Projects in Business*, 3(1), pp. 10-21.
- Boje, D. M. (1991). 'The storytelling organization: A study of story performance in an office-supply firm', *Administrative science quarterly*, pp. 106-126.
- Boje, D. M. (1995). 'Stories of the storytelling organization: A postmodern analysis of Disney as "Tamara-Land"', *Academy of Management journal*, 38(4), pp. 997-1035.
- Boje, D. M. (2001). *Narrative methods for organizational & communication research*. London: Sage.
- Boje, D. M., Rosile, G. A., Dennehy, R. and Summers, D. J. (1997). 'Restorying Reengineering Some Deconstructions and Postmodern Alternatives', *Communication Research*, 24(6), pp. 631-668.
- Bon, R., and Hutchinson, K. (2000). 'Sustainable construction: some economic challenges', *Building Research & Information*, 28(5-6), pp. 310-314.
- Boreham, N. C., Shea, C. E. and Mackway-Jones, K. (2000). 'Clinical risk and collective competence in the hospital emergency department in the UK', *Social science & medicine*, 51(1), pp. 83-91.
- Bommer, M. and Jalajas, D. (1999). 'The threat of organizational downsizing on the innovative propensity of R&D professionals', *R&D Management*, 29(1), 27-34.
- Bossink, B. A. (2004). 'Managing drivers of innovation in construction networks', *Journal of Construction Engineering and Management*, 130(3), pp. 337-345.
- Bossink, B. A. (2007). 'Leadership for sustainable innovation', *International Journal of Technology Management & Sustainable Development*, 6(2), pp. 135-149.
- Bourdieu, P. (1990). *In other words: Essays towards a reflexive sociology*. U.S.A: Stanford University Press.
- Bowley, M. (1960). *Innovations in building materials: an economic study*. London: Duckworth.

- Boyce, M. E. (1996). 'Organizational story and storytelling: a critical review', *Journal of organizational change management*, 9(5), pp. 5-26.
- Boyce, M. E. (1995). 'Collective centring and collective sense-making in the stories and storytelling of one organization', *Organization Studies*, 16(1), pp. 107-37.
- Bradley Guy, G. and Kibert, C. J. (1998). 'Developing indicators of sustainability: US experience', *building research & information*, 26(1), pp. 39-45.
- Brandon, P. S. and Lu, S. L. (eds.) (2008). *Clients driving innovation*. Chichester, West Sussex, UK: Wiley-Blackwell.
- Braun, V. and Clarke, V. (2006). 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp. 77-101
- Bredillet, C. N. (2010). 'Blowing hot and cold on project management', *Project Management Journal*, 41(3), pp. 4-20.
- Bresnen, M. and Marshall, N. (2001). 'Understanding the diffusion and application of new management ideas in construction', *Engineering, Construction and Architectural Management*, 8(5/6), pp. 335-345.
- Bresnen, M., Goussevskaia, A. and Swan, J. (2005) 'Implementing change in construction project organizations: exploring the interplay between structure and agency', *Building Research and Information*, 33(6), pp. 547-60.
- Bröchner, J. (2010). 'Construction contractors as service innovators', *Building Research & Information*, 38(3), pp. 235-246.
- Brown, A. D. (2006). 'A Narrative Approach to Collective Identities', *Journal of Management Studies*, 43(4), pp. 731-753.
- Brown, A. D., Stacey, P., and Nandhakumar, J. (2008). 'Making sense of sensemaking narratives', *Human relations*, 61(8), pp. 1035-1062.
- Brown, A. D. and Phua, F. T. T. (2011). 'Subjectively construed identities and discourse: towards a research agenda for construction management', *Construction Management and Economics*, 29, pp. 83-95.
- Brown, A. D. and Jones, M. (1998). 'Doomed to failure: Narratives of inevitability and conspiracy in a failed IS project', *Organization Studies*, 19, pp. 73-88.

- Brown, M. H. and McMillan, J. J. (1991). 'Culture as text: The development of an organizational narrative'. *Southern Journal of Communication*, 57(1), 49-60.
- Bryman, A. and Bell, E. (2007). *Business research methods*. 2<sup>nd</sup> edn. New York: Oxford University Press Inc.
- Bryman, A. (2008). *Social research methods*. 3<sup>rd</sup> edn. Oxford: Oxford University Press.
- Bryman, A. (2012). *Social research methods*. 4<sup>th</sup> edn. Oxford: Oxford University Press.
- Buchanan, D. and Bryman, A. (2009). *The Sage handbook of organizational research methods*. London: Sage Publications Ltd.
- Burgess, R. G. (1984). *In the Field: An Introduction to Field Research*. London: Routledge.
- Burningham, C. and West, M. A. (1995). 'Individual, climate, and group interaction processes as predictors of work team innovation', *Small group research*, 26(1), pp. 106-117.
- Burrell, G. and Morgan, G. (1979). *Sociological Paradigms and Organisational Analysis*. Pearson Education.
- Burrell, G. and Morgan, G. (1982). *Sociological Paradigms and Organisational Analysis*. London: Heinemann.
- Buttny, R. (1993). *Social accountability in communication*. London: Sage.
- Calvert, J., Ibarra, C., Patel, P. and Pavitt, K. (2002). 'Innovation outputs in European industry: results from the CIS-1'. European Innovation Monitoring System Publication. <http://www.cordis.lu/eims/src/eims-r34.htm> (Accessed: 01June 2014)
- Capaldo, G., Corti, E. and Greco, O. (1997). 'A coordinated network of different actors to offer innovation services to develop local SMEs inside areas with a delay of development', *In Documento presentado en la Conferencia ERSA*. Rome 26<sup>th</sup> -29<sup>th</sup> August 1997.
- Carty, G. J. (1995). 'Construction', *Journal of Construction Engineering and Management*, 121(3), pp. 319-328.

- Casson, M. and Singh, S. (1993). 'Corporate research and development strategies: the influence of firm, industry and country factors on the decentralization of R&D', *R&D Management*, 23(2), pp. 91-108.
- Chan, P. W. and Liang, V. (2012). Ordering Identities: exploring the emergence and consequences of researcher identity, Proceedings of the European group for organisational studies conference (EGOS), Helsinki, Finland. July, pp. 61- 73
- Chan, P. W. (2012). 'Constructing a sense of time in projects: implications of a Bergsonian view of time, in Smith, S.D (ed.)', *Proceedings 28th Annual ARCOM Conference*, Edinburgh, UK. 3<sup>rd</sup>-5<sup>th</sup> September. Association of Researchers in Construction Management, pp. 497-507.
- Chaminade, C. and Roberts, H. (2002). 'Social capital as a mechanism: connecting knowledge within and across firms', *In Third European Conference on Organizational Knowledge, Learning and Capabilities (OKLC)*. Athens, Greece. 5<sup>th</sup> – 6<sup>th</sup> April
- Charmaz, K. (2000). 'Grounded theory: objectivist and constructivist methods', In N.Denzin and Y.S. Lincoln (eds), *Handbook of qualitative research*. London: Sage.
- Chatman, J. A., Bell, N. E. and Staw, B. M. (1986). 'The managed thought: The role of self-justification and impression management in organisational settings', in Sims, H.P., and Gioia, D. A. (eds.), *The thinking organisation*. San Francisco: Jossey-Bass, pp. 191-214
- Chia, R. (1996). 'The problem of reflexivity in organizational research: towards a postmodern science of organization, *Organization*, 3(1), pp. 31-59.
- Christensen, C.M. (1997). *The Innovator's Dilemma: When New Technology Cause Great Firms to Fail*. Boston, MA: Harvard Business School Press.
- Civil Engineering Research Foundation (CERF) (1993). A Nation-wide Survey of Civil Engineering-related R&D, *American Society of Civil Engineers*, Washington, USA.
- CIB (1996). *Partnering in the team*. London: Thomas Telford.
- Clair, R. P., Chapman, P. A. and Kunkel, A. W. (1996). 'Narrative approaches to raising consciousness about sexual harassment: From research to pedagogy and back again', *Journal of Applied Communication Research*. Vol. 24: pp. 241-259.

- Clair, R. P. (1998). *Organizing Silence: A World of Possibilities*. New York: SUNY Press
- Clegg, S. R., Clegg, S., and Hardy, C. (eds.). (1999). *Studying organization: theory and method*. Sage.
- Comte, A. (1853). *The Positive Philosophy of Auguste Comte* (trans. H. Martineau), London: Trubner and Co.
- Connelly, F. M. and Clandinin, D. J. (1990). 'Stories of experience and narrative inquiry', *Educational Researcher*, 19(5), pp. 2–14.
- Construction Research and Innovation Strategy Panel CRISP (1997). *Creating climate of innovation in construction*. London: CRISP Motivation Group.
- Cooper, D. R. and Schindler, P. S. (2011). *Business Research Methods*. 11<sup>th</sup> end. New York: McGraw-Hill Higher Education
- Cooper, D. R., Schindler, P. S. and Sun, J. (2006). *Business Research Methods*. 9<sup>th</sup> end. New York: McGraw-Hill Higher Education.
- Cooper, R. G. and Kleinschmidt, E. J. (1987). 'New products: what separates winners from losers?', *Journal of product innovation management*, 4(3), pp. 169-184.
- Coopey, J., Keegan, O. and Emler, N. (1997). 'Managers' Innovations as Sense-making', *British Journal of Management*, 8(4), pp. 301-315.
- Coopey, J., Keegan, O. and Emler, N. (1998). 'Managers' innovations and the structuration of organizations', *Journal of Management Studies*, 35(3), pp. 263-284.
- Corbin, J. and Strauss, A. (eds.). (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. 3<sup>rd</sup> edn. California: Sage.
- Cox, A. and Thompson, I. (1997). 'Fit for purpose' contractual relations: determining a theoretical framework for construction projects', *European Journal of Purchasing & Supply Management*, 3(3), pp. 127-135.
- Cox, A. and Ireland, P. (2002). 'Managing construction supply chains: the common sense approach', *Engineering Construction and Architectural Management*, 9(5-6), pp. 409-418



- Craig-Lees, M. (2001). 'Sense making: Trojan horse? Pandora's box?', *Psychology & Marketing*, 18(5), pp. 513-526.
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* Thousand Oaks, 2<sup>nd</sup> edn. CA: Sage.
- Creswell, J. W. (2009). *Research Design: Qualitative, quantitative, and mixed methods approaches*. 3<sup>rd</sup> edn. UK: SAGE.
- Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Australia: Sage.
- Cunliffe, A. L. (2001). 'Managers as practical authors: reconstructing our understanding of management practice', *Journal of Management Studies*, 38, pp. 351-371.
- Cunningham, J. W. and Fitzgerald, J. (1996). 'Epistemology and reading', *Reading Research Quarterly*, 31(1), pp. 36-60.
- Czarniawska, B. (1998). *A Narrative Approach to Organization Studies*. Sweden: Sage.
- Czarniawska, B. (1997). *Narrating the Organization: Dramas of Institutional Identity*. Chicago: University of Chicago Press.
- Dainty, A. R., Bagilhole, B. M. and Neale, R. H. (2000). 'A grounded theory of women's career under-achievement in large UK construction companies', *Construction Management & Economics*, 18(2), pp. 239-250.
- Dale, J. (2007). *Innovation in Construction: Ideas are the currency of the future*. Ascot: CIOB.
- Davey-Wilson, I. E. (2001). 'Innovation in the building process—a postgraduate module', *Engineering structures*, 23(1), 136-144.
- Damanpour, F. (1991). 'Organizational innovation: A meta-analysis of effects of determinants and moderators', *Academy of management journal*, 34(3), pp. 555-590.
- De Fina, A. and Georgakopoulou, A. (2008). 'Analysing narratives as practices', *Qualitative Research*, 8(3), pp. 379-387.

- Deetz, S. (1996). 'Describing Differences in Approaches to Organisation Science: Rethinking Burrell and Morgan and Their Legacy', *Organisation Science*, 7 (2), pp. 191-207.
- Deetz, S. (1973). 'An Understanding of Science and a Hermeneutic Science of Understanding', *Journal of Communication*, 23, pp. 139-159.
- Denzin, N. K. and Lincoln, Y. S. (2011). 'Introduction: The Discipline and Practice of Qualitative Research', In Denzin N. K. and Lincoln Y.s. (eds) *SAGE Handbook of Qualitative Research*. 4<sup>th</sup> ed., London: Sage Publications.
- Denzin, N. K. and Lincoln, Y. S. (2000). 'Introduction: The Discipline and Practice of Qualitative Research', In Denzin N. K. and Lincoln Y.s. (eds) *SAGE Handbook of Qualitative Research*. 2<sup>nd</sup> ed., London: Sage Publications.
- Dervin, B. (1983). 'An overview of sense-making research: Concepts, methods, and results to date' International Communication Association annual meeting, Dallas, May 1983.
- Deuten, J. J. and Rip, A. (2000). 'Narrative infrastructure in product creation processes', *Organization*, 7(1), pp. 69-93.
- Dewick, P. and Miozzo, M. (2002). 'Sustainable technologies and the innovation-regulation paradox', *Futures*, 34(9), 823-840.
- Dewick, P. and Miozzo, M. (2004). 'Networks and innovation: sustainable technologies in Scottish social housing', *R&D Management*, 34(3), pp. 323-333.
- Dikmen, I., Birgonul, M. T. and Artuk, S. U. (2005). 'Integrated framework to investigate value innovations', *Journal of Management in Engineering*, 21(2), pp. 81-90.
- Dodgson, M., Gann, D. M. and Salter, A.J. (2005). *Think, play, Do, Technology, Innovation and Organization*. New York : Oxford University Press.
- Doolin, B. (2003). 'Narratives of change: discourse, technology and organization', *Organization*, 10(4), pp. 751-770.
- Dougherty, D. (1992). 'A practice-centered model of organizational renewal through product innovation', *Strategic Management Journal*, 13(S1), pp. 77-92.

- Dougherty, D. and Cohen, M. A. (1995). 'Product innovation in mature firms', in Bowman, E. and Kogut, B. (eds) *Redesigning the firm*. New York: Oxford University Press, pp. 87-115.
- DTI (2003). *Innovation Report-Competing in the Global Economy: The Innovation Challenge*. HMSO, London.
- DTI (2006). *Innovation in the UK: Indicators and Insights, Department of Trade and Industry*. HMSO, London.
- Dubois, A., and Gadde, L. E. (2002). 'The construction industry as a loosely coupled system: implications for productivity and innovation', *Construction Management & Economics*, 20(7), pp. 621-631.
- Dulaimi, M. F., Ling, F. Y. and Bajracharya, A. (2003). 'Organizational motivation and inter-organizational interaction in construction innovation in Singapore', *Construction Management and Economics*, 21(3), pp. 307-318
- Dulaimi, M. F., Nepal, M. P. and Park, M. (2005). 'A hierarchical structural model of assessing innovation and project performance', *Construction Management and Economics*. 23(6), pp. 565-577
- Dulaimi, M. F. (2007). 'Case studies on knowledge sharing across cultural boundaries', *Engineering, Construction and Architectural Management*, 14(6), pp. 550-567.
- Dulaimi, M. F. (2008). 'Driving innovation in construction: a conceptual model of client leadership', In: Brandon, P. S., and Lu, S. L. (eds.) *Clients driving innovation*. Chichester, West Sussex, UK: Wiley-Blackwell, pp. 137-145.
- Dunford, R. and Jones, D. (2000). 'Narrative in strategic change', *Human relations*, 53(9), pp. 1207-1226.
- Easterby-Smith, M. P. V., Thorpe, R. and Jackson, P. (2008). *Management Research: Theory and Research*. 3<sup>rd</sup> edn. London: Sage.
- Easterby-Smith, M., Thorpe, R. and Jackson, P. (2012). *Management Research*. 4<sup>th</sup> edn London: Sage Publications Ltd.
- Egan, J. (1998). *Rethinking Construction*. London: Report of the Construction Industry Task Force to the Deputy Prime Minister.

- Egan, J. (2002). *Accelerating Change*. London: Rethinking Construction.
- Egbu, C. (2008). 'Clients' roles and contributions to innovations in the construction industry: when giants learn to dance', in: Brandon, P. S., and Lu, S. L. (eds.) *Clients driving innovation*. Chichester. West Sussex, UK: Wiley-Blackwell. pp. 69-77.
- Egbu, C. O. (2004). 'Managing knowledge and intellectual capital for improved organizational innovations in the construction industry: an examination of critical success factors', *Engineering, Construction and Architectural Management*, 11(5), pp. 301-315.
- Egbu, C. O., Henry, J., Kaye, G. R., Quintas, P., Schumacher, T. R. and Young, B. A. (1998). 'Managing organizational innovations in construction', In: Hughes, W (Ed.), *14th Annual ARCOM Conference*. University of Reading, UK. 9-11 September 1998. Association of Researchers in Construction Management, Vol. 2, pp. 605-14.
- Eisenhardt, K. M. and Graebner, M. E. (2007). 'Theory building from cases: opportunities and challenges', *Academy of management journal*, 50(1), pp. 25-32.
- Elias, N. (1991). *The society of Individuals*. Oxford : Blackwell.
- El-Mashaleh, M., O'Brien, W. J., and Minchin Jr, R. E. (2006). 'Firm performance and information technology utilization in the construction industry', *Journal of Construction Engineering and Management*, 132(5), pp. 499-507.
- Fagerberg, J., Mowery, D. C. and Nelson, R. R., (2006). *The Oxford Handbook of Innovation*. Oxford: Oxford University Press
- Fairclough, N. (1989). *Language and Power*. UK, Essex: Longman.
- Fairclough, J. (2002). *Rethinking Construction*. London: Construction Task Force.
- Fairclough, N. (2003). *Analysing Discourse: Textual Analysis for Social Research*. London: Routledge.
- Feldman, M. S., Sköldbberg, K., Brown, R. N., and Horner, D. (2004), 'Making sense of stories: A rhetorical approach to narrative analysis', *Journal of public administration research and theory*, 14(2), pp. 147-170.

- Fernie, S., Green, S. D., Weller, S. J., and Newcombe, R. (2003). 'Knowledge sharing: context, confusion and controversy', *International Journal of Project Management*, 21(3), pp. 177-187.
- Finlay, L.(2002). 'Negotiating the swamp: the opportunity and challenge of reflexivity in research practice', *Qualitative Research* 2(2), pp. 209-230.
- Flick, U. (2014). *An introduction to qualitative research*. 4<sup>th</sup> edn. London: Sage.
- Flood, G. (1999). *Beyond Phenomenology: Rethinking the Study of Religion*. London: Cassell
- Fong, P. S. W. (2008). 'Knowing differently, innovating together? Exploring the dynamics of knowledge creation across boundaries in clients' design teams, in: Brandon, P. S., and Lu, S. L. (eds.) *Clients driving innovation*. Chichester, West Sussex, UK: Wiley-Blackwell, pp. 101-110
- Foucault, M. (1977). *The Archaeology of Knowledge*. London: Tavistock.
- Fraenkel, J. R., and Wallen, N. E. (2006). *How to design and evaluate research in education*. 6<sup>th</sup> edn. Boston: Mc Grawall Hill.
- Frank, A. W. (2008). 'Why study people's stories? The dialogical ethics of narrative analysis', *International Journal of Qualitative Methods*, 1(1), pp. 109-117.
- Franzosi, R. (1998). 'Narrative analysis-or why (and how) sociologists should be interested in narrative', *Annual review of sociology*, pp. 517-554.
- Freeman, C. (1990). *The economics of innovation* (Vol. 2). Edward Elgar Pub.
- Freeman, M. (2004). Data are everywhere: Narrative criticism in the literature of experience, in C. Daiute and C. Lightfoot (eds) *Narrative Analysis: Studying the Development of Individuals in Society*, Thousand Oaks: Sage, pp. 63-81.
- Frost, P., Moore, L., Louis, M., Lundberg, C. and Martin, J. (1985). *Organizational Culture*. Thousand Oaks, CA: Sage.
- Gadamer, H. G. (1975). 'Hermeneutics and social science', *Cultural Hermeneutics*, 2, pp. 307-316.

- Gambatese, J. A., and Hallowell, M. (2011). 'Enabling and measuring innovation in the construction industry', *Construction Management and Economics*, 29(6), pp. 553-567.
- Gann, D. (2000). 'Technology policy: an international comparison of innovation in major capital projects', *Science, Technology, and Innovation Policy: Opportunities and Challenges for the Knowledge Economy*, (8), pp. 209.
- Gann, D. M., (1997). 'Should governments fund construction research?', *Building Research and Information*, 25(5), pp. 257-267.
- Gann, D. M., and Salter, A. J. (2000). 'Innovation in project-based, service-enhanced firms: the construction of complex products and systems', *Research policy*, 29(7), pp. 955-972.
- Gann, D. M., Wang, Y., and Hawkins, R. (1998). 'Do regulations encourage innovation?-the case of energy efficiency in housing', *Building Research & Information*, 26(5), pp. 280-296.
- Garcia, R., and Calantone, R. (2002). 'A critical look at technological innovation typology and innovativeness terminology: a literature review', *Journal of product innovation management*, 19(2), pp. 110-132.
- Garfinkel, H. (1967). *Studies in ethnomethodology*. New Jersey: Prentice-Hall Inc
- Gauthier, J. B., and Ika, L. A. (2012). 'Foundations of Project Management Research: An Explicit and Six-Facet Ontological Framework', *Project Management Journal*, 43(5), 5-23.
- Geertz, C. (1973). *The interpretation of cultures*, New York: Basic Books.
- Gergen, K. (1992). 'Organizational Theory in the Postmodern Era' , in Reed, M. and Hughes, M. (eds.) *Rethinking Organization*, London: Sage.
- Georgakopoulou, A. (2007). 'Small stories, interaction and identities (Vol. 8). John Benjamins Publishing.
- Gephart, R. P. (1993). 'The textual approach: Risk and blame in disaster sensemaking', *Academy of Management Journal*, 36(6), pp. 1465-1514.
- Ghauri, P. N. and Gronhaug, K. (2005). 'Research methods in business studies: A practical guide. 3<sup>rd</sup> edn: Pearson Education.

- Gill, J. and Johnson, P. (2010). *Research methods for managers*. 3<sup>rd</sup> edn. London: Sage.
- Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*. Los Angeles: University of California Press.
- Giere, R. N. (1999). *Science without laws*. Chicago: University of Chicago Press.
- Goulding, C. (1999). 'Consumer research, interpretive paradigms and methodological ambiguities', *European Journal of Marketing*, 33(9/10), pp. 859-873.
- Green, S. D. (2011). *Making sense of construction improvement*. Sussex: John Wiley & Sons.
- Green, S.D. and May, S.C. (2005). 'Lean construction: Arenas of enactment, models of diffusion and the meaning of "leanness"', *Building Research and Information*, 33(6), pp. 498–511.
- Green, S. D., Harty, C., Elmualim, A. A., Larsen, G. D. and Kao, C. C. (2008). 'On the discourse of construction competitiveness', *Building Research & Information*, 36(5), pp. 426-435.
- Greenhalgh, T. and Hurwitz, B. (1999). 'Why study narrative?', *Bmj*, 318(7175), pp. 48-50.
- Groak, S. (1992). *The idea of building*, London: E&FN Spon.
- Gruneberg, S. L. (1997). *Construction economics: an introduction*. London: Macmillan.
- Guba, E. G. and Lincoln, Y. S. (1994). 'Competing paradigms in qualitative research', *Handbook of qualitative research*, 2, pp. 163-194.
- Gubrium, J. F. and Holstein, J. A. (2001). 'Handbook of interview research: Context and method'. London : Sage Publications.
- Gummesson, E. (2000). *Qualitative methods in management research*. California: Sage.
- Guy, G. B. and Kibert C. J. (1998). 'Developing indicators of sustainability: US experience', *Building Research and Information*, 26(1), pp. 39–45.

- Habermas, J. (1970). 'Knowledge and interest' in D. Emmett and A. Macintyre (eds), *Sociological Theory and Philosophical Analysis*, London: Macmillan.
- Hallowell, M. R. and Gambatese, J. A. (2009). 'Qualitative research: application of the Delphi method to CEM research', *Journal of construction engineering and management*, 136(1), pp. 99-107.
- Hamel, G. (2006). 'The why, what, and how of management innovation', *Harvard Business Review*, 84, pp. 72-84.
- Hampson, K. D. and Brandon, P. (2004). *Construction 2020-A vision for Australia's Property and Construction Industry*. Brisbane: CRC Construction Innovation.
- Hardie, M. and Newell, G. (2011). 'Factors influencing technical innovation in construction SMEs: an Australian perspective' *Engineering, Construction and Architectural Management*, 18(6), pp. 618-636.
- Harding, N. (2007), 'On Lacan and the Becoming-ness' of Organizations/Selves', *Organization Studies*, 28 (11), 1761-1773.
- Hare, B., Cameron, I. and Duff, A. R. (2006). 'Exploring the integration of health and safety with pre-construction planning', *Engineering, construction and architectural management*, 13(5), pp. 438-450.
- Hartmann, A. (2008). 'Overcoming resistance to innovation: the integration champion in construction', in: Brandon, P. S., and Lu, S. L. (eds.) *Clients driving innovation*. Chichester. West Sussex, UK: Wiley-Blackwell. pp. 157-166.
- Harty, C. (2005). 'Innovation in construction: a sociology of technology approach', *Building Research & Information*, 33(6), pp. 512-522.
- Hatch, J. A. (2002). *Doing qualitative research in education settings*. New York: SUNY Press.
- Hazen, M. A. (1993). 'Towards polyphonic organization', *Journal of Organizational Change Management*, 6(5), pp. 15-26.
- Henderson, R. M. and Clark, K. B. (1990). 'Architectural innovation: the reconfiguration of existing product technologies and the failure of established firms', *Administrative science quarterly*, pp. 9-30.



- Hill, R. C. and Bowen, P. A. (1997). 'Sustainable construction: principles and a framework for attainment', *Construction Management & Economics*, 15(3), pp. 223-239.
- Hodgson, D. and Cicmil, S. (2006). *Making Projects Critical (Management, Work and Organisations)*. New York: Palgrave Macmillan.
- Hollway, W. (1984). 'Fitting Work: Psychological Assessment in Organizations', in J. Henriques, W. Hallway, C. Urwin, C. Venn and V. Walkerdine (eds.), *Changing the Subject*, New York: Methuen.
- Holmen, E., Pedersen, A. C. and Torvatn, T. (2005). 'Building relationships for technological innovation' *Journal of Business Research*, 58(9), pp. 1240-1250.
- Holstein, J. A., and Gubrium, J. F. (2000). *The self we live by: Narrative identity in a postmodern world*. New York: Oxford University Press.
- Hopkinson, G. C. (2001). 'Influence in marketing channels: A sense-making investigation' *Psychology & Marketing*, 18(5), pp. 423-444.
- Howell, J. M. and Higgins, C. A. (1990). 'Champions of technological innovation' *Administrative science quarterly*, pp. 317-341.
- Howitt, D. and Cramer, D. (2005). *Introduction to research methods in psychology*. Edinburgh: Pearson Education Limited.
- Hussey, J. and Hussey, R. (1997). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*. London: Macmillan.
- HM Government, (2013). *Construction 2025*. London: Crown.
- Ivory, C. (2005) 'The cult of customer responsiveness: is design innovation the price of a client-focused construction industry?' *Construction Management and Economics*, 23(8), pp. 861-870.
- Janesick, V. J. (2000). 'The choreography of qualitative research design: Minuets, improvisations and crystallization', in N.K. Denzin and Y.S. Lincoln (eds.) *Handbook of Qualitative Research*. 2<sup>nd</sup> ed. Thousand Oaks, CA: Sage, pp. 379-400.

- Johannessen, J. A., Olsen, B. and Lumpkin, G. T. (2001). 'Innovation as newness: what is new, how new, and new to whom?', *European Journal of innovation management*, 4(1), pp. 20-31.
- Johnson, P. and Clark, M. (2006). 'Mapping the terrain: an overview of business and management research methodologies', in P. Johnson and M. Clark. (eds) *Business and Management Research Methodologies*. London, Sage.
- Jones, M. and Saad, M. (2003). *Managing innovation in construction*. London: Thomas Telford.
- Kale, S. and Ardit, D. (2009). 'Innovation diffusion modeling in the construction industry', *Journal of Construction Engineering and Management*, 136(3), pp. 329-340.
- Ketokivi, M. and Mantere, S. (2010). 'Two strategies for inductive reasoning in organizational research', *Academy of Management Review*, 35(2), pp. 315-333.
- Khosrowshahi, F., Ghodous, P. and Sarshar, M. (2014). 'Visualization of the Modeled Degradation of Building Flooring Systems in Building Maintenance', *Computer-Aided Civil and Infrastructure Engineering*, 29(1), pp. 18-30.
- Klein, G., Moon, B. M. and Hoffman, R. R. (2006). 'Making Sense of Sensemaking 1: Alternative Perspectives', *IEEE intelligent systems*, 21(4), pp. 70-73.
- Knorr-Cetina, K. D. (1983). 'The ethnographic study of scientific work: towards a constructivist interpretation of science' in Knorr-Cetina, K.D. and Mulkay, M. (eds), *Science Observed: Perspectives on the social study of science*. London: Sage. pp. 115-140
- Koskela, L. and Vrijhoef, R. (2001). 'Is the current theory of construction a hindrance to innovation?', *Building Research and Information*, 29(3), pp.197-207
- Koskinen, K. U., Pihlanto, P. and Vanharanta, H. (2003). 'Tacit knowledge acquisition and sharing in a project work context', *International journal of project management*, 21(4), pp. 281-290.
- Krathwohl, D. R. (2009). *Methods of educational and social science research: The logic of methods*. USA:Waveland Press..

- Kulatunga, K., Kulatunga, U., Amaratunga, D. and Haigh, R. (2011). 'Client's championing characteristics that promote construction innovation', *Construction Innovation: Information, Process, Management*, 11(4), 380-398.
- Laughlin, H. P. (1970). *The ego and its defenses*. New York: Appleton-Century-Crofts.
- Larsen, G. D. (2011). 'Understanding the early stages of the innovation diffusion process: awareness, influence and communication networks', *Construction Management and Economics*, 29(10), pp. 987–1002.
- Larsson, N. (1996). 'Public-private strategies for moving towards green building practices', *Ind. Environ.*, 19(2), pp. 23–25.
- Latham, M. (1994). *Constructing the team*. London: HSMO.
- Latour, B. and Woolgar, S. (1979). *Laboratory Life: The Social Construction of Scientific Facts*. Beverly Hills, CA: Sage.
- Lee, N. G. (1991). *Using computers in qualitative research*. London: Sage.
- Leiringer, R. and Cardellino, P. (2008). 'Tales of the expected: investigating the rhetorical strategies of innovation champions', *Construction Management and Economics*, 26(10), pp. 1043–54.
- LePatner, B. B. (2008). *Broken Buildings, Busted Budgets: How to Fix America's Trillion-Dollar Construction Industry*. London: University of Chicago Press.
- Lieblich A., Tuval-Mashiach R. and Zilber T. (1998). *Narrative Research. Reading, Analysis and Interpretation*. Beverly Hills, CA: Sage Publications.
- Lim, J. N. and Ofori, G. (2007). 'Classification of innovation for strategic decision making in construction businesses', *Construction Management and Economics*, 25(9), pp. 963-978.
- Lim, J. N., Schultmann, F. and Ofori, G. (2010). 'Tailoring competitive advantages derived from innovation to the needs of construction firms', *Journal of Construction Engineering and Management*, 136(5), pp. 568-580.
- Lincoln, Y. S. (1992). 'Sympathetic connections between qualitative methods and health research', *Qualitative Health Research*, 2(4), pp. 375-391.

- Lincoln, Y. S. and Guba, E. G. (1985). 'Establishing trustworthiness', *Naturalistic inquiry*, 289, pp. 331.
- Lincoln, Y. S. and Guba, E. G. (1989). *Fourth generation evaluation*. USA: Sage Publications.
- Lincoln, Y. S., Lynham, S. A. and Guba, E. G. (2011). 'Paradigmatic Controversies, Contradictions, and Emerging Confluences', in Denzin N. K. and Lincoln Y.S. (eds) *Handbook of Qualitative Research*. London: Sage Publications.
- Lindgren, M. and Packendorff, J. (2009). 'Social constructionism and entrepreneurship: Basic assumptions and consequences for theory and research', *International Journal of Entrepreneurial Behaviour & Research*, 15(1), pp. 25-47.
- Linehan, C. and Kavanagh, D. (2006). 'From project ontologies to communities of virtue', *Making projects critical*, pp. 51-67.
- Ling, F. Y. Y. (2003) 'Managing the implementation of construction innovations', *Construction Management and Economics*, 21(6), pp. 635-649.
- Lingard, H., Brown, K., Bradley, L., Bailey, C. and Townsend, K. (2007). 'Improving employees' work-life balance in the construction industry: Project alliance case study', *Journal of Construction Engineering and Management*, 133(10), pp. 807-815.
- Lingard, L., Albert, M. and Levinson, W. (2008). 'Grounded theory, mixed methods, and action research'. *Bmj*, 337: a567.
- Littlemore, M. and Chan, P. (2009). 'Recognising and rewarding innovation in construction: exploring disconnections in managerial discourse'. *Global Innovation in Construction Conference*. Loughborough University, Loughborough, England. 13<sup>th</sup> -16<sup>th</sup> September, pp. 350-359.
- Louis, M. R. (1990). 'Acculturation in the workplace: Newcomers as lay ethnographers' in Schneider, B. (ed.) *Organizational climate and culture*. San Francisco: Jossey-Bass, pp. 85-129.
- Maclean, M., Harvey, C. and Chia, R. (2012). 'Sensemaking, storytelling and the legitimization of elite business career', *Human Relations*, 65(1), pp. 17-40.
- Maidique, M. A. (1980). 'Entrepreneurs, champions, and technological innovation', *Sloan management review*, 21(2), pp. 59-76.

- Mangan, J., Lalwani, C. and Gardner, B. (2004). 'Combining quantitative and qualitative methodologies in logistics research', *International Journal of Physical Distribution & Logistics Management*, 34.
- Manley, K. and McFallan, S. (2006). 'Exploring the drivers of firm-level innovation in the construction industry', *Construction Management and Economics*, 24(9), pp. 911-920.
- Manley, K., Blayse, A. M. and McFallan, S. (2005). 'Demonstrating the benefits of construction innovation.
- Manley, K., McFallan, S. and Kajewski, S. (2009). 'Relationship between construction firm strategies and innovation outcomes', *Journal of construction engineering and management*, 135(8), pp. 764-771.
- Manley, K. (2006). Identifying the determinants of construction innovation, *Joint International Conference on Construction Culture, Innovation and Management*, Dubai, 26<sup>th</sup> -29<sup>th</sup> November.
- Manseau, A. and Seaden, G. (eds.). (2001). *Innovation in Construction-An International Review of Public Policies*. London: Routledge.
- Marcus, G. E. (1994). 'What Comes (Just) After "Post"': The Case of Ethnography', in N.K. Denzin and Y.S. Lincoln (eds) *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage.
- Marinova, D. and Phillimore, J. (2003). 'Models of innovation' *The international handbook on innovation*, pp. 44-53.
- Markham, S. K. and Griffin, A. (1998). 'The breakfast of champions: Associations between champions and product development environments, practices and performance', *Journal of Product Innovation Management*, 15(5), pp. 436-454.
- Mason, J. (2002). *Qualitative researching*. 2<sup>nd</sup> edn. London: Sage.
- McAdam, R., Reid, R. and Gibson, D. (2004). 'Innovation and organisational size in Irish SMEs: an empirical study', *International Journal of Innovation Management*, Vol. 8 No. 2, pp. 147-65.
- McBeth, M. K., Shanahan, E. A. and Jones, M. D. (2005). 'The science of storytelling: Measuring policy beliefs in Greater Yellowstone', *Society and Natural Resources*, 18(5), pp. 413-429.

- McGuire, J. B. (1986). 'Management and research methodology' *Journal of Management*, 12(1), pp. 5-17.
- Mishler E. G. (1986). *Research interviewing. Context and narrative*. London: Harvard University Press.
- Miozzo, M. and Dewick, P. (2002). 'Building competitive advantage: innovation and corporate governance in European construction', *Research policy*, 31(6), pp. 989-1008.
- Miozzo, M. and Dewick, P. (2004). 'Networks and innovation in European construction: benefits from inter-organisational cooperation in a fragmented industry', *International Journal of Technology Management*, 27(1), pp. 68-92.
- Miozzo, M. and Dewick, P. (2004). *Innovation in construction: a European analysis*. Cheltenham: Edward Elgar Publishing.
- Mitropoulos, P. and Tatum, C. B. (1999). 'Technology adoption decisions in construction organizations', *Journal of Construction Engineering and Management*, 125(5), pp. 330-338.
- Mohr, L. B. (1969). 'Determinants of innovation in organizations' *The American Political Science Review*, pp. 111-126.
- Mokyr, J. (1990). *The lever of riches: Technological creativity and economic progress*. New York: Oxford University Press.
- Morgan, G. (1984) 'Opportunities arising from paradigm diversity', *Administration & Society*, 16, pp. 306-327.
- Morgan, G. (1980). 'Paradigms, Metaphors, and Puzzle Solving in Organization Theory', *Administrative Science Quarterly*, 25, pp. 605-622.
- Morison, M. and Moir, J. (1998). 'The role of computer software in the analysis of qualitative data: efficient clerk, research assistant or Trojan horse?', *Journal of advanced nursing*, 28(1), pp. 106-116.
- Mowery, D. and Rosenberg, N. (1979). 'The influence of market demand upon innovation: a critical review of some recent empirical studies', *Research Policy*, 8(2), pp. 102-153.

- Mumby, D. K. (1987). 'The political function of narrative in organizations'. *Communications Monographs*, 54(2), 113-127.
- Murphy, M., Heaney, G. and Perera, S. (2011). 'A methodology for evaluating construction innovation constraints through project stakeholder competencies and FMEA', *Construction Innovation: Information, Process, Management*, 11(4), pp. 416-440.
- Murray, M. (2003). 'Narrative psychology', *Qualitative psychology: A practical guide to research methods*, pp. 111-131.
- Myers, M. D. (1997). 'Qualitative Research in Information Systems', *MIS Quarterly*, pp. 241-242.
- Myrsiades, L. S. (1987). 'Corporate stories as cultural communications in the organizational setting', *Management Communication Quarterly*, 1(1), pp. 84-120.
- Naaranoja, N., Haapalainen P. and Lonka, H. (2008). 'Knowledge management supports clients driving innovation: two case studies in Brandon, P. S., and Lu, S. L. eds. *Clients driving innovation*. Chichester, West Sussex, UK: Wiley-Blackwell. pp. 177- 189
- Nam, C. H. and Tatum, C. B. (1988). 'Major characteristics of constructed products and resulting limitations of construction technology', *Construction management and economics*, 6(2), pp. 133-147.
- Nam, C. H. and Tatum, C. B. (1989). 'Toward understanding of product innovation process in construction', *Journal of Construction Engineering Management*, 115(4), pp. 517-534
- Nam, C. H. and Tatum, C. B. (1992). 'Strategies for technology push: Lessons from construction innovations', *Journal of construction engineering and management*, 118(3), 507-524.
- Nam, C. H. and Tatum, C. B. (1997). 'Leaders and champions for construction innovation', *Construction Management & Economics*, 15(3), pp.259-270.
- NAO (2009). *Innovation across central government* [Online]. Available at: <http://www.nao.org.uk/wp-content/uploads/2009/03/080912.pdf> (Accessed: 25 November 2013)

- NAO (2001). *Modernising Construction*. Report by the Comptroller and Auditor General of the National Audit Office, The Stationery Office, London.
- NAO (2005). *Improving Public Services through better construction*. London: The Stationery Office.
- Neely, A. and Hii, J. (1998). *Innovation and business performance: a literature review*. The Judge Institute of Management Studies, University of Cambridge.
- National Endowment for Science, Technology and the Arts (2007). *Hidden innovation: how innovation happens in six 'low innovation' sectors*. London: NESTA.
- Ngowi, A. B. (2001). 'Creating competitive advantage by using environment-friendly building processes', *Building and Environment*, 36(3), pp. 291–298.
- Niosi, J. (1999). 'Fourth-generation R&D: From linear models to flexible innovation', *Journal of business research*, 45(2), pp. 111-117.
- O'Farrell, M. and Miller, C. J. M. (2002). 'The barriers to new technology diffusion in the construction industry of South Wales', *Current Issues in Small Construction Enterprise Development*, pp. 123-137.
- Orbuch, T. L. (1997). 'People's Accounts Count: The Sociology of Accounts', *Annual Review of Sociology*, 23, pp. 455-479.
- Ozorhon, B. (2012). 'Analysis of Construction Innovation Process at Project Level', *Journal of Management in Engineering*, 29(4), pp. 455-463.
- Ozorhon, B. (2013). 'Response of Construction Clients to Low-Carbon Building Regulations', *Journal of Construction Engineering and Management*, 139(12).
- Ozorhon, B. Abbott, C., Aouad, G. and Powell, J. (2010). *Innovation in construction: A project life cycle approach*. Salford Centre for Research and Innovation.
- Ofori, G. (1990). *The construction industry: aspects of its economics and management*. Singapore: Singapore University Press.



- Packendorff, J. (1995). 'Inquiring into the temporary organization: new directions for project management research', *Scandinavian journal of management*, 11(4), pp. 319-333.
- Palmer, I. and Dunford, R. (1996). 'Conflicting uses of metaphors: reconceptualizing their use in the field of organizational change', *Academy of Management Review*, 21(3), pp. 691-717.
- Pavitt, K. (1985). 'Patent statistics as indicators of innovative activities: possibilities and problems', *Scientometrics*, 7(1), pp. 77-99.
- Pedersen, D. O. (1996). 'The economics of innovation in construction', *Economic Management of Innovation, Productivity and Quality in Construction: CIB W 55 Building Economics 7th International Symposium*, University of Zagreb, Zagreb, Croatia, 4<sup>th</sup> –7<sup>th</sup> September, pp. 158–84.
- Peters, T. (1990). 'Get Innovative or Get Dead', *California Management Review*, 33(1), pp. 9-26.
- Peters, T. J. and Waterman, R. H. (1982). *In search of Excellence*. New York: Harper and Row.
- Pettigrew, A. M. (2001). 'Management research after modernism', *British Journal of Management*, 12(s1), pp. S61-S70.
- Phua, F. T. (2013). 'Construction management research at the individual level of analysis: current status, gaps and future directions', *Construction Management and Economics*, 31(2), pp. 167-179.
- Pierce, J. L. and Delbecq, A. L. (1977). 'Organization structure, individual attitudes and innovation', *Academy of management review*, 2(1), pp. 27-37.
- Peirce, C. S. (1957). *Essays in the philosophy of science*. New York: The Liberal Arts Press
- Pinnegar, S. and Daynes, J. G. (2007). 'Locating narrative inquiry historically', in Clandinin, D. J. (ed.) *Handbook of narrative inquiry: Mapping a methodology* Thousand Oaks, CA: Sage Publications Inc, pp. 3-34.
- Poole, M. S., Van de Ven, A. H., Dooley, k. and Holmes, M. E. (2000). *Organizational change and innovation processes: Theory and methods for research*. New York: Oxford University Press.

- Potter, J. and Wetherell, M. (1987). *Discourse and social psychology: Beyond attitudes and behaviour*. London: Sage.
- Porter, M. E. (1998). *Competitive Strategy: techniques for analysing industries and competitors*. 2<sup>nd</sup> edn. New York: Simon and Schuster.
- Pries, F. and Janszen, F. (1995). 'Innovation in the construction industry: the dominant role of the environment', *Construction management and economics*, 13(1), pp. 43-51.
- Putnam, H. (1987). *The Many Faces of Realism*. Chicago and La Salle, Open Court.
- Qi, G. Y., Shen, L. Y., Zeng, S. X. and Jorge, O. J. (2010). 'The drivers for contractors' green innovation: an industry perspective', *Journal of Cleaner Production*, 18(14), pp. 1358-1365.
- Ramanujam, V. and Mensch, G. O. (1985). 'Improving the Strategy-Innovation Link', *Journal of Product Innovation Management*, 2(4), pp. 213-223.
- Raynsford, N. (1999). 'The UK's approach to sustainable development in construction', *Building Research & Information*, 27(6), pp. 419-423.
- Reed, M. (2000). 'The limits of discourse analysis in organizational analysis', *organization*, 7(3), pp. 524-530.
- Remenyi, D. (1998). *Doing research in business and management: an introduction to process and method*. London: Sage.
- 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 Ltd.
- Rhodes, C. and Brown, A. D. (2005). 'Narrative, organizations and research', *International Journal of Management Reviews*, 7(3), pp. 167-188.
- Rhodes, C. (2001). *Writing organization: (Re) presentation and control in narratives at work* (Vol. 7). Amsterdam: John Benjamins Publishing.
- Richards, L. and Morse, J. M. (2012). *Readme first for a user's guide to qualitative methods*. 3<sup>rd</sup> edn. London: Sage.

- Ricoeur, P. (1984). *Time and Narrative*. Volume 1, Translated by K. McLaughlin and D. Pellauer, Chicago, IL: University of Chicago Press.
- Riessman, C. K. (1993). *Narrative analysis* (Vol. 30). California: Sage.
- Riessman, C. K. (2013). 'Analysis of personal narratives' in Fortune, A. E., Reid, W. J. and Miller, R. I. (ed.) *Qualitative research in social work*. New York: Columbia University Press
- Riessman, C. K. (2002). 'Analysis of personal narratives' in Gubrium, J. F., Holstein, J. A.(ed.) *Handbook of Interview Research*. Thousand Oaks: Sage.
- Riessman, C. K. (2008). *Narrative methods for the human sciences*. California: Sage.
- Robinson, J. A. and Hawpe, L. (1986). 'Narrative thinking as a heuristic process' in Sarbin, T. (ed.) *Narrative psychology: The storied nature of human conduct*. New York: Praeger Scientific, pp. 111-125
- Robson, C. (2002). *Real word research*. 2<sup>nd</sup> edn . Oxford: Blackwell.
- Rogers, E. M. (1983). *Diffusion of innovations*. 3<sup>rd</sup> edn. USA: The Free Press
- Rose, T. and Manley, K. (2010). 'Client recommendations for financial incentives on construction projects', *Engineering, Construction and Architectural Management*, 17(3), pp. 252-267.
- Rosenberg, N. (1982). *Inside the Black Box: technology and Economics*. New York: Cambridge University Press.
- Rothwell, R. (1992). 'Successful industrial innovation: critical factors for the 1990s', *R&D Management*, 22(3), pp. 221-240.
- Rothwell, R. (1994). 'Towards the fifth-generation innovation process', *International marketing review*, 11(1), pp. 7-31.
- Ruby, J. (1980) 'Exposing yourself: reflexivity, anthropology, and film', *Semiotica*, 30(1-2), pp. 153-180.
- Ruddock, L. and Ruddock, S. (2009). 'Reassessing productivity in the construction sector to reflect hidden innovation and the knowledge economy', *Construction Management and Economics*, 27(9), pp. 871-879.

- Ruttan, V. W. (1959). Usher and Schumpeter on invention, innovation, and technological change. *The quarterly journal of economics*, 73(4), 596-606.
- Saad, M., Jones, M. and James, P. (2002). 'A review of the progress towards the adoption of supply chain management (SCM) relationships in construction', *European Journal of Purchasing & Supply Management*, 8(3), 173-183.
- Salter, A. and Gann, D. (2003). 'Sources of ideas for innovation in engineering design', *Research Policy*, 32(8), 1309-1324.
- Salzer-Mörling, M. (1998). 'As God created the earth: a saga that makes sense?', in Grant D., Keenoy T. and Oswick C. (eds), *Discourse and organization*. London: SAGE Publications Ltd, pp. 104-119.
- Samsura, D., van der Krabben, E. and Van Deemen, A. M. A. (2010). 'A game theory approach to the analysis of land and property development processes', *Land Use Policy*, 27(2), pp. 564-578.
- Sarbin, T. R. (1986). *Narrative psychology: The storied nature of human conduct*. Westport, CT, US: Praeger Publishers/Greenwood Publishing Group.
- Saunders, M. L. P. and Thornhill, A. (2003). *Research methods for business students*, 3<sup>rd</sup> edn. Essex: Harlow, Financial Times Prentice Hall, Pearson Education.
- Saunders, M., Lewis, P. and Thornhill, A. (2009). *Research Methods for Business Students*. 5<sup>th</sup> edn. Essex: Pearson Education Limited.
- Saunders, M., Lewis, P. and Thornhill, A. (2012). *Research methods for business students*. 6<sup>th</sup> edn. Essex: Harlow, Financial Times Prentice Hall, Pearson Education.
- Schmookler, J. (1966). *Invention and economic growth*. Cambridge: Harvard University Press.
- Schon, D. A. (1963). 'Champions for radical new inventions', *Harvard business review*, 41(2), pp. 77-86.
- Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. (Vol. 55). Cambridge: Transaction Publishers.

- Schumpeter, J. A. (1939). *Business cycles (Vol. 1, pp. 161-74)*. New York: McGraw-Hill.
- Schumpeter, J. A. (1947). 'The creative response in economic history', *The journal of economic history*, 7(02), pp. 149-159.
- Schutz, A. (1967). *The Phenomenology of the Social World* (translated by G. Walsh and F. Lehnert) Evanston: Northwestern University Press
- Seaden, G., Guolla, M., Doutriaux, J. and Nash, J. (2003). 'Strategic decisions and innovation in construction firms', *Construction Management and Economics*, 21, pp. 603–12.
- Seligman, L. (2006). 'Sensemaking throughout adoption and the innovation-decision process', *European Journal of Innovation Management*, 9(1), pp. 108-120.
- Sexton, M. G. and Lu, S. L. (2012). 'Construction Innovation: Theory and Practice', *Construction Innovation and Process Improvement*, 45.
- Sexton, M., and Barrett, P. (2003). 'A literature synthesis of innovation in small construction firms: insights, ambiguities and questions', *Construction Management and Economics*, 21(6), pp. 613-622.
- Sexton, M. and Barrett, P. (2003). 'Appropriate innovation in small construction firms', *Construction management and economics*, 21(6), 623-633.
- Sexton, M., Abbott, C. and Lu, S. (2008). 'Challenging the illusion of the all powerful clients' role in driving innovation' in Brandon, P. S., and Lu, S. L. (eds.) *Clients driving innovation*. Chichester, West Sussex, UK: Wiley-Blackwell, pp. 43- 48.
- Seymour, D. and Rooke, J. (1995). 'The culture of the industry and the culture of research', *Construction Management and Economics*, 13(6), pp. 511-523.
- Shenhav, S. R. (2006). 'Political narratives and political reality', *International Political Science Review*, 27(3), pp. 245-262.
- Shotter, J. (1993). *Conversational Realities*. London: Sage Publications

- Skeggs, B. (2001). 'Feminist Ethnography', in Atkinson, P., Coffey, A., Delamont, S., Lofland, J. and Lofland, L. (eds.) *Handbook of Ethnography*. London: Sage, pp. 426-442
- Silverman, D. (1993). *Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction*. London: Sage.
- Silverman, D. and Marvasti, A. (2008). *Doing qualitative research: A comprehensive guide*. California: Sage.
- Slappendel, C. (1996). 'Perspectives on innovation in organizations', *Organization Studies*, 17(1), pp. 107-129.
- Slaughter, E. S. (1998). 'Models of construction innovation', *Journal of Construction Engineering and management*, 124(3), pp. 226-231.
- Slaughter, S. (1993). 'Innovation and learning during implementation: a comparison of user and manufacturer innovations', *Research Policy*, 22(1), pp. 81-95.
- Slaughter, E. S. (1993). 'Builders as sources of construction innovation'. *Journal of Construction Engineering and Management*, 119(3), 532-549.
- Slaughter, E. S. (2000). 'Implementation of construction innovations', *Building Research & Information*, 28(1), 2-17.
- Smith, F. L. and Keyton, J. (2001). 'Organizational storytelling metaphors for relational power and identity struggles', *Management Communication Quarterly*, 15(2), pp. 149-182.
- Squire, C. (2008). 'Experience-centred and culturally-oriented approaches to narrative', *Doing narrative research*, 1, pp. 41-63.
- Starbuck, W. H. and Milliken, F. J. (1988). Executives' perceptual filters: What they notice and how they make sense. The executive effect: Concepts and methods for studying top managers, pp. 35- 65.
- Starkey, K. and Crane, A. (2003). Toward green narrative: Management and the evolutionary epic. *Academy of Management Review*, 28(2), 220-237. State University of New York Press.
- Stewart, I. C. (2011). Profession and Innovation in the Experience of Historical and Contemporary Commercial Managers. PhD. The University of Manchester.

- Stewart, I. C. and Fenn, P. (2006). 'Strategy: the motivation for innovation', *Construction Innovation: Information, Process, Management*, 6(3), 173-185.
- Suppe, F. (1977). *The structure of scientific theories*. 2<sup>nd</sup> edn. University of Illinois Press.
- Swan, J., Newell, S., Scarbrough, H. and Hislop, D. (1999). 'Knowledge management and innovation: networks and networking', *Journal of Knowledge management*, 3(4), pp. 262-275.
- Swan, W., Cooper, R., McDermott, P. and Wood, G. (2001). 'A review of social network analysis for the IMI trust in construction project', *Proceedings of the 17<sup>th</sup> ARCOM Conference*. Salford University, UK. 5<sup>th</sup>–7<sup>th</sup> September 200. pp. 59-67
- Sweezy, P. M. (1943). 'Professor Schumpeter's theory of innovation', *The review of economic statistics*, pp. 93-96.
- Talmy, S. (2011). 'The interview as collaborative achievement: Interaction, identity, and ideology in a speech event', *Applied linguistics*, 32(1), pp. 25-42.
- Tatum, C. B. (1984). 'What prompts construction innovation?', *Journal of Construction Engineering and Management*, 110(3), pp. 311-323.
- Tatum, C. B. (1987). 'Process of innovation in construction firm'. *Journal of Construction Engineering and Management*, 113(4), pp. 648-663.
- Tatum, C. B. (1989). 'Organizing to increase innovation in construction firms', *Journal of Construction Engineering and Management*, 115(4), pp. 602-617.
- Tatum, C. B. (1986). Potential mechanisms for construction innovation. *Journal of Construction Engineering and Management*, 112(2), pp. 178-191.
- Taylor, C. (1985). *Human agency and language*. Cambridge: Cambridge University Press.
- Taylor, M. (2010). The impact of sensemaking on knowledge transfer: a qualitative analysis of junior doctors' clinical handover. PhD. University of Southampton.

- Taylor, S. S., Fisher, D. and Dufresne, R. L. (2002). 'The Aesthetics of Management Storytelling: A Key to Organizational Learning', *Management Learning*, 33 (3), pp. 313-330.
- Thiry, M. (2001). 'Sensemaking in value management practice', *International Journal of Project Management*, 19(2), pp. 71-77.
- Thomas, D. R. (2006). 'A general inductive approach for analyzing qualitative evaluation data', *American journal of evaluation*, 27(2), pp. 237-246.
- Thomas, S. R., Lee, S. H., Spencer, J. D., Tucker, R. L. and Chapman, R. E. (2004). 'Impacts of design/information technology on project outcomes', *Journal of Construction Engineering and Management*, 130(4), pp. 586-97.
- Thomas, A. B. (2004). *Research Skills for Management Studies*, London: Routledge, Taylor & Francis.
- Thomson, C. S. A (2006). Study Of The Innovation Process Within The Construction Project Environment. PhD. University of Dundee.
- Thompson, I., Cox, A. and Anderson, L. (1998). 'Contracting strategies for the project environment', *European Journal of Purchasing and Supply Management*, 4, pp. 31-41.
- Thorpe, D., Ryan, N. and Charles, M. B. (2009). 'Innovation and small residential builders: an Australian study', *Construction Innovation: Information, Process, Management*, 9(2), pp. 184-200.
- Tidd, J. (2006). *A review of innovation models*. London: Imperial Collage London.
- Tidd, J., Bessant, J. and Pavitt, K. (1997). *Managing Innovation: Integrating Technological, Market and Organizational Change*. Chichester: Wiley.
- Tidd J., Bessant J. and Pavit K. (2003). *Managing Innovation- Integrating technology, market and organisational change*. 2<sup>nd</sup> edn. Chichester: John Wiley & Son.
- Toole, T. M. (2001). 'Technological trajectories of construction innovation' *Journal of Architectural Engineering*, 7(4), pp. 107-114.



- Toole T. M. , Hallowell, M. and Chinowsky, P. (2013). 'A tool for enhancing innovation in construction organizations', *Engineering Project Organization Journal*, 3:1, pp. 32-50.
- Toole, T. M. (1998). 'Uncertainty and homebuilders' adoption of technological innovations', *Journal of Construction Engineering and Management*, 124(4), pp. 323-32.
- Tsoukas, H. and Hatch, M. J. (2001). 'Complex thinking, complex practice: The case for a narrative approach to organizational complexity', *Human Relations*, 54(8), pp. 979-1013.
- Utterback, J. M. (1974). 'Innovation in industry and the diffusion of technology' *Science*, 183(4125), pp. 620-626.
- UK Cabinet Office (2011). *Government Construction Strategy*.
- Vaara, E. (2002). 'On the discursive construction of success/failure in narratives of post-merger integration', *Organization studies*, 23(2), pp. 211-248.
- Van de Ven, A. H. and Poole, M. S. (1990). 'Methods for studying innovation development in the Minnesota Innovation Research Program', *Organization science*, 1(3), pp. 313-335.
- Van de Ven, A. H., Polley, D. E., Garud, R. and Venkataraman, S. (1999). *The Innovation Journey*. New York: Oxford University Press.
- Veenswijk, M. and Berendse, M. (2008). 'Constructing new working practices through project narratives', *International Journal of Project Organisation and Management*, 1(1), pp. 65-85.
- Veshosky, D. (1998). 'Managing innovation information in engineering and construction firms', *Journal of Management in Engineering*, 14(1), pp. 58-66.
- Von Hippel, E. (1998). *The sources of innovation*. Oxford: Oxford University Press.
- Watson, T. J. (1995). 'Rhetoric, discourse and argument in organizational sense making: a reflexive tale', *Organization Studies*, 16(5), pp. 805-821.
- Watzlawick, P. (1984). *The Invented Reality: How Do We Know What We Believe We Know?*, London: Norton & Company.

- Webb, C. (1999). 'Analysing qualitative data: computerized and other approaches', *Journal of advanced nursing*, 29(2), pp. 323-330.
- Weedon, C. (2004). *Identity And Culture: Narratives Of Difference And Belonging: Narratives of Difference and Belonging*. New York: McGraw-Hill International.
- Weick, K. E. (1979). *The social psychology of organizing (Topics in social psychology series)*.
- Weick, K. E. (1995). *Sensemaking in organizations*. (Vol. 3). London: Sage.
- Weick, K. E., Sutcliffe, K. M. and Obstfeld, D. (2005). 'Organizing and the process of sensemaking', *Organization science*, 16(4), pp. 409-421.
- Weick, K. E. (1993). 'The collapse of sensemaking in organizations: The Mann Gulch disaster', *Administrative science quarterly*, pp. 628-652.
- Welling, D. T. and Kamann, D. J. F. (2001). 'Vertical cooperation in the construction industry: size does matter', *Journal of Supply Chain Management*, 37(4), pp. 28-33.
- West, M. A. and Anderson, N. R. (1996). 'Innovation in top management teams', *Journal of Applied Psychology*, 81 (6), pp. 680-693.
- West, M. A. (1990). *Innovation and creativity at work: Psychological and organizational strategies*. Chichester: Wiley.
- White, H. (1987). *The Content of the Form: Narrative Discourse and Historical Representation*. Baltimore, MD: The John Hopkins University Press.
- Willig, C. (2001). *Qualitative research in psychology: A practical guide to theory and method*. Buckingham: Open University Press
- Willig, C. and Stainton-Rogers, W. (eds.) (2007). *Handbook of qualitative research in psychology*. London: Sage.
- Wilkins, A. L. (1983). 'Organizational stories as symbols which control the organization', *Organizational symbolism*, pp. 81-92.

- Winch, G. M. (2003). 'How innovative is construction? Comparing aggregated data on construction innovation and other sectors—a case of apples and pears', *Construction Management and Economics*, 21(6), pp. 651-654.
- Winch, G. M. (2000). 'Institutional reform in British construction: partnering and private finance', *Building Research & Information*, 28(2), pp. 141-155.
- Winch, G. M. (1998). 'Zephyrs of creative destruction: understanding the management of innovation in construction', *Building Research and Information*, 26(5), pp. 268-279.
- Witten, M. (1993). 'Narrative and the culture of obedience at the workplace', in Mumby, D.K. (ed.), *Narrative and Social Control: Critical Perspectives*. Newbury Park, CA: Sage, pp. 97-118.
- Wolstenholme, A. (2009) *Never Waist a Good Crisis. A Review of Progress since Rethinking Construction and Thoughts for Our Future*. London: Constructing Excellence.
- Woudhuysen, J. and Abley, I. (2004). *Why is construction so backward?*. Chichester: Wiley Academy.
- Wolfe, R. A. (1994). 'Organizational innovation: Review, critique and suggested research directions', *Journal of management studies*, 31(3), pp. 405-431.
- Wright, C. R., Manning, M. R., Farmer, B. and Gilbreath, B. (2000) 'Resourceful sensemaking in product development teams', *Organization Studies*, 21, pp. 807-25.
- Yin, R. K. (2009). *Case Study Research: design and methods*. 4<sup>th</sup> edn. California: Sage.
- Zachry, M. (1999). 'Management discourse and popular narratives: The myriad plots of total quality management', *Narrative and professional communication*, pp. 107-120.
- Zaltman, G., Duncan, R. and Holbek, J. (1973). *Innovations and organizations*. New York: Wiley.
- Zawdie, G. (2012). 'Construction Innovation through Change Management', in Akintoye, A, Goulding, J. and Girma, Z. (eds.) *Construction Innovation and Process Improvement*. Oxford: John Wiley & Sons.

## **Appendix A**

### **Initial email for interviewees**

Dear Sir/Madam,

I am a doctoral candidate in Management of Projects at University of Manchester. The topic that I am researching is the management of innovation in the construction industry. In brief, this study is examining motivation and drivers for innovation in the construction industry. In addition, this study is trying to understand how innovation as a part of strategic thinking of an organisation in pursuit of competitive advantage could motivate participants involved in construction projects to innovate.

You have been identified as an expert who has a direct role in construction projects and invited to participate in this study. You will be asked to do a recorded individual interview, face to face or via telephone or Skype. A set of questions regarding the research topic will be asked. The interview will take around an hour.

Participation is voluntary and if you are interested in taking part please email me at [ayda.abadi@postgrad.manchester.ac.uk](mailto:ayda.abadi@postgrad.manchester.ac.uk) and I will send you further information regarding the research. I hope that you volunteer to participate in this study. Should you participate, please be assured that you may withdraw from this study at any time. Please note that replying to this email does not automatically entail your participation.

Kind Regards,

Ayda Abadi  
PhD Student  
Management of Projects  
School of Mechanical, Aerospace and Civil Engineering  
University of Manchester

Supervisor: Dr. Peter Fenn

## Appendix B

### Incentives to Stimulate Innovation in Construction Industry

#### Participant Information Sheet

You are being invited to take part in a research study [as part of a student project – Innovation Management in Construction Industry for a PhD degree]. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Please ask if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

#### **Who will conduct the research?**

Ayda Abadi

The University of Manchester

Oxford Road

Manchester, M13 9PL

#### **Title of the Research**

Incentives to Stimulate Innovation in Construction Industry (working title)

#### **What is the aim of the research?**

The overall aim of the research is to investigate the resistance to innovation in Construction Industry

**Why have I been chosen?**

The participants in this research are the practitioners having at least five years working experience within construction industry in the UK.

**What would I be asked to do if I took part?**

You would be invited to do 30mintues/an hour interview (the duration of the interview depends on the willingness of you to share the information). In the interview, you would be asked your views, opinion and experiences about my research area. Some structured questions have been designed. However, the questions would depend on the flow of the conversation and your answers on the subject area. The followings are the type of questions you would be asked:

In your view, what do you understand about innovation?

Is innovation part of strategic thinking of your organisation?

How innovation is practiced in your organisation?

What record do you keep for innovation?

Do you have any stories about innovation within your projects?

Where do the new ideas normally come from? (how do you capture and manage/track) improvement ideas in your organisation?

How is the innovation encouraged in construction sector?

**What happens to the data collected?**

Data will be anonymised by removing any identifying information from all collected data. Personal data will only appear on consent forms and these will be printed and stored in locked university file and destroyed via shredding after 10 years. Once they have been printed out, electronic consent forms will be destroyed.

**How is confidentiality maintained?**

The interview will be recorded by an audio recorder and will be saved in the university computer and laptop computer. Interviews will be transcribed but any identifying information such as names and locations will be removed. Transcripts will be stored using password protected files. Data will be encrypted in accordance with the university Encryption Passphrase Policy Guidance.

**What happens if I do not want to take part or if I change my mind?**

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time without giving a reason and without detriment to yourself.

**Will I be paid for participating in the research?**

No.

**What is the duration of the research?**

Unstructured and open-ended questions. Approximately 6 questions. The duration of the interview depends on the answers and discussion.

**Will the outcomes of the research be published?**

The collected data will be published in the final thesis of PhD, journal publications and conference papers.

**Criminal Records Check (if applicable)**

N/A

**Contact for further information**

Email address: [ayda.abadi@postgrad.manchester.ac.uk](mailto:ayda.abadi@postgrad.manchester.ac.uk)

**What if something goes wrong?**

If you would like to make a formal complaint about the conduct of the research you should contact the Head of the Research Office, Christie Building, University of Manchester, Oxford Road, Manchester, M13 9PL.



## Appendix C

## CONSENT FORM

If you are happy to participate please complete and sign the consent form below

Please  
Initial  
the  
Boxes

1. I confirm that I have read the attached information sheet on the above project and have had the opportunity to consider the information and ask questions and had these answered satisfactorily

2. I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving a reason

3. I understand that the interviews will be audio-recorded

4. I agree to the use of anonymous quotes

5. I agree that any data collected may be passed to other researchers

I agree to take part in the above project:

Email address of participant: -----

Name of participant: ----- Signed: ----- Date: -----

Name of the researcher: ----- Signed: ----- Date: -----

This document is sent to you as a draft for your consideration. On the day of the interview the Interviewer will take your consent via a signed form; you will be given a copy to take away with you

## Appendix D

### Ethics Committee Approval Letter

The University  
of Manchester

MANCHESTER  
1824

Secretary to Research Ethics Committees  
Room 2.004 John Owens Building

Tel: 0161 275 2206/2046

Fax: 0161 275 5697

Email: [timothy.stibbs@manchester.ac.uk](mailto:timothy.stibbs@manchester.ac.uk)

ref: ethics/12059

Compliance and Risk Office  
University of Manchester  
Oxford Road  
Manchester, M13 9PL

Miss Ayda Abadi,  
PhD student  
c/o Dr Peter Fenn,  
Pariser Building B13

13<sup>th</sup> July 2012

Dear Ayda,

**Research Ethics Committee 2**

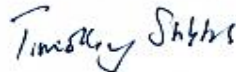
*Abadi, Fenn: Understanding innovation management in construction industry (ref 12059)*

I write to thank you and Peter Fenn for attending the meeting on 28<sup>th</sup> May and to confirm that the amended documents set out in your email of 7<sup>th</sup> June satisfies the concerns of the Committee and that the project has been given a favourable ethical opinion.

This approval is effective for a period of five years and if the project continues beyond that period it must be submitted for review. It is the Committee's practice to warn investigators that they should not depart from the agreed protocol without seeking the approval of the Committee, as any significant deviation could invalidate the insurance arrangements and constitute research misconduct. We also ask that any information sheet should carry a University logo or other indication of where it came from, and that, in accordance with University policy, any data carrying personal identifiers must be encrypted when not held on a university computer or kept as a hard copy in a location which is accessible only to those involved with the research.

Finally, I would be grateful if you could complete and return the attached form at the end of the project or by May 2013.

Yours sincerely



Dr T P C Stibbs  
Secretary to the University Research Ethics Committee

Enclosed: Report form