Planning Intentionality and its Implications for Project Planned Time

A thesis submitted to The University of Manchester for the degree of

Doctor of Philosophy

in the Faculty of Engineering and Physical Sciences

2014

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## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>APA</td>
<td>American Planning Association</td>
</tr>
<tr>
<td>BoK</td>
<td>Body of Knowledge</td>
</tr>
<tr>
<td>BTC</td>
<td>Bromilow’s Time-Cost</td>
</tr>
<tr>
<td>CA</td>
<td>Conversation Analysis</td>
</tr>
<tr>
<td>CMS</td>
<td>Critical Management Studies</td>
</tr>
<tr>
<td>CPM</td>
<td>Critical Path Method</td>
</tr>
<tr>
<td>EV</td>
<td>Earned Value</td>
</tr>
<tr>
<td>HM Treasury</td>
<td>Her Majesty's Treasury</td>
</tr>
<tr>
<td>IEB</td>
<td>Individual Estimation Bias</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>LEGO</td>
<td>Leg Godt</td>
</tr>
<tr>
<td>LOT-R</td>
<td>Life Orientation Test-Revised</td>
</tr>
<tr>
<td>MACE</td>
<td>Mechanical, Aerospace and Civil Engineering</td>
</tr>
<tr>
<td>NTG</td>
<td>Nominal Group Technique</td>
</tr>
<tr>
<td>PERT</td>
<td>Program Evaluation Review Technique</td>
</tr>
<tr>
<td>PM</td>
<td>Project Management</td>
</tr>
<tr>
<td>PMBoK</td>
<td>Project Management Body of Knowledge</td>
</tr>
<tr>
<td>PMI</td>
<td>Project Management Institute</td>
</tr>
<tr>
<td>PMP</td>
<td>Project Management Professional</td>
</tr>
<tr>
<td>PTS</td>
<td>Perceived Team Support</td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>SDS</td>
<td>Social Decision Scheme</td>
</tr>
<tr>
<td>VP</td>
<td>Virtual Prototyping</td>
</tr>
<tr>
<td>WBS</td>
<td>Work Breakdown Structure</td>
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Abstract

Within the construction industry, proximity of actual to scheduled completion time is a primary performance measure, and deviations from planned schedules remain a popular concern in the field of construction management. Prevailing research assumes that delays arise either from flawed execution of the plan or from failure to plan effectively. Thus, solutions suggested include improving execution and developing ever more sophisticated planning techniques. In spite of these efforts, accuracy in scheduling construction projects has shown little or no improvement, and clients continue to incur the significant costs associated with the failure to more accurately plan.

Eschewing this traditional techno-rational view, the current research turned to critical management studies for solutions and investigated planning intentionality, the intentional and unintentional roles planners play in project delays. Thus, it sought to explore the following with respect to the project planner role: optimism bias, where a planner unintentionally mitigates negative information in decision-making; strategic misrepresentation, where a planner intentionally mitigates negative information; and group dynamics in time estimation. The latter is relevant because a team rather than an individual typically embodies the planner function within a construction project.

To perform this research, two mixed-methods studies, preceded by a pilot study, and seven interviews with project planners were conducted. The first mixed-methods study investigated how intended and unintended actions of participants affected underestimation of time during task performance; and the second investigated the creation of collective intentionality, the transmutation of individual preferences into a group consensus in time estimation.

Results of the first mixed-methods study identified the key situational variables differentiating intended and unintended actions of planners and indicated how these can influence the quality of time estimation. Results of the second study showed that group performance in time estimation was inferior to that of individuals and that group member interaction appeared detrimental to good decision-making. Reasons found were sense of power, commitment, confidence level, cultural diversity, conflicts, and groupthink. The findings were compared and contrasted with those obtained from interviews with project planners to enhance the scope of the study.
Declaration

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Acknowledgements

I would like to offer my sincerest thanks to my supervisors, Dr. Margaret Emsley and Dr. Paul Chan for their guidance, support, and assistance throughout the PhD process. Margaret has been my supervisor since my master’s programme in Construction Management in 2008. She has always been lively, enthusiastic, energetic, and extremely supportive. It was her support that gave me the courage to get up when I was down during these years. Paul has also been extremely supportive and receptive during the research, and his valuable suggestions and comments were instrumental for the successful completion of this research. He also significantly enhanced my academic development and the fruitful discussions that we had during the meetings made me dig deeper and ‘think more’ about the research.

I also wish to sincerely thank all the participants of the research for their effort and time to help out with this research; I humbly acknowledge their contribution. I am also indebted to Mark for proofreading the final manuscript and for checking my English.

I would like to thank my friends here in the UK, who made this journey memorable and exciting, especially my colleagues in the Pariser Building; Mostafa, Mohsen, Ayda, Mansoor, Elika, Moheeb, Kamal, Ashkan, Arash, Bachir, Henry, Sergio, William, who all made life cheerful and interesting during these four difficult years. I would also like to thank my best friends Aidin, Amir and Mohammad who were not here with me, but were always in touch through messages and phone calls, and as a result, I never felt alone during the PhD.

I would like to thank my mum and dad for unconditionally providing their love, support, guidance, and encouragement during so many years of university studies. I owe you huge gratitude. Besides them, my brothers and sisters, Farzane, Fariba, Farshad and Fariborz. You guys always encouraged and helped me to lift my morale to stand where I am today. I can hardly express my gratitude in words to thank you.

At the end I would like express special thanks to my wife Neda who has put up with me throughout all this, loving and supporting me, and most of all believing in me. You never doubted that I could do this, even when I doubted myself- you can now say ‘I told you so’! Mere words cannot express my unbounded gratitude to you.
List of publications

A) Submitted journal papers (Under review)

B) Journal paper (Under preparation)

C) Submitted conference papers

D) Poster
Chapter 1: Introduction

1.1 Research background and motivation

Time is “as fundamental a topic as any that exists in human affairs” (Bluedorn and Denhardt, 1988, p. 316), particularly in the highly dynamic and unpredictable environment of construction. Within the construction area, time performance is considered one of the three crucial measures of success (Walker, 1995; Atkinson, 1999) and is an indicator of a project’s efficiency (Nkado, 1995). In fact, one requirement of a project manager’s job is to continuously compete against time (Stalk and Hout, 1990) since “time is costlier now than ever” (Blount and Janicik, 2001, p. 566). For instance, the expected average cost of one day’s delay for the Channel Tunnel project was “about US$1 million” (Flyvbjerg et al., 2004, p. 6). Thus, organisations expend considerable money and effort to accurately predict completion times of construction projects (Buehler et al., 2005).

In spite of these expenditures and the use of various management practices and scheduling techniques adopted to enhance prediction reliability, the data indicate a significantly poor record globally with respect to on-time delivery (see e.g. Ahmed et al., 2003; Eden et al., 2005; Williams et al., 2009) in both megaprojects (Flyvbjerg et al., 2002) and small-scale projects (Odeck, 2004). It is contended that even successful projects (i.e. those for which all contracting parties are deemed financially satisfied) are rarely completed precisely according to the original construction schedule and experience delays in completion (Beattie, 2005).

Generally, researchers within the field of construction management adopt two dominant approaches to deal with the project-delay problem. The first assumes the primacy of the project plan and thus interprets delays as resulting from flawed execution of this plan. Proponents of this approach therefore investigate the causes of poor execution and highlight the effects of construction delays, often developing guidance for practitioners to aid them in identifying possible measures for mitigating against or eliminating delays (see e.g. Chan and Kumaraswamy, 2002; Kazaz et al., 2012). The other approach attempts to improve the accuracy of time estimation through such methods as the critical path method (CPM), the program evaluation review technique (PERT), and Monte Carlo simulation (Bertelsen, 2004) or by building empirical models to predict
construction duration as accurately as possible, e.g. the BTC model (see e.g. Khosrowshahi and Kaka, 1996; Hoffman et al., 2007). Yet, despite the wealth of research in this area and the proposed solutions for reducing project delays, the data show that inaccuracies have “neither increased nor decreased historically” (Flyvbjerg et al., 2007, p.36).

In recent years, the theoretical and methodological limitations inherent in these conventional and techno-rational approaches towards project overruns have been widely discussed by critical management studies (CMS) scholars (see e.g. Cicmil and Hodgson, 2006; Alvesson et al., 2009). In particular, CMS researchers have argued that such linear approaches to explaining efficiency and optimal performance downplay their social and political complexities and so inhibit further research and dissemination of knowledge among practitioners within the construction industry (Clegg and Courpasson, 2004). Following this line of thinking, Flyvbjerg (2005; 2014) contends that project overruns due to technical problems and inadequate data are “old excuses” and so are taken for granted by researchers and practitioners. Instead, he proposes optimism bias and strategic misrepresentation explanations to account for the intentional and unintentional roles of planners in making biased estimations of project outcomes, which generally lead to inaccurate plans (see also Williams et al., 2009; Winch, 2013; Pinto, 2013).

Adhering to the CMS research tradition and building on Flyvbjerg and the work of his colleagues, this thesis highlights the need for research to move beyond the mere enumeration of causes and consequences of delays towards examination of the role planners’ intentionality and actions have in producing biased estimates of project completion times. Accordingly, the concept of “planning intentionality” is introduced to differentiate between intended or unintended actions of planners and the role they play in creating delays. An instance of such a planned action is submission of a deliberately optimistic completion time to a client in order to obtain a contract. However, a planner may unintentionally bias a schedule, due to a tendency to downplay the negative, for instance. Research to date has tended to focus exclusively on explaining either one or the other, and the interplay of both in a given project remains underexplored and requires further explanation. Furthermore, reviewing the literature on project overruns, no study was found to focus exclusively on explaining project delays using aforementioned explanations.
In addition, a review of the literature on project time and time estimation in construction management reveals a tendency to assume that project plans are the product of individual accomplishments rather than of a team. However, planning and forecasting completion time of projects are not tasks performed solely by an individual planner but are, rather, a collective creation of those with a stake in planning (Sanna et al., 2005; Buehler et al., 2005). This neglect is surprising since groups are generally considered to act and behave differently than individuals in many circumstances (see e.g. Cooper and Kagel, 2005; Sutter et al., 2009; Kugler et al., 2012). Therefore, in creating project plans, a question remains as to how individual intentions of planners are aggregated to the collective level. Knowing this could possibly shed light on how a ‘group’ of individual planners can ‘collectively’ misjudge their estimates.

1.2 Research aim and objectives
The aim of this research is to examine the role of planning intentionality in establishing project planned time. In so doing, the research seeks to explore how the intentional and unintentional actions of planners can influence the accuracy of the project schedule. Accordingly, in order to achieve this aim, the following objectives have been established:

i. To critically review the current literature of delays in construction by means of the CMS approach in order to identify the shortcomings and gaps in extant research.

ii. To explore how intentional and unintentional actions of planners play out in producing biased estimations of project time.

iii. To identify the situational factors affecting the interaction taking place between planners and the quality of their estimations.

iv. To examine the effect of group discussion as a method to aggregate individuals’ time estimates and compare the effect of group discussion on quality of these estimates with that of no interaction between members of the planning team.

v. To discover how individual intentions of planners are aggregated to the collective level and what the challenges are here.

1.3 Research questions
The primary questions for this research are:
i. Why has learning from previous poor performance apparently not occurred so that, consequently, no improvement in timely completion of construction projects over time has taken place?

ii. How could intended and unintended actions of planners lead to the creation of delays?

iii. What are the key situational variables differentiating intended and unintended actions of planners and how do they influence the quality of time estimation?

iv. How and to what extent does each individual planner take part in generating the ‘collective’ estimates made by teams?

v. Does participation in face-to-face meetings aid teams in reducing bias in their time estimation?

1.4 Scope of the research

This study’s data collection began in February 2011 and finished in July 2013. It started with an initial pilot experiment with 12 students doing PhDs in Project Management, followed by interviews with those students. Next, Experiment 1 was conducted with 60 university students in October 2012, and experiment 2 was conducted with 90 students in March 2013. Both experiments were followed by semi-structured interviews with the experiment’s subjects. Finally, seven interviews were carried out with project planners to enrich and extend the findings of the experimental studies to what is actually happening in planning practice and real-world settings.

1.5 Structure of the thesis

The thesis is structured in nine chapters and the flow of chapters is organised based on the following research framework (see Figure 1.1).

Chapter 1: Introduction: This chapter presents the research overview, research aims and objectives, research questions, scope of the research, and structure of the thesis.

Chapter 2: Research on project delays in construction: This chapter provides a critical review of the current literature of construction delays by drawing on the insights offered by CMS scholars. It raises questions regarding prevailing ontological and epistemological assumptions over the nature of delays. This chapter concludes with a radically different approach to studying construction delays that goes beyond the typical cause-and-effect studies so as to emphasise the agency of planners in responding to dynamic situations, where they make decisions and behave of their own volition.
Chapter 3: The role of planning intentionality in explaining project delays: This chapter discusses issues neglected in the growing body of literature dedicated to project delays so as to establish a better understanding of the role planners play in inaccurately predicting completion times, whether intended or unintended. It not only calls for more attention to be directed at studying the intentionalities of planners in scheduling projects, and thereby introduces the concept of planning intentionality, but also extends the existing scholarship by focusing on the role of groups in estimating project completion times.

Chapter 4: Research design and methodology: This chapter presents the philosophical issues that underpin this research. It describes in detail the research approach, design, strategy, and data collection methods used to address the research questions along with the rationale for the selection of each choice made for this research. Moreover, this chapter explains the methods used to enhance the validity and reliability of findings.

Chapter 5: Pilot study and review of previous research on time underestimation: This chapter explains how the study’s research questions emerged from reviewing the literature and from the pilot study. Initially, it reviews the research methods adopted by previous studies to investigate time underestimation. Then this chapter presents the details about the data collection procedures and outcomes of the pilot study carried out prior to the main study. It also describes initial findings resulting from the pilot research along with lessons learnt to take forward into the main study.

Chapter 6: Biased estimation of completion times: This chapter investigates the relationship and dynamics between intended and unintended actions through the concept of planning intentionality. It also distinguishes between two possible explanations for forecasting inaccuracy, optimism bias and strategic misrepresentation. To do so, this chapter details the analysis, results, and findings of Experiment 1, which was performed to determine the role of such situational variables as planner knowledge of previous tasks and accuracy-based incentives on intentionality of research participants. Qualitative data collected from interviews with the experiment’s subjects served to amplify and explain Experiment 1’s results.

Chapter 7: Time estimation as a group activity: This chapter investigates the role of groups in producing estimates of completion times and examines how distributional
preferences of group members are aggregated into a single decision. How group discussions affect accuracy of estimates is also examined. The results and findings of this chapter are based on an explanatory mixed-methods study. In addition, by using conversation analysis to analyse interview data, this chapter provides reasons for the low collectivity involved in the joint decisions of groups.

**Chapter 8: Interviews with practitioners:** This chapter presents the results and analysis of in-depth interviews carried out with seven project planners working for different construction companies. The method of content analysis is employed to analyse the qualitative data obtained from interviewees. The associated data analysis, results, and findings which result serve to strengthen and enhance the scope of the findings of the two mixed-methods studies presented in Chapters 6 and 7.

**Chapter 9: Discussion, conclusions and recommendations:** This chapter presents the research findings from the two mixed-methods studies comprising the study and the results of interviews with practitioners within the construction industry. It also summarises, discusses, and evaluates these findings with respect to each other and to the existing literature provided in Chapters 2 and 3. Moreover, this chapter provides the conclusions of the research project along with its theoretical and practical contributions. Finally, it highlights the limitations of this research project and makes recommendations for further research.
Chapter 1 – Introduction to the research problem, aim, objectives, and research questions

Chapter 2 – A critical overview of the current literature of construction delays

Chapter 3 – Understanding the role of planning intentionality in explaining project delays

Chapter 4 – An overview of the mixed-methods research and the methods of data collection and data analysis

Chapter 5 – Conducting pilot study along with reviewing the research methods adopted by previous studies investigating time estimation

Chapter 6 – Analysis of the first mixed-methods research to investigate how planning intentionality plays out

Chapter 7 – Analysis of the second mixed-methods research to investigate the role of groups in producing estimates of time

Chapter 8 – Analysis of the interviews with project planners to strengthen and enhance the scope of findings of mixed-methods studies

Chapter 9 – Summary and discussion of findings along with highlighting the conclusions and contributions of the research

Figure 1.1: Structure of the thesis
Chapter 2: Research on project delays in construction

2.1 Introduction

The construction industry has a long-standing reputation for projects being delayed and exceeding their scheduled times. For a long time, many researchers in the field of construction management have tried to investigate the causes and effects of construction delays. Their primary motivation has been to formulate technical and/or managerial hints and solutions for better managing (and eradicating) such delays in construction projects. In recent years, however, this conventional and dominant approach towards project overruns has come under criticism by Critical Management Studies (CMS) scholars for its theoretical and methodological limitations (see e.g. Cicmil and Hodgson, 2006; Alvesson et al., 2009). Drawing on the insights offered by CMS scholars, this chapter’s main aim is to problematise the theoretical foundations and ideologies of the conventional knowledge and its assumptions about the nature of project delays.

This chapter initially defines the construction project, explores its various characteristics, and gives some understanding about different types of stakeholders involved in the construction project. It then demonstrates that timely completion of construction projects is an important measure of project success. This chapter, however, provides the figures regarding the poor record with respect to the completion of construction projects within the planned period. To understand the reasons behind this poor record, it conducts a review of the current research on project delays in construction to determine the prevailing understanding of this phenomenon and to identify the shortcomings and gaps in the extant research. Then, by borrowing the analytical lens of scholars in CMS, it questions the ontological and epistemological assumptions that underpin contemporary studies on construction project delays in order to raise further questions that will, it is hoped, advance the theoretical and practical understanding of project delays. Finally, this chapter calls for a radically different approach to studying construction delays, one that goes beyond the more typical cause-and-effect studies to emphasise the agency of planners in responding to dynamic situations, where they make decisions and behave of their own volition. This will likely shed light on how and why project time plans are unrealistic.
2.2 Characteristics of the construction industry

The Project Management Institute (2008) defines a project as a temporary endeavour undertaken to create a unique product, service, or result. The temporary nature of projects indicates that every project has a definite beginning and a definite end. The end is reached when the project’s objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. The unique features of a project mean that the project is different in some distinguishing way from all similar projects. The same definition could be applied to a construction project where the desired outcome represents the building, road or any other constructed structure. A construction project involves a diverse range of professionals and numerous parties involved in various processes, different phases and stages of work with the principal aim of creating new value needed by society, for example building schools for education services or factories for manufacturing goods. What makes construction projects special is the fact that they are often unique projects where different organisations deliver their contractually agreed services to reach the project goal: the finished product (Dubois and Gadde, 2002).

The construction industry is that part of the economy that deals with the design, construction, utilisation, and maintenance as well as with the modulation, modification and demolition or deconstruction of constructs. It is a large and complex industry comprising many types and sizes of organisations and a great deal of input from both the public and private sectors. Winch (2002) notes that in a typical modern society, around half of all physical asset creation is the responsibility of the construction industry. It generates around 10% of national wealth (gross domestic product) and contributes approximately 30-40 % to global energy consumption as well as 20-30 % to greenhouse gas emissions.

There are countless reasons why the use of construction projects is increasing day after day: firstly, the economic, social and cultural growth of any nation depends on its construction projects, such as schools, hospitals, factories, and power projects. It is in fact through the construction projects that modern societies create new value and physical assets. In addition, the construction industry employs a large number of people directly and indirectly and, as a result, has a huge impact on the economy of a particular country or region during the actual construction process. For example, in the UK around 1.9 million employees, of which 0.7 million are self-employed, work in the construction
sector, making it the country’s biggest industry (Cooke and Williams, 2013). The construction industry also has significant interaction with other sectors such as agriculture, ICT, public health and safety, manufacturing, and so on.

It should be noted, however, that the characteristics of a construction project are different from the management of other projects such as IT projects and engineering projects. The differences mainly stem from the nature and characteristics of construction projects and understanding them is important for the successful management of construction projects. According to Bennett (2003), construction projects in general are:

- Usually capital intensive, complex; and require significant management skills, involvement and coordination of a wide range of experts in various fields;
- Involved with relatively intensive labour use, and consume a large amount of materials and resources;
- Usually undertaken outside; hence, they are susceptible to many external variables such as weather conditions and various urban activities;
- Concerned with environmental and energy issues as well as the geographical conditions of the project site;
- Subject to a variety of laws and regulations that aim to ensure public safety and minimise environmental impacts.

In addition, as Abowtiz and Toole (2009) pointed out, construction projects are a by-product of a social process involving many stakeholders. Freeman (1984) defines stakeholders as “any group or individual who can affect or is affected by the achievement of the organisation’s objectives”. The specific structure and group of stakeholders varies from company to company as well as from industry to industry. Some of them are more central to the project and have more levels of responsibility and authority, and some only emerge in certain phases. Although the stakeholders share the common object (e.g. building project) in exchange for monetary or social value, their interests are diversified and sometimes also contradictory. Even, as Pinto and Slevin (1989) argue, project stakeholders perceive project success or failure differently based on their expectations. Therefore, in the next section the main issues affecting project success from stakeholders’ point of view will be discussed.
2.3 Project success

Construction projects have been managed for a long time. A significant example of this type of project is the construction of Rhuddlan Castle, which was carried out over 700 years ago by Master James of St. George. He managed this project with 3,000 men in less than three years (Walker, 1995). However, in recent decades, it has become so challenging for many companies to gain satisfactory advantages from the projects due to the complex, high-growth and fast-changing business environment (Williams et al., 2009). It is even reported that profit margins in the construction industry shrunk from 20% to 3%, forcing project owners and contractors to take on more jobs to make the same annual income (Hutchings, 2004). As a result, delivering successful projects became a fundamental issue to most governments, project owners and contractors, and to communities.

Williams et al. (2009) point out that asking the archetypical man in the street about projects, it is clear that the reputation of projects and project management is that they are generally unsuccessful. In the public view, a failure occurs if a project does not finish on time and on budget. The term “white elephant”, which is used continuously by the media, refers to this issue that the public’s mind is associated with these failures. Fenn (2008) argues that the construction industry, more than any other industry, is known for the often poor quality of its products and projects, which are over budget and beyond the original time constraints (see also Williams et al., 2009). This has led many researchers to start to identify the causes of poor performance and project failures in order to avoid them and consequently improve the success rate of construction projects.

Project success has been widely discussed in the project management literature. Traditionally, success is defined as the degree to which project goals and expectations are met (Chan et al. 2002). Tuman (1986) defines project success as correct anticipation of all project requirements and having sufficient resources to meet the client’s needs in a timely manner. Lam et al. (2008) reported that it is difficult to assess whether the performance of a project is a success or a failure because stakeholders sometimes have conflicting vested interests and hence different perceptions of success for that particular project. Due to this difficulty in identifying project success, there have been many attempts over the years to determine factors that lead to project success. For example, Pinto and Slevin (1987) identified fourteen critical success factors across a wide range of companies and project types including top management support, project mission,
client consultation, project schedules, technical tasks, personnel recruitment, client acceptance, monitoring and feedback, characteristics of the project team leader, communication and trouble-shooting, power and politics, environmental effects and urgency.

Other studies similarly grouped the critical success factors in their particular region or country (see e.g. Chua et al., 1999; Cooke-Davies, 2002). Although there was lack of consensus on these factors from one study to another (Jha and Iyer, 2007), the conventional measures of time, cost, and quality have been reported as the most frequent criteria of project success (PMI, 2008). These are known as triple constraints, and form a triangle between cost, schedule and scope (see Figure 2.1). According to the triple constraints model, the projects which are late, costly, and/or not completed according to the agreed specifications, and therefore do not meet some or all of these triple constraints, are most likely to fail (Anbari et al., 2008).

The focus of this thesis is specifically on project time, as it has received less research attention in the field of project management and organisational studies than the other two success criteria; cost and quality (see e.g. Lee and Liebenau, 1999). This issue is surprising since construction companies are generally more concerned about time planning than resource allocation and its cash-flow implications at the start of projects (Laufer and Tucker, 1987), the reason being that, out of the three primary parameters of project performance, ‘time’ may be most subject to the influence of project management (Sidwell, 1984).

Figure 2.1: Triple Constraints Model (PMI, 2008).
2.4 The importance of project time in construction

*Project time* refers to the time duration needed to complete a project. It is scheduled to enable the construction project to be delivered by a specific date stipulated in contract (Hatush and Skitmore, 1997). Over the past three decades, in response to the challenge brought by the globalisation of the world economy, one of the main achievements in the management of construction projects is completion of the project within the prescribed time (Xiao and Proverbs, 2002). This issue is even more pronounced in today's fast-paced construction environment, where the main owners’ desire is often to be the “first in the market” (Kog et al., 1999, p. 351).

Furthermore, project time often serves as a crucial benchmark for assessing the performance of projects (e.g. Chan and Kumaraswamy, 2002), an indicator of efficiency (e.g. Nkado, 1995; Assaf and Al-Hejjii, 2006), and a criterion for project success (e.g., Stoy et al., 2007; Anbari et al., 2008). The Latham Report (cited in Othman et al., 2006) generates the same message, i.e. that “ensuring timely delivery of projects is one of the important needs of clients of the construction industry” (p. 482). Likewise, the UK national databases of construction projects (e.g. Glenigan and Constructing Excellence, 2012) on Key Performance Indicators (KPIs) have identified *construction time* and *time predictability* as two main parameters for benchmarking the performance of construction projects. Due to the overriding importance of the timely delivery of projects, much money and considerable effort has been spent over the years to develop accurate time predictions for projects (Buehler et al., 2005). However, despite adopting various management practices and improving scheduling techniques to enhance the reliability of predictions, the data indicate a significantly poor record with respect to the completion of projects within the planned period (see e.g. Ahmed et al., 2003; Eden et al., 2005; Sambasivan and Soon, 2007; Williams et al., 2009). Moreover, this tendency appears to be common to both First and Third World countries (Flyvbjerg et al., 2002). It is contended that, even with respect to successful projects, in terms of all contracting parties walking away financially satisfied, are rarely completed precisely according to the original construction schedule (Beattie, 2005). Often accompanied by economic, social, and personal costs (Buehler et al., 1994), this underestimation and/or overestimation of project time would result in misinformation regarding expected financial outcomes being communicated to stakeholders and could lead to disruption.
(project cancellation before completion) or delay (lateness in delivering a project on time) (Tesch et al., 2007).

2.5 Delays in construction projects

In terms of definition, ‘delay’ is a time overrun beyond the date that parties have agreed upon for the delivery of the project (O’Brien, 1976). Delay has been thought to be commonplace in construction projects (Frimpong and Oluwoye, 2003; Toor and Ogunlana, 2008; Doloi et al., 2012) and is known as one of the most recurring problems in construction industry (Mahamid, 2013). There are countless examples of famous projects from around the world that were not completed within the originally planned time, e.g. the Scottish Parliament finished more than three years late (Williams et al., 2009); the Sydney Opera House experienced a ten-year delay (Anter et al., 2009); Boston's Big Dig had a delay of nine years; Denver's $5 billion International Airport was finished two years late; the London Millennium Bridge, which failed to perform and was closed immediately upon opening (Ojiako et al., 2008); and the Great Belt rail tunnel in Denmark, delivered approximately five years later than planned (Flyvbjerg, 2007).

The list of examples of projects with time overruns is seemingly endless and is not limited only to megaprojects. Majid and McCaffer (1998) argue that delays have occurred in most types of projects, from simple building projects to infrastructure such as stadiums and dams (see also Flyvbjerg et al., 2009). In addition, the Glenigan Report (2012) revealed that the time predictability of private housing projects in the UK in terms of design and construction was “poor” and similar to that in larger projects. In point of fact, Odeck (2004) demonstrated that overruns appeared to be more predominant among smaller projects than larger ones.

In fact, a glance at the content of recent public reports (e.g. National Audit Office, 2006; Standish Group, 2009; Glenigan report, 2012) and those mentioned in previous studies (see e.g. Morris and Hugh, 1987; Flyvbjerg et al., 2002; Williams et al., 2003; Khamooshi and Cioffi, 2013) confirms the inability of projects to meet their deadlines. It seems that this time overrun has become the norm rather than the exception (Barker and Cole, 2012) and can now be considered part of the reality of contemporary construction projects (Cicmil and Hodgson, 2006). Table 2.1 provides a dismal list of a few examples of schedule overruns adapted from construction reports and studies.
Table 2.1: List of schedule overruns based on construction reports and studies.

<table>
<thead>
<tr>
<th>Reports / Studies</th>
<th>Schedule Overruns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenigan Report (2012)</td>
<td>In the worst performance within 12 years, only 34% of construction projects came in on time or better in the UK construction industry in 2012.</td>
</tr>
<tr>
<td>The Standish Group CHAOS Report (2009)</td>
<td>44% of the projects suffered delay and 24% were cancelled before they could be completed.</td>
</tr>
<tr>
<td>Flyvbjerg (2009)</td>
<td>Out of 258 projects across 20 nations and 5 continents, 9 out of 10 projects had overruns in cost and time.</td>
</tr>
<tr>
<td>Assaf and Al-Hejji (2006)</td>
<td>70% of the construction projects in Saudi Arabia endure delay.</td>
</tr>
<tr>
<td>Tukel and Rom (1998)</td>
<td>Based on interviews with 91 project managers, 56% indicated that deadlines were often exceeded or missed.</td>
</tr>
<tr>
<td>Lientz and Rea (2001)</td>
<td>Half of all system and technology implementation projects overrun their budgets and schedules by 200% or more.</td>
</tr>
<tr>
<td>Odeyinka and Yusif (1997)</td>
<td>Seven out of ten projects surveyed suffered time overruns in Nigeria.</td>
</tr>
<tr>
<td>Morris and Hugh (1987)</td>
<td>Based on the records of more than 4000 construction projects, they discovered that projects were rarely finished on time or within the allocated budget.</td>
</tr>
</tbody>
</table>

Source: Field work

2.6 Review of contemporary research on delays in construction

Due to its severity and frequency, delay in construction projects has always been a topic of concern for construction management scholars. The earliest studies in this area attempted to identify the causes of delays and their consequences within the construction industries of their particular countries. Baldwin et al. (1971), for example, recognised 17 factors that led to delays in construction projects in the USA and identified the three major causes of project delays as inclement weather, labour supply, and sub-contractors. Another study carried out by Sullivan and Harris (1986) examined the problems causing construction delays in the UK from the viewpoint of civil contractors, consultants, and clients. Based on their findings, contractors and consultants regarded waiting for information from clients as the most significant cause of delays, while clients considered ground problems as the most important cause of delay. Drawing on these early studies, other authors built on this literature by extracting the causes of delays in their respective countries to help guide practitioners in identifying possible measures for mitigating against (or even eliminating) construction project delays (see e.g. Chan and Kumaraswamy, 1997, in Hong Kong; Aibinu and Jagboro, 2002, in Nigeria; Ahmed et al., 2003, in the USA; Assaf and Al-Hejji, 2006, in Saudi Arabia; Stoy et al., 2007, in Germany; Toor and Ogunlana, 2008, in Thailand; Doloi et al., 2012, in India). Furthermore, the data for these studies were collected through typical methods, including questionnaire survey responses from construction professionals (see e.g. Koushki et al., 2005; Ayudhya, 2011) and interviews with
practitioners (see e.g. Asnaashari et al., 2009; Venkatesh et al., 2012). Others have reproduced the causes of delays in construction through reviews of the literature (see e.g. Majid and McCaffer, 1998; Ramanathan et al., 2012).

This thesis has reviewed 60 studies which encompass 31 countries and which employed the approach described above (see Appendix A for the full list). Based on review, three fundamental approaches of these studies on project delays in construction have been identified:

- The researchers were often interested in demonstrating how devastating the problem of delay was in their country through highlighting the figures of project failures and their consequences;
- The researchers tried to investigate the causes of construction delays by compiling a list of ‘delay causes’ and ranking them by determining their occurrences and impacts; and
- The researchers were motivated to provide hints and potential solutions for better managing (and eradicating) delays in construction projects.

Each of the steps described above will be elaborated on in order to portray the conventional understandings shared by most researchers concerning construction delays.

2.6.1 Consequences of delays in construction projects

Generally, delay is known as a negative phenomenon which often has knock-on effects on a project as a whole (Scott, 1993) or even on the overall economy of a country (Arditi et al., 1985). In a study carried out by Flyvbjerg (2007), the effect of the longer implementation of a project on cost escalation is measured in constant prices by 4.64% per year of delay incurred after the time of decision to build. For example, for a project in the size range of the Channel Tunnel, whose cost at completion was $8 billion, the expected average cost of delay could be estimated at approximately US$350 million per year, or about US$1 million per day. In such a situation, the income from a project cannot cover costs, and the interest, and interest on that interest, keeps accumulating – resulting in the so-called ‘interest trap.’ This has happened, for instance, in the case of the Channel Tunnel and the Danish Great Belt rail link (Flyvbjerg, 2007).
Ahmed et al. (2003) identify delay as the most common and complex phenomenon in construction, and it is typified by cost and time overruns (see also Xiao and Proverbs, 2002; Abdul-Rahman et al., 2006; Stoy et al., 2007; Alaghbari et al., 2007). In addition, missing deadlines in construction projects may have extensive negative consequences for all stakeholders, leading to client dissatisfaction through their loss of revenue (Ward, 2005); damage to the image and reputation of the contractor as a result of not finishing on time and/or on budget (Toor and Ogunlana, 2008); and ill effects to the psychological well-being of employees because of frustration associated with failure of goal attainment (Gevers et al., 2009). As Ahmed et al. (2003) note, delay can also debilitate the relationship between parties involved in a project, possibly resulting in lengthy court battles have relatively large financial ramifications and/or causing general feelings of apprehension towards each other. Furthermore, construction delays, especially in large projects, can undermine public trust and confidence in both the industry and government. Ellis and Thomas (2002) captured this issue, and declared that:

“A significant annoyance to the public occurs when construction projects are not completed in a timely manner and when the actual progress of the construction work is longer than necessary, thereby prolonging the inconvenience and disrupted business access. Economic and social welfare and safety are all related to timely completions” (p. 1).

2.6.2 Determining the main causes of delay

Of particular concern in studies of project delay is assessing the relative importance of individual factors to a range of practitioners including clients, contractors, and design consultants (see e.g. Assaf et al., 1995; Chan and Kumaraswamy, 1997; Mezher and Tawil, 1998; Odeh and Battaineh, 2002; Assaf and Al-Hejji, 2006) and their perceived severity of delay outcomes (see e.g. Mansfield et al., 1994; Mahamid, 2013).

From the clients’ perspective, the source of delays is often attributed to deficiencies in the contractors’ organisational capabilities (Sambasivan and Soon, 2007; Razaki et al., 2009), bad planning and scheduling (Arditi et al., 1985; Haseeb et al., 2011; Shebob et al., 2012), and poor monitoring and control of staff (Kumaraswamy and Chan, 1998; Odeh and Battaineh, 2002).

On the other hand, contractors tended to lay the blame on clients by identifying as the main causes for project delays frequent change orders (Koushki et al., 2005; Le-Hoai et
al., 2008; Hwang et al., 2013), financial difficulties and client insolvency (Sweis et al., 2007; El-Razek et al., 2008), slowness in making decisions (Chan and Kumaraswamy, 1997; Faridi and El-Sayegh, 2006), and poor communication by the owners with other parties (Walker and Vines, 2000; Chan and Kumaraswamy, 2002; Al-hadi et al., 2009).

Designers, on the other hand, have noted the parts played by clients and contractors in creating project delays, including the ‘lowest bid wins’ system favoured by owners (Al-khalili and Al-Ghafly, 1999; Assaf and Al-Hejji, 2006), owner interference (Abdul-Rahman et al., 2006; Al-Kharashi and Skitmore, 2009), lack of proper tools and equipment (Ogunlana and Promkuntong, 1996; Long et al., 2004; Zou et al., 2007), and poor technical performance and bad material management by contractors (Izam and Bustani, 2001; Fallahnejad, 2013).

The vicissitudes associated with the physical nature of construction work have also been identified as major causes of construction delays; these include inclement weather (Zakeri et al., 1996; Manavazhi and Adhikari, 2002), unfavourable site conditions (Ellis and Thomas, 2002; Alaghbari et al., 2007), ground problems (Sullivan and Harris, 1986; Tommy et al., 2006), and equipment breakdown and site accidents (Majid and McCaffer, 1998; Mahamid, 2013; Ruqaishi and Bashir, 2013). Contractual disputes and conflicts (Semple et al., 1994; Harris and Scott, 2001), changes in governmental regulations (Apolot et al., 2009; Kaliba et al., 2009), and economic conditions and inflation (Al-Momani, 2000; Frimpong et al., 2003) have also been identified as problems that could lead to delays in construction projects.

2.6.3 Providing solutions to eliminate delay

Past scholarship on construction delays has been concerned with finding ways of improving the time performance of projects. Typically, scholars studying delays in construction have tried to recommend solutions based on countering the causes of delays mentioned in the previous section. So, possible strategies for ameliorating delays include better stakeholder management (Ellis and Thomas, 2002), improving the effectiveness of site management and supervision (Sambasivan and Soon, 2007; Kaliba et al., 2009), enhancing the skills and training of practitioners (Zakeri et al., 1996; Frimpong et al., 2003; Haseeb et al., 2011), better communication and strong management teams (Sullivan and Harris, 1986; Walker and Vines, 2000; Chan and Kumaraswamy, 2002), a clear and thorough client brief (McManus et al., 1996; Lo et
al., 2006), good investigation before the construction phase (Arditi et al., 1985; Ahmed et al., 2003), providing monetary incentives (Nkado, 1995; Kumaraswamy and Chan, 1995; Kog et al., 1999), solving disputes through the development of negotiation skills for resolving contractual disputes (Walker, 1995; Xiao and Proverbs, 2002), providing a proper mechanism for evaluating change orders (Semple et al., 1994; Yang and Wei, 2010), enhancing commitment of senior leadership (Meier, 2010), and ensuring adequate and available sources of finance (Aibinu and Jagboro, 2002; Koushki et al., 2005; Apolot et al., 2009).

There is a tendency to treat the problem of delays in construction as a techno-rational problem, where delays can simply be ‘cured’ by reversing their causes. It is this linear, rational approach that is often taken for granted and rarely problematised. Therefore, in the next section, the current construction delay literature is critically reviewed and discussed through a theoretical lens brought from critical management studies. This will potentially problematise the ontological and epistemological assumptions that underpin prevailing studies on construction project delays and will raise further questions that would advance the collective, scholarly and practical understanding of project delays.

2.7 Critical perspectives on the construction delay literature

The problems of project delay have been much investigated in the construction industry. The number of publications over the past decades on this subject is testimony to the importance of the issue in management studies. As the literature review has indicated, much of this literature shares a common approach to project delays in construction.

Adhering to a research tradition known as critical management studies (see e.g. Cicmil and Hodgson, 2006; Alvesson et al., 2009), this thesis contends that the conventional approach towards construction delays limits our understanding of their reality (Hällgren, 2012) and also lessens the possibility of stimulating further research and transferring knowledge to the practitioners in the construction industry (Van de Ven and Johnson, 2006). Therefore, the aim of this section is to draw on the insights offered by the critical management studies tradition to problematise the ontological and epistemological underpinnings of project delays by questioning the theoretical foundations and ideologies of the conventional knowledge and its assumptions concerning their nature.
2.7.1 Critical management studies (CMS)

Alvesson and Deetz (2000) state that it is important to choose a theoretical framework that can create knowledge related to the lived experience of project practitioners and that can provide an understanding of their communicative actions (and their meanings). Beside this, as Packendorff (2013) argues, the researcher’s job is not only to admire taken-for-granted dominant notions but also to critically scrutinise and re-examine such perspectives. This is the basis of critical management studies (CMS), which is so-labelled by Alvesson and Willmott (1992) and has been developed and elaborated by contemporary scholars (see e.g. Fournier and Grey, 2000; Clegg et al., 2006; Cicmil and Hodgson, 2006; Adler et al., 2007; Alvesson et al., 2009). In fact, these authors derived their inspiration and theoretical framework from a wide range of writers including Weber, Marx, Bourdieu, Baudrillard, Foucault, Habermas, and so on. (cited in Grey and Willmott, 2005). Although CMS contains a variety of intellectual traditions—which have their roots in the work of the Frankfurt School—they all share a common purpose: to question taken for granted approaches in management research that assumes organisations solely as a neutral instrument for achieving shared goals (Taskin and Willmott, 2008).

CMS emerged as a movement to problematise the relevance and mainstream thinking and practice of management (Alvesson et al., 2009). It has been advanced by a series of organised activities including the CMS conference (a bi-annual conference held in the UK since 1999), the CMS division of the American Academy of Management, and the workshops entitled ‘Making Projects Critical’ (since 2003). These activities have provided the platform for academics from the social sciences to contest the theoretical and methodological limitations of the dominant nostrums of PM research. These events have addressed a broad range of themes, such as the issue of power and domination in project-settings, ethics and moral responsibility within projects, tensions between standardisation and creativity in project organisations, the limits to ‘projectification’ and the dysfunctions of project rationality (Hodgson et al., 2012).

What does CMS as a perspective include? And how does it work? CMS scholars bring critical thinking to bear on the efficacy and socio-political consequences of applying standardised and rationalist knowledge to project management (Hodgson and Cicmil, 2008). They do so by questioning the project management mainstream for its heavy reliance on ‘best practice’ as outlined in, for example, PMBOK® and PMP® guides
(Clegg and Courpasson, 2004). These project management guides explain what organisations ‘should’ look like and what managers ‘should’ do (Alvesson et al., 2009). However, it is argued that this approach explicitly and deliberately ignores managers’ potential role as competent social and political actors in complex project-labelled arrangements (Hodgson and Cicmil, 2008). Therefore, the aim of frameworks brought from critical management studies in general is to call for a move beyond the instrumentalism, assumptions of performativity (Fournier and Grey, 2000), and conventional positivist and technicist approaches towards projects’ implementation and control (Packendorff, 2013).

Grey and Willmott (2005) identified three interrelated core propositions for CMS in order to create a framework that encompasses a large variety of different theoretical positions in a flexible way, as well as defining some boundaries between CMS and other managerialist positions. The three propositions are as follows:

1. *De-naturalisation* through questioning the taken-for-granted (or naturalised) assumptions which are often legitimised by reference to nature and necessity (e.g., men dominate women). It draws attention to political and power relations instead of considering the current way in which organisations are organised as somehow natural, normal, or inevitable (Hodgson and Cicmil, 2008).

2. *Anti-performativity* through problematising the instrumentality of management practices (e.g. social relations) which assume that there is a means-ends calculus and that actors and organisations should aim to maximise profits through the effectiveness and efficiency concepts. This approach fails to appreciate the importance of morality, ethics, and the value of knowledge.

3. *Reflexivity*. CMS is reflexive in that it challenges the objectivity and assumptions of positivism that are often taken for granted based on positivism’s own claims. Wickert and Schaefer (2014) stated that, in CMS, reflexivity refers to “the ability to recognise how management is influenced by the social positions of the actors involved and ‘by the associated use of power-invested language and convention in constructing’ organisational reality” (p. 5).

It should be noted, however, that in recent years CMS has been the subject of severe criticisms. Critiques mainly believe that there is very little evidence that CMS has had much success in changing oppressive work practices (see also Parker, 2010). Wray-
Bliss (2002), for example, argues that CMS scholars routinely separate themselves from those they study and subordinate the voices of the subjects they claim to speak for under their own authority. In addition, Dunne (2008) asserts that CMS authors failed to engage with current social and political issues such as war, violence, or global injustice, and, in short, CMS has been little but self-serving. In response to these critiques, Fournier and Smith (2012) note that “doing or not doing things is not the only question, what is important is that we recognise the reasons, conditions and consequences of our action or inaction” (0. 472).

It should be mentioned that there is much more to CMS than has been discussed above. However, the discussed features provide sufficient guidelines for the purpose of this thesis and provide the possibility of framing the questions and subsequent exploration of the ontological and epistemological issues concerning project delays in construction.

### 2.7.2 Epistemological matters of concern: How do we study project delays?

It is crucial for social scientists to perceive knowledge in depth and explain the ways that knowledge can be generated. Epistemology, or theory of knowledge, deals with the nature, sources, and processes of knowledge and knowing (Baptiste, 2001) and the views of interpreting knowledge (Koskinen et al., 2003). Fitzgerald (1999) notes that epistemology deals with three key questions, including the following:

- What constitutes knowledge?
- Where is that knowledge located?
- How is that knowledge acquired?

In this section, the literature of project delays is revisited through an epistemological lens in order to answer the questions above. Ultimately, the aim is to explore why, despite knowing the causes and solutions of project time overruns, they still occur in the same order of magnitude as it was 10, 30, and 70 years ago (Flyvbjerg et al., 2002); especially in light of the considerable resources that have been expended over the years to improve the accuracy of time estimation through developing such methods as Earned Value (EV) and Critical Path Method (CPM) and advancing such techniques as PERT (Program Evaluation Review Technique) and Monte Carlo simulation (Byram, 1997; Bertelsen, 2004).
By reviewing past research on construction delays, the following critical observations can be made. Firstly, the prevailing literature on delays in construction projects seems somewhat acontextual, due to the normative view taken by scholars to identify the factors causing construction delays and to improve the time performance of projects. These factors have come to be viewed as pre-ordained in the literature such that many researchers simply seek to either confirm their prevalence or investigate their magnitude. Despite studies being undertaken in a variety of countries, the list of factors appears to be the same. For example, one study conducted by Sullivan and Harris (1986) identified variation orders as one of the main causes of delays in the UK construction industry. Similarly, many studies reused this factor in their study of construction delays (e.g. Chan and Kumaraswamy, 1997 in Hong Kong; Aibinu and Jagboro, 2002 in Nigeria; Al-Momani, 2000 in Jordan; Ahmed et al., 2003 in the USA; Koushki et al., 2005 in Kuwait; Assaf and Al-Hejji, 2006 in Saudi Arabia; Toor and Ogunlana, 2008 in Thailand; Venkatesh et al., 2012 in India; Fallahnejad, 2013 in Iran).

By reviewing the literature, this thesis has identified over 70 causes of construction delays and categorised those into 9 different groups based on their types and the responsible party for those delays (see Appendix B).

Secondly, there is a sense that studies dealing with project delays in construction tend not to be accumulative. In other words, new studies do not add to our understanding, simply because there is sometimes a lack of transparency in the ways researchers explain their contributions. For example, Yang and Wei (2010) examined the problem of delays in Taiwan by extracting 31 delay causes from 18 previous ‘similar’ studies. They did not give any indications as to how they chose these studies and why the factors causing delay in their context were the same as those in the 18 previous studies. Thus, it is argued that factors have been produced and reproduced with little impact on changing practices in the industry (see also Flyvbjerg, 2007). As a result, it has become difficult for critical researchers to assess their real theoretical and practical contribution (Hållgren, 2012).

Thirdly, in uncovering the causes and consequences of construction delays, the research methods adopted are noteworthy. A scan of the literature reveals that the methodology adopted usually consists of quantitative methods (typically self-perception questionnaire surveys) to identify the factors causing construction delays. The designed questionnaires are often distributed among different companies via email or the internet. The
participants must then choose the most important causes of delay associated with their projects from the questionnaire (see e.g. Acharya et al., 2006; Toor and Ogunlana, 2008; Le-Hoai et al., 2008; Al-Kharashi and Skitmore, 2009). Alvesson and Deetz (2000) identify one serious weakness of questionnaires, that participants are forced to subordinate themselves to the subjectivity of the researcher. Also, as Alvesson (1996) notes, by using questionnaire each person must choose a particular response from among three or so possibilities, which may say little of what the participant actually feels or thinks. The social reality and the psychology of people cannot be abstracted through this method. Another problem with the questionnaire is that the relationship between the questionnaire issue and the response rate can sometimes be vague. The review of the literature on project delays found published studies which made bold statements based on a questionnaire response rate of 10% or lower. For example, carrying out a study on delay mitigation in the Malaysian construction industry, Abdul-Rahman et al. (2006) distributed 2,598 questionnaires but received just 113 replies (a 4.3% response rate). Based on this, the authors concluded that delay would be mitigated by increasing productivity and asking for an extension of time. Similar to this thesis, Smyth and Morris (2007) criticise this type of research and contend that the selection and application of methodologies are highly significant because if the epistemological base of our research is weak, then progress in developing the knowledge base for research and practice in the field will also be weak. Thus the primary question being explored is whether we are careful enough in selecting and applying methodologies.

Therefore, previous researchers on project delays in construction seem to exacerbate the problem of a ‘shortage of high-impact research’ (Sandberg and Alvesson, 2011) by re-emphasising the underlying assumptions of previous research. It seems that they have taken similar epistemological approaches to studying the nature of delays. This does not mean that re-emphasising previous understandings is not important, since it enhances the field’s credibility (Hällgren, 2012). However, in line with what CMS scholars contend, it does limits the possibility of transferring lessons learnt from research into practice, adding to our knowledge about project delays, invoking new theories, and challenging the literature’s underlying assumptions in any significant way. Smyth and Morris (2007) argued that general explanations tend to produce normative patterns that marginalise contextual understandings particular to project environments. They called for a need to combine general explanations with particular examples that would make
sense to practitioners (see also recent calls for more case study research in the field of project management, e.g. Flyvbjerg, 2006, and Alvesson and Sandberg, 2013).

2.7.3 Ontological approaches to project delays: Flawed plan or execution?
Ontology is a branch of philosophy that focuses on assumptions or theories about the nature of the world and of reality. Gauthier and Ika (2012) point out that in project management, less effort has been made to assess the ontological underpinnings of the research, and this neglect would result in a situation where PM researchers do not understand what phenomena the discipline is united to verify, explore, and extend (see also Sewchurran et al., 2010). Bredillet (2008) suggests that the ontological level should be considered, alongside the epistemological and theoretical levels, as a preamble condition for management research.

Drawing on Burrell and Morgan (1979), Chia (1995) developed being and becoming ontologies (see also Linehan and Kavanagh, 2006). Being ontology contends that it is not possible to describe reality using static terminology or paradigm of thought; rather, reality is to be viewed as emergent, dynamic, and temporary (Green et al., 2010). In addition, primacy is given to the interactions and the processes of social relations involved in the everyday life of organisations (Tsoukas and Chia, 2002). As a result, ‘becoming’ emphasises the role of language, discourses, meaning, interpretation (Cicmil et al., 2006), and on-going sensemaking (Weick, 1979).

In contrast, being ontology is conceptualised by a ‘true’ reality which is out there—as static, discrete, and identifiable things, entities, and events—and the researchers’ duty is to find it (Chia, 1996). Here, projects are considered independent of the observer as discrete, concrete entities, privileging a reified conception of a project objective (Pellegrinelli and Murray-Webster, 2011). A more thorough distinction between these two ontological stances is provided by Winter et al. (2006), which is extracted from the works of Linehan and Kavanagh (2006), who noted the following:

“In a being ontology primacy is given to objects, things, states, events, and noun...this style of thinking leads us to consider project organisations as things, as entities, akin to elephants and other organisms, with functions, parts, structure, and relationships with similar entities in the ‘environment’... In contrast to a being ontology, a becoming ontology emphasises process, verbs, activity, and the construction of entities...a becoming ontology demands that we continually question categories and divisions that are routinely seen as fixed....to hold a becoming ontology is to demand that we question boundaries on the basis that these are always
Based on the above distinctions, Ghoshal (2005) argues that, since project management is defined as a ‘social science,’ its focus should therefore be on observing the lived experience of project actors and their interactions within a social system (e.g. organisations) with the aim of understanding what is actually going on in the everyday life of the projects (see also Cicmil et al., 2006). However, Williams (2005) notes that this approach is in contrast with the conventional approach of project management, which assumes that the reality exists “out there” and the “facts” of situations can be observed and calculated. PMBOK, for example, promotes its view, in which projects are viewed as concrete (rather than socially constructed) entities that should pursue certain defined goals through certain skills and a certain body of knowledge, called ‘best practice’. Reviewing the literature on project delays has shown that many studies have tended to promote this perspective—which often views management simply as the application of tools and techniques to get the job done (see e.g. Pollack, 2007; Ika, 2009). Sewchurran et al. (2010) mention that the reason of the popularity of this conventional approach promoted by PMBOK is the fact that for many graduates, scholars, and project practitioners, the best practice approaches of PMBOK are accepted as the core basis of PM.

More recently, however, such techno-rational interpretations in projects, which are grounded in ‘being’ ontology, have been called into question (e.g. Williams, 2005; Flyvbjerg, 2005; Cicmil and Hodgson, 2006; Linehan and Kavanagh, 2006). These scholars have called for a shift from a ‘being ontology’ towards a ‘becoming ontology’, from overemphasising reification and representation towards emphasising sense-making and questioning boundaries. For example, Cicmil and Hodgson (2006) criticised the positivist approach adopted by many studies which primarily offer “suitable methods for rational assessment of the problematic situation in order to come up with the correct solutions” (p. 118). It is argued that conceptualising PM in this way ignores the political, ethical, and moral aspects of organisations (Flyvbjerg et al., 2002; Ghoshal, 2005), overlooks a range of social and behavioural factors behind project failures (Fincham, 2002), and reduces management skills and knowledge to ‘value-neutral competence’ (Hodgson and Cicmil, 2008).
As opposed to the present research, and what CMS scholars have maintained, a review of the literature has shown that much of the prevailing research on construction delays has tended to emphasise finding and combating the technical difficulties that would cause project delays. The conventional understanding here is that delay is the consequence of deviation from the plan (Kim and Reinschmidt, 2009; Kreiner, 2014), thus leading to the tacit assumption that the project plan is ‘right’, and, therefore, the only things that need to be corrected are the causes of the deviation (cf. Eizakshiri et al., 2011). Through this, a productive suite of studies have identified the sources of flawed execution and technical problems, such as design mistakes (Assaf and Al-khalil, 1995; Al-hadi et al., 2009), poor labour productivity (Kazaz et al., 2012), inexperienced management (Sambasivan and Soon, 2007), incompetent technical staff (Toor and Ogunlana, 2008), poor subcontractor performance and project complexity (Nkado, 1995). Other studies have determined poor managerial skills as the main barriers for timely completion of construction projects, including deficiency in controlling and managing sub-contractors (Mbachu, 2008; Costello and Garrett, 2008), poor monitoring and site management (Apolot et al., 2011; Hwang et al., 2013), slowness in making decisions (Alwi and Hampson, 2003; Alaghbari et al., 2007), poor communication with different parties (Al-Khalil and Al-Ghafl, 1999; Al-Kharashi and Skitmore, 2009), late supervision (Hamzah et al., 2012; Zakaria et al., 2013), hiring less qualified staff (Manavazhi and Adhikari, 2002; Enshassi and Aziz, 2008), and excessive bureaucracy (Arditi et al., 1985; Assaf et al., 1995).

It is argued, therefore, that the ontological approach underpinning current studies of project delays, in which “perturbations or risks are there to be managed away to bring the project back to the plan” as seems to be implied in the BOKs, needs to be questioned (Williams, 2005, p. 501; see also Morris, 1994). Similarly, Eizakshiri et al. (2011), in a paper titled “delays, what delays?”, has criticised the ontological approach of researchers to construction delays by questioning the conventional assumption that the project plan is always ‘right’ at the early stages of the project and delays are therefore a consequence of flawed execution.

2.8 Summary of implications

Based on the above criticisms of the epistemological and ontological assumptions of past research on project delays and through adopting a critical perspective, the following insights have been obtained.
First, an examination of what construction management researchers have found about the failures of projects in terms of timely completion leads to the realisation that the dominant stream of research in a given area has been devoted to identifying the causes and consequences of schedule delays. This approach towards studying project cost and time overruns and understanding the sources of success and/or failure has been termed “factor research strategy” (Sauer, 1999). This strategy typically uses quantitative methods and statistical techniques to a) identify technical and/or managerial issues; b) provide the best solutions and strategies for avoidance or mitigation of that phenomenon; and c) implement the recommendations to eliminate the problems associated with the phenomenon in practice. The review of the literature reveals that this approach has become immensely popular in explaining the problem of delays in the construction industry for over thirty years. Due to overuse of this strategy by construction delay researchers, the factors and the solutions for project delays are fully known to most in the field.

In recent years, however, this simplistic cause-and-effect view has been criticised by a number of scholars. Smyth and Morris (2007), for example, point out that linear causality tends to atomise research and disregard the context by investigating cause-effect relationships. They argue that this rational thinking is the product of the traditional paradigm promoted by PMBOK, which is akin to positivism. In fact, explaining an action goes beyond the simple, scripted view of identifying cause and effect. In describing an action, we cannot fully explain it until we know how the agent views it. Once we know that, “we can explain the action by showing its significance, its role in meeting the agent’s desires, given his beliefs” (Rosenberg, 2008, p. 56). This is what the notion of intentionality (see e.g. Searle, 1990; Bratman, 1992) is about. By giving centrality to the social phenomena of intentionality, we would be able to elaborate the dynamics of human intentions and actions situated within an institutional context (Eizakshiri et al., 2011).

Second, reviewing the past research on construction delays revealed that many researchers of construction delays have adopted the techno-rational approach by focusing their attention on increasing the efficiency and productivity of organisations through highlighting the ‘critical success factors’ to represent a model that depicts the ‘true’ nature of the projects (Cicmil and Hodgson, 2006). This classical mainstream view of project management is characterised by the maturation of the project
management models, tools, techniques, and what could be generalised as sets of ‘best practices’ (Bredillet, 2008; Lalonde et al., 2012). Scheduling tools and Earned Value are the results of this focus (Turner, 1999). As Cicmil and Hodgson (2006) argue, such works perpetuate the belief that certain institutions, structures, or systems work or function in certain ways. Hence if any failure occurs in a project, the researchers try to uncover the underlying causes of the incidents and propose corrective actions (cf. Kharbanda and Pinto, 1996).

Third, it seems that previous research on construction delays makes the tacit assumption that the plan is always accurate from the beginning. Therefore, the only things that need to be corrected are causes of deviations during implementation. However, this approach neglects the varying contexts in which a multitude of project planners enact reality and make decisions (Flyvbjerg et al., 2002). In fact, the prevailing emphasis on searching for causes of deviations from the plan downplays the role planners have in responding to dynamic situations, where they make the plan and behave of their own volition (Mutch et al., 2006; Chambon and Haggard, 2013). Therefore, in studying the nature of project delays, there is a need to move away from viewing delays simply as mere deviations to the taken-for-granted plan and instead to bring to the fore the significance of context and the role of planners’ intentionality in explaining project delays. This issue is investigated in the next chapter by adopting a much more critical stance and evaluating planners’ actions in producing project completion times in the first place.
Chapter 3: The role of planning intentionality in explaining project delays

3.1 Introduction

In the previous chapter, the current literature of project delays in construction was critically reviewed by drawing on the tradition referred to as critical management studies (CMS), raising questions about prevailing ontological and epistemological assumptions concerning the nature of delays in construction projects. Past scholarship on construction delays appears to have taken for granted the righteousness of plans, thereby ignoring situated (Suchman, 1987) and improvisational actions of planners (see e.g. Hatch, 1999; Cunha and Chia, 2007). Therefore, in general, this chapter calls for more critical scholarship that moves beyond the mere enumeration of causes and consequences of delays to situate the problem within the particular contexts and struggles in which project planners operate.

In so doing, this chapter initially defines project planning and project scheduling in construction projects. It then identifies planners’ duties and responsibilities and the challenges they face in planning a construction project. This also echoes Winch and Kelsey’s (2005) concern that “there is remarkably little research into what construction project planners actually do” (p. 141). This chapter then reviews the pertinent literature to draw out the contributions of prevailing studies prior to, in a vein similar to that of the previous chapter, borrowing the analytical lens of CMS scholarship in critically reviewing the literature on planning practice so as to stimulate further research questions. This process revealed that the arguments made here are consistent with recent attempts initiated to question the adequacy of rational planning methods and the role of planners in erroneous estimations of project costs (see e.g. Lovallo and Kahneman, 2003; Flyvbjerg et al., 2009; Pinto, 2013; Winch, 2013). Drawing on the work of contemporary scholars, this chapter highlights five critical aspects which, it is argued, remain under-explored in this area of research. This chapter, thus, discusses issues neglected in this growing body of literature so as to establish a better understanding of the role planners play in inaccurately predicting completion times, whether intended or unintended.
3.2 Planning in construction

A project cannot be clarified until its characteristics are expressed explicitly, and a better view of the time scale, deliverables, evolving tasks, required resources and relations is achieved. The project plan typically provides the establishment and expression of these predetermined courses of action and contains sufficient details to tell the project team exactly what must be done, when it must be done and what resources are to be used in order to produce the deliverables of the project successfully. PMI (2008) defines a project plan as a “formal, approved document that defines how the project is executed, monitored and controlled. It may be summary or detailed and may be composed of one or more subsidiary management plans and other planning documents. The objective of a project management plan is to define the approach to be used by the project team to deliver the intended project management scope of the project”.

Typically, project planners create the project plan following the inputs they receive from the project team and key stakeholders. The plan should be agreed upon and approved by at least the project team and its key stakeholders. Mubarak (2010) suggests that it is good practice to have a formal project management plan approved in the early stages of the project because many clients require the contractor to submit a project plan as part of the contractual arrangements. Similarly, Koskela and Howell (2002) believe that developing a project plan is a critical part of pre-construction planning, as it provides “legitimisation” for the project.

Winch and North (2006) assert that planning lies at “the heart of construction project management” (p. 473) and so occupies a prominent place in the functions of planners and managers (Laufer and Tucker, 1987). Planning is generally assumed to have a significant impact on project success (Dvir et al., 2003; Zwikael, 2009) and to play a crucial role in the consummative delivery of construction projects (Faniran et al., 1994). Andersen (2000) found that effective strategic planning results in higher performance in all industrial settings and enhances both organisational innovation and economic performance. Laufer and Tucker (1987) claim that the planning that is carried out before the project starts (at the front-end stage of the projects) has been identified as one of the most influential criteria of delivering a successful project. Similarly, Gibson et al. (1995) point out that earlier planning has the greatest impact on the outcome of the project.
Baldwin et al. (2009) defines planning as a systematic, future-oriented system that organisations use to formulate strategies and establish long-term directions in order to achieve future goals; it is therefore goal-oriented. The aim of planning is to calculate what risks may occur in the project and how to deal with them during the project’s lifecycle. The planning is also where the budget and the schedule are developed. There is still a lack of consensus regarding the definition of the term ‘planning’ among project management researchers (see e.g. Wildavsky, 1973; Snyder and Glueck, 1980; Mintzberg, 1981). Snyder and Glueck (1980) define planning as a ‘process’ of decision-making which consciously and deliberately establishes a set of directions and guidelines in the form of a ‘plan’ for the project team in order to achieve the project goals at some point in the future. In contrast, Mintzberg (1981) criticises this classic use of the word planning as being too vague to be ascribed to anything in particular that planners do. He declares that, by this definition, “all decision-making becomes planning, since a decision is essentially a commitment to action, that is, a vow to do something in the future” (p. 320). Similarly to Mintzberg, Laufer et al. (1994) contend that planning in reality is much more than just decision-making and define it as “a process of anticipatory decision-making—to decide what and/or how to perform actions due at some point in the future” (p. 54).

Russell and Taylor (2003) mention that the planning process includes defining project objectives, identifying activities, establishing precedence relationships, making time estimates, determining project completion time, comparing project schedule objectives, and determining resource requirements to meet objectives. According to Laufer and Tucker (1987, p. 244) the aim of the planning process is to answer the following four questions:

- What should be done? (activities)
- How should activities be performed? (methods)
- Who should perform each activity and with what means? (resources)
- When should activities be performed? (sequence and timing).
Project planning serves as a foundation for various related functions, such as cost estimating, scheduling and time estimation, project control, quality control, safety management, and others. Yet, one of the most important tasks in construction planning, which is the focus of the present research, is to prepare the time plan and make sure that the project will be finished on time (Hendrickson, 1998). Depending on the time perspective, Söderberg (1999) identifies three different levels of planning: 1) Strategic planning: this is the most comprehensive level of planning. This planning often focuses on the organisation’s long-term goals and strategies; 2) Tactical planning: the aim of this level of planning is to form a structure for the organisation’s operations. Tactical planning is represented through the production time plan in a construction company; 3) Operational planning: the aim of operational planning is to attain short-term objectives in the project. It contains a higher level of detail concerning the resources and activities, and is represented by a weekly or monthly plan.

It should be noted that the focus of interest of the present thesis is primarily on scheduling and time estimation at the strategic level of planning because the concept of planning is too broad in scope to serve as a frame of reference for this thesis.

### 3.3 Project scheduling

Planning and scheduling are two terms that are often thought of as synonymous. However, they are not. Scheduling is the tangible manifestation of the planning process that ensures the timely completion of the projects and the sequence in which these activities are to be executed (Trauner et al., 2009). Mubarak (2010) argues that while project planning aims to answer questions such as what is going to be done? how? where? by whom? and when?, scheduling deals with when? at a detailed level. Scheduling is identified as the most important planning activity (Amor, 2002) and has received the most research attention by scholars studying project planning (Laufer et al., 1994).

The project schedule is important for both clients and contractors in order to complete the project within budget and on time. Mubarak (2010) notes that contractors need project scheduling in order to:

- Calculate the project completion date;
- Calculate the start or end of a specific activity;
• Coordinate among trades and subcontractors, and manage conflicts;
• Predict and calculate the cash flow;
• Improve work efficiency;
• Use it as an effective project control tool;
• Evaluate the effect of changes;
• Prove delay claims in court.

On the other hand, clients need project scheduling in order to
• Get an idea of the project’s expected finish date;
• Ensure contractor’s proper planning for timely completion;
• Predict and calculate the cash flow;
• Use it as an effective project monitoring tool;
• Evaluate the effect of changes;
• Verify delay claims:

The creation of a realistic schedule is not just limited to the construction stage, but extends to the pre-construction and post-construction stages as well. The schedule provides the necessary insight for different project actors to identify the required resources and plan for their timely allocation ahead of time. Cash flows, procurement and delivery of material, crew scheduling, and equipment allocation are such considerations. Schedules are also suitable tools for project control. Based on the obtained information and feedback from the project manager, timely and necessary corrective action can be taken should there be any deviation from the project schedule.

Project scheduling in practice, especially in the construction industry, is often conducted with several useful tools and techniques that are often integrated in computer software such as CPM, bar charts or Gantt charts as well as Precedence Logic Diagrams or PERT or Gantt charts focusing on time-oriented objectives and network diagrams. Although possessing knowledge of these tools and techniques is an advantage for project planners, construction planning must be carried out by competent planners who are experienced in their work and have practical knowledge (Laufer et al., 1994).
In fact, project planners form an important link between planning and execution and their role is often mentioned yet rarely properly studied (Winch and Kelsey, 2005). Moreover, as mentioned in Chapter 2, past studies on construction project delays mainly considered the role of the clients, contractors, and consultants in creating delays. They, however, failed to consider the significance of the planners’ role in timely delivery of projects. Therefore, in the next section, the role that planners play in relation to on-time delivery of construction projects will be discussed.

3.4 Project planner’s responsibilities in construction

The review of the planning literature has shown that despite the ample research in examining ‘what planning ought to be’ and how this process should be improved, very little was found on the question of ‘what planners do’ (Innes, 1995). Winch and Kelsey (2005) echoed this concern by noting that “there is remarkably little research into what construction project planners actually do” (p. 141). This neglect is surprising because, as Baldwin et al. (2009) assert, the effectiveness of planning is largely dependent on the experience and judgement of the planner(s) involved in the project. Additionally, understanding how planners act in a construction project will give a better insight into how and why plans become what they are, since planners are the ones possessing substantial and expert knowledge regarding the plan-making processes.

Planners are instrumental in projecting an image (or images) of desirable organisational futures (Morgan, 1986; Winter and Szczepanek, 2009), as they create, mediate, and facilitate common goals and visions (Ferraro, 1995) through their plans. For Dawson and Dawson (1998), planners are actors who should act as early as possible so as to lessen the likelihood of undesirable events. Campbell and Fainstein (2005) claim that planners not only plan but also negotiate, forecast, research, survey, and organise financing. Ideally, they bring professional knowledge into practice as well as ensuring that estimates are based on a robust understanding of the technical methods and associated risks (Zwikael, 2009). In fact, in many organisations, planners are responsible for gathering the necessary information in order to make the final go/no-go decision (Flyvbjerg et al., 2009).

Kelsey et al. (2001) note that planners have two main responsibilities. The primary one is their technical responsibility, which involves planning projects as realistically as possible and preventing projects from going over budgets and exceeding their
completion times. The second duty of planners concerns their commercial role, whereby they can enhance the credibility and reputation of the contractor’s team by demonstrating superior competence to project owners through their actions and behaviours and thereby creating an opportunity for repeat business. These diverse responsibilities make the planner’s job demanding and complicated. For this reason, it is argued that planners are often short of time and are unable to perform all planning activities properly (Zwikael, 2009).

Although planners can bring certain advantages to construction companies, Laufer et al. (1994) declare that, in many companies, there is no such defined role as ‘project planner’, but instead the project manager deals with planning and acts as planner. They refer to this issue as the ‘planner-manager dilemma’ and maintain that project managers not only have insufficient time in which to prepare documentation and project plans under constantly changing conditions but also have inadequate knowledge and experience in using planning methods and techniques. Managers also do not possess a clear enough insight into the planning process to predict unforeseen circumstances with respect to projects, i.e. they lack understanding of the design process, the permitting process, the development/release/award of bid packages, the tracking of long lead procurement items and materials, the actual construction of the project, and the steps needed to commission and close out the project. Therefore, Laufer et al. (1994) conclude that “it is a fallacy to assume that a manager can give meaningful approval to plans prepared by a specialist planner” (p. 60).

Furthermore, it should be noted that, even if organisations recruit expert project planners for their planning processes, differences in opinion often occur between project managers and project planners due to divergent views and asymmetries in information (Laufer and Tucker, 1987). While the former believe that they possess practical knowledge concerning the project and its environment, the latter assume that they have more professional and methodological knowledge concerning planning. In one study comparing site-based project managers and office-based project planners, Johansen and Wilson (2006) found that managers considered planning to be imprecise and believed that a plan should give them increased flexibility, whereas planners considered planning as their own job and expected managers and workers to work their way through rigidly controlled plans of the planners’ creation. In addition, they noted that, from the planners’ point of view, managers should not be engaged in the initial planning process.
(i.e. developing the master plan) but instead should be concerned only with delivering the project. This raises the following question: What exactly do planners do in the initial planning process?

Laufer and Tucker (1987), drawing on earlier works by Ackoff (1970) and Mintzberg (1981), investigated planners’ involvement in a project and found that planners initially review the contract and designs, investigate the documentation provided for tender bids, and assess construction site conditions. During this process, they weigh the pros and cons of various factors (cost vs. time vs. quality) to formulate strategies covering all influential parameters (e.g. physical parameters, codes, laws, customs, and neighbours) in order to choose the best options for the project in line with the client’s demands. Then, planners gather information about construction equipment, resources, and upcoming project activities from a client group or contractor group. They should be realistic in terms of identifying what information is required by whom and in what format; what knowledge content is optimally required; and what accompanying activities will offset anti-planning forces and ensure implementation according to plans.

Winch and Kelsey (2005) observe that planners tend to be overwhelmed with information and so spend a considerable portion of their time sorting through a large amount of irrelevant information. Therefore, they need to adopt strategies enabling them cope more effectively with a great deal of information.

After categorising and prioritising project-related information, planners communicate and negotiate with specialist subcontractors and suppliers, upon whom the main contractor depends for their detailed knowledge, both at the tender stage and after the awarding of the contract. However, the interaction between planners and these actors may sometimes result in potential conflicts which can entail negative consequences for all parties involved. Thus, planners’ negotiating skills are all-important.

Next, planners use different methods of distribution and scheduling techniques to assimilate labour totals, the duration of key activities, plant totals, and the duration of site on-costs (Baldwin et al., 2009). Many planners still employ such traditional methods for scheduling and planning activities as the Critical Path Method (CPM) and bar charts. They may also use Work Breakdown Structure (WBS) to break down the project into detailed and easily managed tasks so as to be better able to monitor and control the project’s progress and required deliverables. These methods and techniques
help planners allocate staff and resources to particular activities and to a particular schedule. However, Huang et al. (2007) state that detailed schedules and changes made during the construction process cannot be easily manipulated and updated with some traditional methods. Jongeling and Olofsson (2007) emphasise another problem with traditional methods that they do not provide enough information concerning the spatial context and complexities of the project details. Therefore, many planners began using new simulation technologies and now well-established modelling tools which emerged during the last decade, such as Virtual Prototyping (VP) or 4D CAD Applications. Heesom and Mahdjoubi (2004) point out that these tools enable the planning of construction tasks to be more efficient by enabling visualisation of planning strategies prior to the actual start of construction and managing design and implementation changes whilst making sure that such changes do not affect estimated cost and completion time.

The next step for planners involves participating in various plenary meetings to discuss the schedule for key construction activities, planning the framework of construction processes, and going through all information collected from the project brief, stakeholders, required labour, and site conditions. After this negotiation stage, planners make their decisions with respect to all these based on detailed analysis, heuristics judgements, and experience-based learning (Winch and Kelsey, 2005). After project initiation, planners then check and reassess the project plan based on emerging information and consequently update the plan. If any serious changes are required or if the response time in making a decision is very short, not only do planners make decisions regarding the distribution of information, but they must often assume an active role in assimilating this information. To do so, they should be in contact with other teams and be able to understand the provided reports in order to evaluate and monitor the progression of the work at each stage of the process. In other words, planners should be aware of all details of the project as it progresses.

In summary, Winch and Kelsey (2005, p. 149) have highlighted the following duties of planners in construction projects:

- Ensuring that estimating and tendering is on a robust basis;
- Planning in a time- and information-constrained environment;
- Using heuristics based on judgement and experience-based learning;
• Identifying and communicating the potential risks involved; and
• Negotiating and communicating with operational management colleagues.

3.5 A review of the project planner literature

The responsibilities of planners have hitherto been discussed with the aim of elaborating what construction planners do (the concern of Winch and Kelsey, 2005). As was evident, planners play a key role in projects being delivered on time, on budget, and with the expected quality. Williams et al. (2009) postulate that if planners cannot articulate problems correctly, meet the budget, see far enough ahead to anticipate unforeseen issues, and make accurate estimations about completion times, projects could fail. Therefore, understanding how planners act in the dynamic environment of a construction project and evaluating their roles in the plan-making process are crucial. However, as mentioned, there is a dearth of studies focusing in particular on the role of construction planners (see e.g. Kelsey et al., 2001; Johansen and Wilson, 2006; Zwikael, 2009). The aim of these studies was generally to enhance the knowledgeability and capability of planners so that they could do their job more effectively and efficiently. Zwikael (2009), for example, notes the following:

“Construction project planners wishing to improve project performance at the planning phase of a project should concentrate more on the accurate identification of all project activities. They should focus on the development of a high-quality project plan that can be approved by key stakeholders” (p. 372).

Reviewing the literature concerning the role of planners in construction would seem to indicate that construction studies are predominantly inspired by a technicist approach, similar to studies on project delays. The conventional assumption here is that planners cannot predict the future outcomes of projects precisely due to the dynamic and complex nature of construction projects and the involvement of different parties each having different goals, expectations, and interests. Furthermore, projects are exposed to the effects of risk and uncertainty due to the instability of economic and political conditions (Comfort et al., 2001), shortage of resources (Hwang et al., 2013), inclement weather (Manavazhi and Adhikari, 2002), presence of various interest groups (Belout and Gauvreau, 2004), incompetent technical and managerial staff (Pinto, 2002), site accidents (Mahamid et al., 2012), and project location (Kaming et al., 1997). To reduce uncertainty and ease the job of the planner, conventional studies mainly suggest using
the integration of “strategy-pull and technology-push research paradigms” (Sriprasert and Dawood, 2003, p. 342). This approach is in line with the recommendations given in the Project Management Body of Knowledge (PMBOK) for improving the planning process, achieving high quality, and more accurately planning the project (Zwikael, 2009).

In terms of strategy pull, researchers tend to develop strategies to enable planners to generate more reliable plans, reduce involved risks, and improve on-site productivity. For example, the strategy advocated by Sriprasert and Dawood (2003) separates execution from planning by introducing a technique called multi-constraint planning. This technique has five characteristics: collaborative and multi-level planning, multi-constraint consideration, effective handling of uncertainty, appropriate visual representation, and practicable optimisation. The authors conclude that the successful implementation of the multi-constraint planning technique would help planners to understand problems more clearly, reduce risks, produce more reliable plans, and improve productivity.

In another study, Li et al. (2006) attempted to develop strategies to aid planners in dealing with large amounts of information. They note that planners often lack a proper method for managing the information flows so as to locate the required information and therefore must engage in a lot of guesswork (see also Winch and Kelsey, 2005). Moreover, the quality of much of the collected information is often poor and inaccurate, as, for example, incomplete design information or imperfect drawings and specifications. Thus, Li et al. (2006) provide a three point information classification system using a dependency structure matrix tool to help planners deal with planning tasks and their information dependencies so as to generate better time estimates.

Proponents of the strategy-pull approach have also been motivated to identify critical success factors in an attempt to suggest corrective actions that must be taken in order to improve construction project planning and the productivity of project planners. Zwikael (2009), for instance, concluded that activity definition, which concerns accurately identifying all project activities, is the most important planning process and therefore planners should spend most of their time concentrating on this issue by, for example, employing different planning tools and techniques, e.g. Work Breakdown Structure (WBS). He emphasises that achieving a high-quality project plan and developing that is
another important planning process whose implementation requires devoting sufficient effort and time to evaluating the project plan, most likely in meetings with groups of planners and project managers.

In terms of technology-push, planners are often seen as ‘technicians’ who should consider all possible unforeseen problems through identification and correction/avoidance before making their estimations of time and cost (Dey, 2002). As a result, a substantial amount of the published literature on construction planning has suggested various risk-management methods and techniques to allow project planners and estimators to cope with the effects of uncertain environments and, more importantly, to achieve higher accuracy in their estimates (see e.g. Laufer and Tucker, 1987; Sriprasert and Dawood, 2003; Heesom and Mahdjoubi, 2004; Li et al., 2006). This classical mainstream view of project planners has led to accelerated maturation of project management tools and techniques and to what could be generalised as sets of ‘best practices’ (Pollack, 2007; Bredillet, 2008; Lalonde et al., 2012). Some of these techniques and methods are the Critical Path Method (CPM), Line-of-Balance method, simulation, knowledge-based expert systems, artificial intelligence, visualisation method, critical chain scheduling, and Last Planner® method (for a comprehensive review of these, see Sriprasert and Dawood, 2003).

Supporters of the technology-push approach also place greater emphasis on planners’ skills, experiences, and knowledge in dealing with technical-related problems. For example, Laufer et al. (1994) contend that one reason for bad planning in construction projects is incompetent and inexperienced planners. They believe that experienced planners benefit from the knowledge, skills, and field experience acquired over involvement in previous projects through the learning process and suggest that planners should go through special training and examination before being recruited by organisations. Similarly, Heesom and Mahdjoubi (2004) stress that effective plan generation needs well-qualified and experienced staff. They also declared that the number of experienced planners has decreased and the UK faces a shortage of skills in the area of construction planning.

In summary, the traditional and shared approach views project planners as technicians who should use a set of tools and techniques to estimate project outcomes and formulate a detailed plan at the project’s outset. Along with this, planners should also employ a
control system and corrective strategies to monitor progress with respect to the original plan for any deviations therefrom and correct such negative variances (Ballard, 2000; Winch, 2006). It is argued that this approach, which is highly task oriented and focused primarily on efficiency and productivity, is in fact what PMBOK promotes (Koskela and Howell, 2002) as the method with which to improve the planning process and achieve high quality and a more accurate project plan (Zwikael, 2009). Table 3.1 below summarises the contributions of prevailing studies on the role of project planners in construction.

Table 3.1: Contributions of prevailing studies to the project planner role in construction.

<table>
<thead>
<tr>
<th>Suggesting strategies to planners in developing highly detailed and rigid plans (see e.g. Bart, 1993)</th>
<th>Finding critical success factors for planners (see e.g. Zwikael, 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encouraging planners to develop a solid project plan and instructing how to follow that plan to project completion (see e.g. Dvir et al., 2003)</td>
<td>Building/developing empirical models for planners to predict construction duration (see e.g. Khosrowshahi and Kaka, 1996)</td>
</tr>
<tr>
<td>Identifying the source of risks and uncertainties in order to reduce their consequences (see e.g. Sriprasert and Dawood, 2003)</td>
<td>Developing methods of distribution and scheduling techniques (see e.g. Jongeling and Olofsson, 2007)</td>
</tr>
<tr>
<td>Proposing corrective strategies to address the design changes and control the outcomes (see e.g. Winch and Kelsey, 2005)</td>
<td>Enhancing planners’ knowledgability through a learning process (see e.g. Laufer et al., 1994)</td>
</tr>
</tbody>
</table>

Source: Field work

3.6 Critical perspectives of research on project planner literature

As discussed in Chapter 2, the appropriateness of the technicist approach and the dominant paradigm of PM has been criticised by a number of recent scholars (see e.g. Morris, 1994; Williams, 2005; Winter et al., 2006; Smyth and Morris, 2007; Hodgson and Cicmil, 2007). For instance, Morris (1994) argues that the engineering sciences greatly influenced project management to follow the instrumental logic in which management tools and systems predominate. The resulting focus on processes, frameworks, and techniques has led to the perception of projects as machines in need of a technical fix (Green, 1998), and so project managers are considered skilful technicians attempting to resolve technical problems (Cicmil et al., 2006). Bredillet (2008) goes further in criticising the conventional viewpoint by arguing that:

“The world sees project management from a positivistic perspective (set of methods and tools interacting with other fields of management and engineering). This leads to linearity and over simplification when attempting to solve complex problems and is inadequate to explain the true nature of project management” (p. 239).
In the remainder of this section, by borrowing the analytical lens provided by recent CMS scholars and by adopting a much more critical stance, the shortcomings of past research relevant to the role of project planners is discussed in order to stimulate further research questions. Those shortcomings are outlined in the following paragraphs.

First, advocates of the technicist point of view suggest that, if the formal planning systems have been effectively designed, then the quality of planner anticipatory decision-making should be enhanced and the future of projects could be sketched and controlled through the project plan (Miller et al., 1960; Bryman et al., 1987; Lundin and Söderholm, 1995; Zwikael, 2009). The formal planning system is an integrated set of policies and procedures based on the PMBOK, which encourages planners towards the development of a time framework within which site activities will be carried out; reviewing project progress at regular intervals; and taking appropriate measures to keep the project in line with the original schedule (Faniran et al., 1994).

One of the outcomes of over-emphasising the formal planning system was the development of empirical models for planners to predict construction duration as accurately as possible (see e.g. Bromilow et al., 1980; Khosrowshahi and Kaka, 1996). The Bromilow's time–cost (BTC) model, for example, was one of the first models using regression analysis to estimate project duration when cost (as the main variable), client type, and year of construction were known. Since then, numerous studies have been conducted to evaluate and improve the BTC model or to introduce new models (see e.g. Chan and Kumaraswamy, 2002; Stoy et al., 2007; Hoffman et al., 2007).

However, it could be argued that overreliance on the formal planning system and overemphasis on technology and project management tools and techniques have several disadvantages. First, according to Winch (2006), planners in this view, are seen as “omniscient and independent of the situation to be managed” (p. 170). As a result of this perception, they are viewed as unable to respond adequately to the reality of managing complicated projects in the ever-changing flux of events with shifting circumstances (Crawford et al., 2006). Second, when planners produce project time estimates, they not only use extensive estimation models and tools but also their expert judgements (Jørgensen, 2007). It seems that in the current literature, researchers fail to consider the latter’s effect in their studies (Goodwin, 2000). Third, overemphasising the dominant technicist approach ignores the role of planners and their ability to engage intelligently
with the complexity of projects (Winter et al., 2006), and it overlooks the critical role of social and political power associated with the planner’s role in social arrangements (Clegg et al., 2006) and the role of language and meaning in shaping the nature of the interaction between planners and other managers or stakeholders (Fournier and Grey, 2000). Thus, Alvesson and Deetz (2000) contend that the dominant technicist approach is at a remove from the actuality of projects, which is “often messy, ambiguous, fragmented and political in character” (p. 60).

Second, Dvir et al. (2003) express that the conventional understanding of the planner’s role in construction projects is to prepare a solid project plan and follow that plan to project successful completion. Flyvbjerg et al. (2009) argue that within this approach ‘plan’ is “very likely to serve as an anchor…which is almost always seen as a ‘realistic’ best or most likely case” (p. 9). The assumption behind this view is that construction projects are repetitive and their execution routine (see e.g. Bryman et al., 1987). Therefore, based on their experience of operations resulting from this repetitiveness and continuity, planners should know what to do and why and by whom it should be done (Lundin and Söderholm, 1995).

However, the aforementioned view decouples planners from the project’s environment and intensifies undesirable consequences that can result in greater overruns than need be the case (Cicmil et al., 2006). It also fails to consider the relationship between plans and situated action. Suchman (1987) maintains that plans cannot represent practices and circumstances in all their concrete details—which the contemporary planning view presupposes—and can be considered as simply a general reflection of the localised actions to be taken. She stresses the importance of situated features in the executions of plans, which she calls ‘situated actions’, thus implying that “every course of action depends in essential ways upon its material and social circumstances” (p. 50). Thus, planners’ actions and decisions can be affected by different situational factors (e.g. incentives for more accurate planning).

Third, as mentioned in the previous section, interest is growing in developing methods and techniques for construction project planning such as virtual prototyping (VP) or 4D CAD applications. The number of publications over the past decade dedicated to these particular techniques testifies to the importance of this issue for construction management researchers (see e.g. Heesom and Mahdjoubi, 2004; Jongeling and
Olofsson, 2007; Baldwin et al., 2009; Mahalingam et al., 2010). These methods are often developed to provide support for planners to overcome their practical and technical difficulties in visualising construction processes in order to produce a more reliable plan. Accordingly, due to the developments in technology and project management tools and techniques for planners, and especially with regard to the lessons learnt from their previous experiences and failures in predicting project outcomes, one would expect an improvement in time/cost estimation for projects over time (Pellegrinelli and Murray-Webster, 2011).

Yet, as Flyvbjerg (2005) asserts, project overruns have remained a constant problem as evidenced by nine out of ten of his sample projects during a 70-year period (1935-2005) suffering from overruns (see Table 2.2 for more figures of schedule overruns). Thus, he concluded that planner excuses of inadequate data or models and technical problems constitute “old excuses” (p. 20). Implicit to such an approach is the idea of technical objectivity (Wachs, 1990), where anything that goes wrong in a project is mainly due to defects in the systems and processes (Cooke-Davis, 2002).

It should be noted that the above points made against the dominant view of the project planners’ role in construction research is not intended to undermine contributions made by previous researchers. In fact, no one can deny how such new applications as 4D CAD have made planners’ work easier or how adopting certain strategies, like multi-constraint planning for instance, have allowed planners to understand problems more clearly and to reduce risk. However, certain issues must be considered regarding the agency of planners and their ability to make choices and give shape to project plans, and mainstream project management theory often neglects these issues, leading in turn to possible creation of project delays. Table 3.2 below summarises the points missing in prevailing studies on the role of project planners.

Table 3.2: Neglected issues in project planner literature.

| The role of planners’ heuristics judgements and their improvisational actions | Planners’ actions and behaviours in the dynamic environment of construction projects |
| The social and political power associated with the planner’s role | The nature of interaction and communication among planners |
| Planner intentionalities involved in scheduling projects | The way project’s environment and situational factors can affect planners |
| The influence of organisational politics and power relations on project planners’ actions | The strong theoretical foundations and framework within which to consider theories, philosophies, and ethical issues grounded in project planning |

Source: Field work
3.7 The influence of planners’ inaccurate estimates on project overruns

In recent years, in order to challenge conventional paradigms in planning research, contemporary scholarship on project overruns has shifted focus from project management tools and techniques to attempts at finding alternative explanations for failure of project plans with respect to on-time and on-cost performance. Specifically, the work of Bent Flyvbjerg and his colleagues (see Flyvbjerg et al., 2002; 2005; 2009) initiated this shift. For over a decade, Flyvbjerg has examined why planners inaccurately estimate the costs of projects and has concluded that many projects are hindered by the dual effects of optimism bias (delusion) and strategic misrepresentation (deception). Consequently, a growing body of literature has highlighted the importance of his concepts and explored how psychological and political-economic factors can lead to inaccuracies in forecasting (see Table 3.3). By doing so, they have highlighted the weaknesses of conventional scientific and naturalistic approaches to project management in capturing the complexities in planning, understanding its practice and processes, and explaining planners’ actions.

Indeed, the argument put forward in the previous section of this chapter is mainly in line with what Flyvbjerg and his colleagues have recently outlined. The main similarity is that both have highlighted the weaknesses of the aforementioned approaches to project planning and the way these result in project overruns. Therefore, in the present research, it is argued that considering the explanations provided by Flyvbjerg and his colleagues for project overruns would be beneficial, because of the following:

- First, it not only enables us to better evaluate planners’ roles in the plan-making process but also provides a deeper understanding of planners’ actions and behaviours in the dynamic environment of construction projects.

- Second, Flyvbjerg and his supporters raise the important questions of how and why planners make plans which, if implemented, result in project overruns. This is somehow similar to one of the research questions of this thesis: “Why do planners not learn from previous mistakes in estimating project time?” In fact, answering these questions will potentially help shed light on how and why project time plans are unrealistic.
• Third, to the best of the author’s knowledge, the only works which have examined planners’ activities ‘critically’ in the context of construction projects are those of Flyvbjerg and his followers/opponents.

Therefore, in the following subsections, the concepts of optimism bias and strategic misrepresentation are elaborated and discussed.

### Table 3.3: List of studies investigating optimism bias and strategic misrepresentation in construction projects.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Aim of study</th>
<th>Author(s)</th>
<th>Aim of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Wee (2007)</td>
<td>To assess the quality of demand forecasts and cost estimations</td>
<td>Williams et al. (2009)</td>
<td>To understand the quality of decisions made at the front-end stage with scant information</td>
</tr>
<tr>
<td>Eizakshiri et al. (2011)</td>
<td>To investigate the effect of optimism bias and strategic misrepresentation on project delays</td>
<td>Cantarelli et al. (2010)</td>
<td>To investigate the way in which lock-in can emerge and affect cost overruns</td>
</tr>
<tr>
<td>Omland and Strand (2010)</td>
<td>To provide critical-constructive comments on the theory of strategic misrepresentation</td>
<td>Williams and Samset (2010)</td>
<td>To consider psychological and political bias within benefit and cost estimation</td>
</tr>
<tr>
<td>Kutsch et al. (2011)</td>
<td>To explore reasons why optimism bias persists beyond the planning phase</td>
<td>Morris et al. (2011)</td>
<td>To identify leading ideas in the management of projects</td>
</tr>
<tr>
<td>Love et al. (2012)</td>
<td>To provide a nomological framework for social infrastructure project overruns</td>
<td>Giezen (2012)</td>
<td>To reduce complexity and its effects on the planning of projects</td>
</tr>
<tr>
<td>Cruz and Marques (2013)</td>
<td>To assess the flexibility of contracts in coping with project uncertainties</td>
<td>Eliasson and Fosgerau (2013)</td>
<td>To investigate whether cost overruns are due to deception or selection</td>
</tr>
<tr>
<td>Pinto (2013)</td>
<td>To address human errors that can ruin the project planning process</td>
<td>Winch (2013)</td>
<td>To examine why major projects escalate in schedule and budget</td>
</tr>
<tr>
<td>Dominic and Smith (2014)</td>
<td>To present a holistic view on the causes of cost overruns</td>
<td>Clegg et al. (2014)</td>
<td>To provide reflections on phronetic social science and Flyvbjerg’s works</td>
</tr>
</tbody>
</table>

Source: Field work

#### 3.7.1 Psychological explanations

Psychological explanations are based on the concept of planning fallacy and optimism bias. They refer to the fact that humans are imperfect and make mistakes due to limitations inherent in their nature. Planning fallacy leads people to expect to finish a task much earlier than they actually do, despite possessing knowledge that previous tasks have generally taken longer than planned. Kahneman and Tversky (1979) introduced this topic into the psychological literature, and it has been well investigated in studies ranging in scale from novel laboratory tasks (Buehler et al., 1994; Byram,
1997; Newby-Clark et al., 2000; Pezzo et al., 2006) to large-scale industrial projects (Hall, 1980; Schnaars, 1989; Flyvbjerg et al., 2002). In the context of projects, planning fallacy leads planners and promoters not to consider the potential for mistakes and consequently overestimate the benefits and underestimate cost and time. In this sense, their decisions are based on delusional optimism rather than on a rational weighing of gains, losses, and probabilities. As a result, their estimates are unlikely to meet project requirements such as budget, time, and expected returns. As an example of planning fallacy, Buehler et al. (2010) report Denver’s ambitious Stapleton International Airport, which was

“...opened 16 months later than planned at a cost of at least $2 billion over budget, it can only be defined as a case of the planning fallacy if the planners had knowledge of a set of similar projects that had taken longer than planned (which they surely did)” (p. 3).

Lovallo and Kahneman (2003) mention that planning fallacy is due to the fact that actors take an inside view, focusing on the project itself and its details, rather than adopting an outside view based on information drawn from a class of similar projects. On the contrary, in the context where planners have no access to the relevant historical information, they often make their decisions under optimism bias. This cognitive disposition leads people to see themselves as less likely to experience negative events and more likely to experience positive ones. To put it differently, optimism bias causes a chronic tendency to expect better-than-average outcomes, and, in the context of projects, induces planners to discount negative information and make highly positive estimates for projects.

A review of the literature revealed that the reasons behind overoptimism are that people a) do not take into account the fact that in the past they have been interrupted or surprised by something outside of their control (Hinds, 1999; Roy et al., 2005); b) fail to consider all the subcomponents of the planned task (Connolly and Dean, 1997; Kruger and Evans, 2004); c) ignore how long similar projects have usually taken for them in the past (Kahneman and Lovallo, 1993; Buehler et al., 1994); or d) are overly narrow in their focus on future plans (Buehler and Griffin, 2003; Sanna and Schwarz, 2004). In project management, Pinto (2013) identifies the following reasons behind stakeholders’ optimism bias:

- their desired end state
• their cognitive mechanisms
• the information they have about themselves versus others
• their overall mood

Indeed, highly optimistic predictions have far-reaching consequences for organisations and even entire industries (Sanna et al., 2005). For this reason, the UK’s HM Treasury (cited in Winch, 2008) has addressed the influence of optimism bias in their schemes:

“...there is a demonstrated, systematic, tendency for project appraisers to be overly optimistic. This is a worldwide phenomenon that affects both the private and public sectors. Many project parameters are affected by optimism – appraisers tend to overstate benefits, and understate timings and costs, both capital and operational” (p. 4).

In recent years, numerous studies have suggested several ways to mitigate and eliminate the effects of cognitive biases. In the UK, for instance, the Department of Transport asks forecasters to apply ‘optimism uplifts’ to their estimated budgets at the time of decision to build—before obtaining the go or no-go verdict for that project. Flyvbjerg and COWI (2004) explain the influence of optimism uplifts with a numerical example. Suppose project promoters decide to take the risk of cost overrun’s being less than 20%, and assume a level of optimism bias of 80%. Then, they conclude, an uplift of 32% should be calculated into the estimated capital expenditure budget. Thus, if project cost is initially estimated at £100 million, by incorporating uplifts, the final budget would be £132 million.

### 3.7.2 Political-economic explanation

In many organisations, planners’ actions might be associated with the exercise of power and incentive-oriented behaviour rather than with knowledge (Clegg, 1989). This concept provides the basis of communicative action theorists’ approach, which views planners as actors in the world rather than as neutral experts (see e.g. Howe and Kaufman, 1979; Innes, 1995). Howe and Kaufman (1979) have divided planners into two groups: those planners who see themselves as technicians and those planners who perceive themselves as political actors. They mention that those who cannot classify themselves into one of these two groups strongly feel the competing pressure of both roles (see also Wachs, 1990). In another study, Innes (1995) criticises the instrumental rationality approach of planners, which views planning as an important tool with which to gain more power than is legitimate. She elucidates that:
“If knowledge that makes a difference is constructed through a process in which a planner is not only a player, but a guide and manager, initiating and framing questions and directing attention, then ethical principles for this planner become even more essential” (p. 185).

This ethical dimension of forecasting is the basis of Flyvbjerg’s political-economic explanation. On this basis, planners do intentionally and strategically overestimate benefits and underestimate costs and times to increase the likelihood of their project being authorised and funded. The political-economic explanation is also known as strategic misrepresentation (Flyvbjerg et al., 2002)—the ‘dark side’ of planning—where project managers and planners frequently lie with numbers (Flyvbjerg, 2005; 2009; see also Wachs, 1989, 1990). The rationale of this concept is that a project that appears more beneficial on paper then it would have a greater chance of being funded. For this purpose, contractors may intentionally propose bids—which are unrealistically biased—to fit within the acceptable budget of the project owners. Indeed, contractors know from experience that clients will typically tolerate subsequent cost escalations and time overruns when they occur. It seems to be not reasonable to stop the project once a considerable amount of money has already been spent to get it started (Dominic and Smith, 2014).

In recent years, a large and growing body of literature has highlighted the importance of strategic misrepresentation and its consequences on construction projects (see e.g. Williams et al., 2009; Winch, 2013; Pinto, 2013). Winch (2013), for instance, argues that strategic misrepresentation is a result of a lack of openness rather than lying about the future. He believes that future-perfect strategising tempts project promoters to use strategic misrepresentation. However, Pinto (2013) identifies political and organisational pressure as underlying motives for strategic misrepresentation. He notes that “decision-makers and politicians are well aware that full disclosure estimates will frequently doom projects even before they are started” (p. 646).

To reduce and overcome strategic misrepresentation, it is suggested that project owners use the mechanisms of transparency and accountability, including peer reviews of forecasts by independent experts, revealing the results of benchmarking to the public along with all relevant documentation, and rewarding projects having realistic time and cost estimates (Flyvbjerg et al., 2005). Another helpful method to redress the tendency towards optimistic estimation is reference class forecasting developed by Kahneman and Tversky (1979). This method persuades planners to take an outside view and to
base their predictions on a statistical distribution of outcomes of the class of reference projects (benchmarking the forecasts against comparable forecasts). The effectiveness of reference class forecasting has been tested empirically both in large-scale construction projects (Flyvbjerg and COWI, 2004) and in experimental research (Buehler et al., 1994; Lovallo and Kahneman, 2003). The American Planning Association (APA) (2005) encourages planners to use this method as a way to make better forecasts and improve forecasting accuracy. This method is more appropriate for non-routine projects such as towers, stadiums, and exhibition centres. Notably, one might ask, given that the method of reference class forecasting seems so obvious, why has it not been used before? Flyvbjerg (2008) notes that conducting reference class forecasting is difficult due to the problem of gathering a valid dataset containing reliable forecasts. He believes “such datasets are rare in real-life policy-making and planning” (p. 10).

3.7.3 A need for further research

Although the explanations provided by Flyvbjerg and his associates concerning the planning of projects seem appealing, a few critical issues remain underexplored. The contribution of the present research is to build upon the work of Flyvbjerg and his colleagues and to consider those critical aspects that remain untouched in that particular research.

First, diagnosing the problem of forecasting inaccuracies suggested by Flyvbjerg and his colleagues has been explored primarily with respect to project cost overrun (see Table 3.3). However, reviewing the literature on project overruns, no study was found to focus exclusively on explaining project delays using optimism bias and strategic misrepresentation (though they might partially refer to the issue of time overrun). This thesis, thus, will contribute to the literature by extending the effects of Flyvbjerg’s explanations on project time and time overruns, the reason being that when planners forecast the cost of a project, they estimate the completion time of that project as well. In addition, cost overruns are always accompanied by time overruns since providing additional funding to cover excess expenditure often takes time (Flyvbjerg et al., 2004).

Second, although optimism bias and strategic misrepresentation are well-defined concepts, the relationship and dynamics between them remains underexplored. Winch (2008) highlights this disconnection by noting that “it is important to distinguish
strategic misrepresentation from the linked concept of optimism bias” (p. 4). It seems that the research to date has tended to focus on one or the other but not both simultaneously in a single project so as to examine how their influence and the nature of their concern might differ. The only notable exception found was the research carried out by Flyvbjerg et al. (2009), who compared the relative explanatory power of optimism bias and strategic misrepresentation in ‘megaprojects’ to identify whether inaccuracies in forecasts of project cost are more likely to be due to one or the other explanation or to both equally. They concluded that strategic misrepresentation could be observed in situations where political and organisational pressures are high, whereas optimism bias could be seen where political and organisational pressures are absent or low (see Figure 3.1). However, they have suggested that further research on this issue is required to establish whether this is the case in other projects. Similarly, in another study, Kutsch et al. (2011) noted that “understanding how these explanations combine will be an interesting field for further study” (p. 1072). Therefore, the purpose of the present research is to explore just how both optimism bias and strategic misrepresentation play out in the planning of projects in a single context.

![Figure 3.1: Explanatory power of optimism bias and strategic misrepresentation (Flyvbjerg, et al., 2009).](image)

Third, surprisingly, previous research has not examined the applicability of Flyvbjerg’s explanations to other types and sizes of projects. Notably, he and his colleagues tried to investigate this issue in one of their studies (Flyvbjerg et al., 2004), and, in terms of project size, concluded that their data did not support that “bigger projects have larger overruns than smaller ones” (p. 16). Regarding different project types, they considered
three types of project ownership: private, state-owned enterprise, and other public ownership. They confirmed that private ownership may help protect the ordinary taxpayer from financial risk and may reduce the number of people exposed to such risk. However, they concluded that

“Little evidence is presented here or elsewhere in the literature that would demonstrate that private projects do indeed perform better than public ones...We expect further research on this issue to be particularly rewarding in either falsifying or confirming this finding” (p. 15).

Thus, it is important to determine whether optimism bias and strategic misrepresentation are generalisable to smaller projects or projects with fixed price and lump sum contracts.

Fourth, Flyvbjerg et al. (2009) mentioned that strategic misrepresentation is due to intentional actions of planners, whereas optimism bias is because of unintentional errors made in the planning process. However, their research did not differentiate between these intentional/unintentional acts of planners nor did it explain under what conditions planners make their decisions intentionally or unintentionally, thus indicating the relative absence of studying the intentionalities of the planners involved in the planning process. Therefore, the present research attempts to inject fresh insights into how intentionality can play a crucial role in advancing our understanding about planners’ actions in producing a biased estimate of completion time.

Fifth, it seems that much of the research on forecasting inaccuracies tends to focus on the role of the planner as an individual rather than on his role within the group (see e.g. Kruger and Evans, 2004; Peetz et al., 2010). Even a review of Flyvbjerg’s works reveals the absence of the collective role of planners. Sanna et al (2005) state that this neglect is surprising since planning and forecasting of project outcomes are not typically carried out by individuals but by groups such as committees, teams, or work groups. In addition, planners often develop their forecasts in team meetings and are called upon to justify their predictions on the basis of detailed step-by-step plans (Kerr and Tindale, 2011). More importantly, groups behave and act differently from individuals in many circumstances in terms of identifying problems and generating possible solutions (Sutter et al., 2009). Therefore, this thesis extends the existing scholarship by focusing on the role of groups in producing estimations of project completion time.
In order to address the five numbered concerns, the following key issues must be addressed:

1. How can we differentiate between planners’ intentional and unintentional actions?
2. How can a ‘group’ of planners underestimate the completion time of projects?

3.8 Towards a greater emphasis on planning intentionality

In the previous sections, the current literature concerning the planner’s role in construction was critically reviewed, raising questions about intentional and unintentional acts of planners in estimating project outcomes. In this section, it is argued how the concept of intentionality can play a crucial role in advancing our understanding about planners’ actions in producing biased estimates of completion time.

3.8.1 Introduction to intentionality

Intentionality plays a significant role in the epistemology of the cognitive sciences and the ontological status of social entities. It characterises both humans’ actions and minds (Bratman, 1992) towards a specific object (goal) or a path in order to achieve something (means) (Bird, 1988). The term ‘intentionality’ comes from the Latin word *intentio* (from the verb *intender*), which means ‘being directed towards an object’ (Brentano, 1985). It is also defined as “the property of actions that makes ordinary people and scholars alike call them purposeful, meant, or done intentionally” (Malle et al., 2001, p. 3).

The importance of intentionality as a property of mind has been widely recognised (Searle, 1990). Whilst the origin of the concept of intentionality can be traced back to Plato and Aristotle’s works (382 B.C.), early writings about intentionality in the 12th century were intimately connected with religious debates concerning the concept of free will (Malle and Knobe, 1997). However, the modern formulation of the concept of intentionality was made by Franz Brentano in 1874. He had a predominant role in keeping the term intentionality alive in the philosophical discussions of the last century. Also, he was well aware of the deep historical background of the concept of intentionality through reviews of scholastic discussions from the theories of Descartes through to Aristotle’s work. In his approach, in all mental phenomena, whether they consist of presentation, judgement, love, hate, or desire, there is always something that is the object of that act. In other words, each mental act has directedness towards an
object (Siewert, 2003). Later on, Husserl utilised this as the key concept in his works to develop a theory about the human structure of meaning and the world in which meaning occurs.

Dennett (1989) declares that intentionality and consciousness are the two most important notions related to the distinguishing property. Although they might seem to many to be synonymous, they have entirely different meanings. According to Siewert (2003), consciousness is a feature “shared by sense-experience and imagery… it is the feature that consists in its seeming some way to one to have experiences” (p. 1). *Seeming* here refers to the way something sounds to you or the way something looks to you, as, for example, a baby seeming to suffer pain. However, intentionality is related to the directedness and aboutness of the mental states. The term *aboutness* is that aspect of mental states or events that consists in their being *of* or *about* things (Siewert, 2003). Jacob (2003) believes that the aboutness of beliefs and desires has the potential to misrepresent. To make this point clear, he used the example of the compass. As long as the compass is away from magnetic objects, the needle accurately points north—regardless of the purpose and intentions of its designers and users. However, if a magnetic object interferes with its work, the compass can misrepresent the direction of north, and this misrepresentation is due to intentionality rather than consciousness.

### 3.8.2 Differentiation between intentional and unintentional actions

Within the context of the present research, the important issue is differentiating between intentional and unintentional actions. In so doing, the shared folk concept of intentionality developed by Malle and Knobe (1997) is used. The folk concept is a notion that ordinary people use in order to make sense of their actions and behaviours. As Malle and Knobe (1997) point out, this concept has five components, including “a desire for an outcome; beliefs about an action that leads to that outcome; an intention to perform the action; skills to perform the action; and an awareness of fulfilling the intention while performing the action” (p. 111). In order for a person to act intentionally, all five of these components should be present. The authors further explain the effect of these components in two stages; in the first stage, the five components constitute an intentional action; and in the second stage, the intentional action could affect and change the agent’s goals and behaviours (see Figure 3.2).
Figure 3.2: The two stages of intentional action (after Malle and Knobe, 1997).

As the above figure illustrates, merely investigating individual intentions is insufficient because a person may have an intention to do something (e.g. planners may have the intention to predict a project’s outcome as accurately as possible) but may actually do something else instead (e.g. planners might wrongly estimate due to lack of skill or knowledge). Thus, based on the folk concept, their action cannot be intentional. Knobe and Bura (2006), highlighting the difference between intention and intentional action, note that intention is a particular type of mental state which aims to predict and explain human behaviour whereas intentionality (acting intentionally) is linked to the idea that behaviour assumes to be performed ‘intentionally’ if it stands in the right sort of relation to the agent’s intentions, e.g. John tried to make the coin land on tails (intention) while his friends thought that he made the coin land on tails intentionally (intentionality).

The framework depicted in Figure 3.2 also offers the possibility of opening new lines of inquiry for researchers of construction delays. For example, what desires, beliefs, and intentions drive planners to make decisions about the project time plan during the front-end of the project life cycle? What skills and awareness of information help inform this process? To what extent is this based on informed judgements about what is realistic? How are the desires, beliefs, skills, and awareness of individual stakeholders connected with (or disconnected from) the goals and behaviours of the decision-makers? How can researchers capture these dynamics through the research observations that go beyond the use of self-perception questionnaires? The answers to these questions will be investigated in chapters 6 to 8 of the present research.
3.8.3 The importance of intentionality in project management

The importance of intentionality in project management and how the actions and minds of humans serve to achieve particular goals in a meaningful way have long been matters of concern in philosophy (see e.g. Searle, 1990; Bratman, 1992), psychology (see e.g. Bird, 1988; Malle et al., 2001), and the social sciences (see e.g. Giddens, 1984; Rosenberg, 2008). Rosenberg (2008), for example, notes that the aim of social science is to reveal the meaning of actions through intentionality. He argues that “the study of man that does not treat his behaviour as action, guided by intentions and meanings, is simply not a social science” (p. 15).

However, it is surprising that intentionality has received little research attention in the field of project management, while there is greater purchase in the mainstream management literature in terms of exploring the role of human intentions in seeking managerial outcomes (e.g. Ghoshal, 2005; Hutzschenreuter et al., 2010; Dhillon et al., 2011; Boyd and Bentley, 2012).

Ghoshal (2005), for instance, criticised management scholars for their naturalistic approach towards developing mathematical models for investigation into management research questions instead of considering issues such as human intentionality and agency. He argued that the reason for some of the failings of management practices is the exclusion of human intentionality from the social sciences. In another study, Dhillon et al. (2011) examined the relationship between intentionality and power in information system implementation and concluded that organisational power affects individual intentions of stakeholders and that those intentions later shape implementation. In construction management, Boyd and Bentley (2012) mention that project plans are produced by the interactions of individuals who have shared intention and that those intentions are ‘key’ to improving future construction projects. Closer to the discussion of the present research, Hutzschenreuter et al. (2010) attempted to explain why and how intentionality matters in management and organisations by exploring the role of managerial intentionality through focusing on the role of managers in international business. They noted that the question of what intentionality comprises was still an open question.

Nonaka and Peltokorpi (2006) declared that intentionality plays an important role in organisational adaptation and change. Similarly, Volberda and Lewin (2003) argue that “change is not an outcome of managerial adaptation or environmental selection but rather the joint outcome of intentionality and environmental effects” (p. 2132). This is
the subject of the strategic choice theory (Child, 1997), which endows organisations with the ability to change their destiny by adapting themselves and reshaping their environments. In fact, actors have possibilities and options when confronted with a certain situation, enabling their actions and choices to be based thereon. Intentionality enables them to give shape to their strategic actions (Bandura, 2001) and to establish ‘what is preferable’ (Felin and Foss, 2006). Strategic actions refer to the actions of managers and key organisation actors who are able, due to their insertion in circuits of power (Clegg, 1989), to intervene through a deliberative process to achieve their goals, such as proposing new visions and innovative practices within organisations (Rodrigues and Child, 2003). However, these key actors might have different intentions, beliefs, interests, and expectations that influence their behaviour in collective settings. This raises interesting issues regarding the possibility of collective intentionality, which, as Zollo and Winter (2002) revealed, is often taken for granted in organisational studies.

Thus far, intentionality is described in a very broad sense to explain how intentional actions of social actors can exert influence on individuals, shape communities, and change the environment. Therefore, it is argued that expanding an appreciation for intentionality can yield much in terms of problematising delays in projects (see e.g. Sandberg and Alvesson, 2011; Häggren, 2012).

3.8.4 Planning intentionality: A need to understand planners’ intentionality
In the second chapter of this thesis, it has been suggested that intentionality could provide a more effective understanding of complex actions of actors involved in projects, that is, that actors (in casu planners) have different types of intentionality, the deliberative ability to make choices and give shape to action plans, which in turn influences their choices, decisions, and behaviours. For example, Osland and Strand (2010) note that some planners “may be opportunistic, and may have positions in a bureaucracy which gives them a combination of autonomy and lack of self-interest in the outcome of political processes, and therefore also the ability to act in accordance with norms rooted in a professional ethos” (p. 86). In such a situation, despite planners being ‘aware’ of the possible outcomes and having the right ‘skill’ to avoid them, they withhold their knowledge or misrepresent information in order to obtain more rewards, and so their intended actions are thus in line with what Flyvbjerg et al. (2009) call strategic misrepresentation. Wachs (1990) identifies these types of planners as advocates, who listen to their clients or employers and “cook” the forecasts to save their
In contrast, there might be situations in which planners are optimistic in their estimations of project time (Buehler et al., 2010) where their estimations are unintentionally biased due to the dynamic nature of the plan and its development over time (Suchman, 1987). This is where planners’ errors are unintended and could be explained in light of optimism bias (Lovatto and Kahneman, 2003). For example, in a study carried out by Winch and Kelsey (2005), the authors interviewed 18 construction planners to obtain a better understanding of the planning practice in the UK construction industry. Generally, all planners said that they would not optimise time estimates even if they understood that time was of the essence to the client on that particular project. Most of them said that they “would be prepared to ‘walk away’ from a contract if the construction period stated in the tender were wholly unreasonable by the submission of a non-conforming bid” (p. 149). Wachs (1990) calls these types of planners scientists who analyse data to discover the truth and clarify the best choices from among several courses of action. Scientists, in general, believe that project plans are neither well defined from the beginning, nor are they stable throughout the implementation stage of construction projects (Tryggestad et al., 2010; Pollack, 2007). Therefore, the scientist type of planners suggests that, when unplanned issues that were not apparent earlier emerge at this stage, the project team should either adapt to the change by making use of their knowledge or gain the knowledge required to resolve the issue (Hällgren and Wilson, 2007). Dominic and Smith (2014) argue that in such a situation, if planners underestimate project completion time, it is not based on their intended actions; rather it is due to the potential gains enticing them and blinding them to the likely pitfalls.

To differentiate between the intended and unintended actions of planners, following Lewin and Volberda (1999) and Hutzschenreuter et al. (2010), who introduced managerial intentionality as a specific form of intentionality, the present thesis uses the term planning intentionality. This theoretical concept emphasises the difference between planning intentionality and other types of intentionality and aims to provide an understanding of the intentionality behind planners’ actions so as to explain why they perform certain actions or operations. Planning intentionality is developed to urge that
more attention be paid to studying intentionalities of planners involved in planning the schedule and budget for projects. Indeed, understanding the conditions that result in intended or unintended mistakes of planners is necessary to reduce their incidence within projects (Love et al., 2012). Through this, planning intentionality can contribute to the recent debate on strategic misrepresentation (intended) or optimism bias (unintended) (see Flyvbjerg et al., 2009). The above arguments regarding intended and unintended actions of planners, and how they relate to problems of project delay, are illustrated and summarised below in Table 3.4.

### Table 3.4: Delays based on intended and unintended actions of planners.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Delays as...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unintended</td>
</tr>
<tr>
<td><strong>Key character</strong></td>
<td>Emergent</td>
</tr>
<tr>
<td><strong>What planners do</strong></td>
<td>Make sense of time, moving forward</td>
</tr>
<tr>
<td><strong>Theoretical orientation</strong></td>
<td>Optimism bias</td>
</tr>
<tr>
<td><strong>Example authors</strong></td>
<td>Lovallo and Kähneman (2003); Buehler et al. (2010); Kutsch et al. (2011)</td>
</tr>
</tbody>
</table>

Source: Field work

### 3.9 Time estimation as a group activity

A review of the literature of project planning and how planners estimate the future outcomes of projects revealed that the vast majority of empirical studies in this area have focused on the individual performing a forecasting task (see e.g. Kruger and Evans, 2004; Thomas et al., 2003; Flyvbjerg et al., 2009) and overlooked the collective outcomes of groups (Buehler et al., 2005; Kocher and Sutter, 2005). This neglect is surprising since, in real-life situations, the planners are, in fact, groups rather than individuals (Sanna et al., 2005). Indeed, examining the decisions of planners within their team is warranted and deserves more attention since their decisions may have far-reaching consequences for the project (Kocher and Sutter, 2007). Therefore, it is crucial to study the group in the context of projects because what happens within a group is likely to influence that group’s collective decision, and, conversely, what happens to the group (as a whole) may affect intra-group activity (Gillet et al., 2009). As a result, the purpose of this section is to open the ‘black box’ of decision making within the planner’s team in order to understand the distinctive nature of within-team interaction and to gain an insight into the process of making joint decisions regarding project completion time, which, of course, is absent in the literature of project time planning.
3.9.1 Challenges in team decision making

The team is the basic unit of performance in organisational settings (Moon et al., 2003; Katzenbach and Smith, 2005), and teamwork is conventionally used by organisations in order to enhance the decision-making quality of individuals (Maciejovsky et al., 2013). The reason is that teams are comprised of individuals possessing various skills, experiences, and knowledge which can be aggregated to enhance decision quality and improve organisational performance (Delarue et al., 2008). In the context of projects, some teams have a hierarchical structure with respect to the decision-making process, i.e. decisions are usually taken by the team leader, while others have a nonhierarchical structure in which all team members are equal *ex ante* and aggregate their preferences to reach a single decision. The focus of this research, similar to the growing literature on differences between individuals and teams, is on the latter case, which is termed the unitary team (Balafoutas et al., 2014).

Members of unitary teams are supposed to make their decisions within their group, and this decision might be subject to many kinds of interaction, cooperation and competition issues. In fact, one important challenge here is moving from a diverse set of individual intentionalities to agreement on a consensus choice for the group (collective intentionality). This issue has been addressed through the Social Decision Scheme (SDS) theory by Davis (1973) in small-group research. He developed an analytical method to combine a distribution of member preferences into one group choice. According to SDS theory, each individual has a weight, and so each individual’s decision can change the final group outcome, thus implying that the outcomes of group decisions in a unitary team not only depend on one individual’s perception but also on the decisions of other members of that team. To combine these different perceptions and points of view into a team choice, teams usually sit through a number of meetings and group discussions to aggregate individual preferences.

However, in reality, the process of consensus-seeking is not straightforward, particularly, in the context of project planning, in which the type of decision taken by a group of planners is not only intellective but also has judgemental characteristics due to the high uncertainty involved at the front-end stage of projects (Williams et al., 2009). Thus, planners wishing to make decisions regarding the project schedule often have different preferences from one another. Graefe and Armstrong (2011) indicate that these difficulties in communication and interaction between team members worsen the quality
of the group’s decision. In such a situation, as Hall (1971, p. 51) contends, “Group decisions often are frustrating and inadequate. All members want agreement, but they also want to make their own points heard”. Therefore, one could assume that no matter how aggregated individuals’ decisions may be, single group decisions need not simply be the sum of these individual decisions (Levine and Moreland, 1998). Due to the importance of group discussion and the way interaction with fellow group members or even simply belonging to a group can affect the quality of decisions, investigating how group discussion is able to influence a group’s judgements and shift the preferences of individual group members is worthwhile, and I shall now proceed to do so in the following sub-section.

3.9.2 The effect of group discussion on time estimation

For many years, the vast majority of the literature attempted to investigate empirically the nature and quality of decisions made by teams and individuals (for a recent review, see Charness and Sutter, 2012) and to compare the differences of those decisions in interactive/non-interactive situations (Kugler et al., 2012). However, the results of these studies are not clear-cut and sometimes even contradictory (Kocher and Sutter, 2007). According to Kerr et al. (1996), for example, in decision-based tasks where an objective correct solution exists, groups generally perform better than individuals. Similarly, Cooper and Sutter (2011) found that group decisions are more reliable than individual decisions due to discussion within groups (see also Casari et al., 2010). In contrast, Buehler et al. (2005) found that in terms of time estimation, group predictions were more optimistic than individual predictions and resulted in worse estimates (see also Sanna et al., 2005). The reason, as they mentioned, is because participants in the group-based tasks have a tendency to focus selectively on factors promoting successful task completion, which consequently suppress thoughts regarding potential impediments. This inconclusiveness of existing results raises an important question regarding how communication and group interaction affect individual choices in their decision making for the group (Kocher and Sutter, 2007), particularly in competitive environments (Magee et al., 2007).

Generally, when a group of planners wish to decide on the outcome of projects, each of them comes to the group with individually-generated preferences or solutions along with information, evidence, and documents to support and justify his/her claims or positions. The group’s task is then to participate in a collaborative effort to aggregate
individuals’ approaches in order to achieve a group forecast, a process known as ‘group-based forecasting’ (Kerr and Tindale, 2011). The traditional and popular aggregation method of group-based forecasting is by means of meetings and group discussion between decision-makers.

However, the effectiveness of this conventional approach has been challenged by Kerr et al. (1996). Through numerous experiments, they concluded that group discussion “can attenuate, amplify, or simply reproduce the judgmental bias of individuals” (p. 693). Consequently, a substantial body of literature has concluded that interaction with others does not necessarily improve the quality of judgements (see e.g. Kocher and Sutter, 2005; Buehler et al., 2005). Buehler et al. (2005), for example, argue that group discussion tends to heighten the optimism bias in people’s task completion forecasts and supply two reasons to explain the failure of group discussion to result in better decisions: overconfidence bias, which is often accentuated by group discussion, and judgmental bias, known also as base-rate neglect (Kahneman and Tversky, 1979), whereby people do not adequately take into account overall probabilities and relevant information when making predictions.

In another study, Graefe and Armstrong (2011) questioned the productivity of face-to-face meetings as a method of eliciting project forecasts (see also Green et al., 2007). They mentioned that meetings 1) urge groups to reach ‘speedy decisions’ and do not consider all problems and complexities; 2) cause less confident people or people from lower hierarchic levels to be silent and so be less likely to express their ideas; 3) require time and effort for the group to maintain itself; 4) are expensive to schedule and run; and 5) cause dominant people to exert their influence on the group. They have therefore suggested that statistical aggregation and/or structured approaches such as the Nominal Group Technique (NTG) or Delphi method should replace traditional meetings in order to produce more accurate forecasts.

Statistical aggregation involves no interaction or communication among group members but is based on using certain central tendency statistic(s) (e.g. an arithmetic mean of quantitative forecasts) to aggregate group members’ estimates. Kerr and Tindale (2011) argue that statistical aggregation could achieve a higher level of accuracy than group judgements based on the consensus because in the former there are no social dilemmas involved that could change individual forecasters’ initial preferences. In contrast, Van
Dijk et al. (2012) found that, although in simple cases statistical aggregation of individual preferences led to fewer errors than group discussion, in more difficult and complicated cases, the opposite was true.

Therefore, given the inconclusiveness of existing results, additional evidence on the aggregation of individual preferences into team choices seems desirable. This raises the following important question: Does mechanical aggregation of individual opinions result in more accurate forecasts for group activities than group discussion? To answer this, the present study aims to investigate this issue through two different methods: face-to-face meetings and statistical aggregation methods. This will potentially shed light on which of these methods produces more or less accurate group forecasts and why, and will thus aid planners who employ primarily group meetings to reach joint decisions about project time.

3.9.3 The collectivity involved in group decisions

One important issue that deserves more attention in the study of project planners as a group is the collectivity involved in their joint decisions. Tollefsen (2004) mention that assessing the collaborative work of a group is a complex undertaking in its own right, since the aggregation and emergence of individuals’ intentions or norms to the collective level is not straightforward. For example, Pettit (2001) argues that a group may sometimes collectively endorse a conclusion that a majority of its members individually reject. As an example, some group members may not happy with an outcome but do not challenge it because they are afraid to speak out or may want the session to end quickly. Thus, in motivating project management scholars to critically examine the relationship between individuals and groups, Cicmil and Hodgson (2006) stress the following:

“There is a need to explore how the relationships between individuals and collectivities are being constituted and reproduced in the context of project management, and how asymmetrical power relations create and sustain the social reality of projects” (p. 118).

Mead (1934) argues that humans do not live in a void or vacuum and need to communicate with others within the social realm to understand their ‘self’. This self, he argues, is being continuously developed through interaction with other human beings; it is the “product of social interaction, developed and refined through an on-going process of participation in society” (Jeon, 2004, p. 250). Mead (1934) contends that the ‘self’
consists of two parts. The ‘I’ is subjective and active while the ‘me’ is objective and passive, and the person’s behaviour is a result of their interaction. Searle (1990) explains Mead’s self as individual intentionality of an agent and believes that it shapes and informs individual actions and behaviours. However, he argues that individual intentionality alone cannot explain collective actions (see also Bratman, 1992; Tuomela, 2005). He thus proposes the concept of collective intentionality which manifests itself in such cooperative behaviour as we believe, we desire, and we intend.

Tuomela (2005) maintains that, whenever a group of people engage in a common activity, each member of the group comes to an understanding of the goal of their actions as being something along the lines of “we will do X together”. This togetherness creates the group members’ joint action, because each group member sees other members as being part of the same group, each doing his or her part, as only a part of their doing it together. However, as Tollefsen (2004) argues, the move from many instances of “I” to a singular “we” is not always straightforward due to the conflict between rationality at the individual and collective levels. This leads to an important question: ‘Are collective intentions different from mere summation of individual intentions?’ This issue is subject to great controversy in the philosophy of mind and of cognitive sciences (see e.g. Searle, 1990; Bratman, 1992; Gilbert, 1994; Tuomela, 2005).

Searle (1990), for example, argues that a single person can have a collective intention such as “we intend to do X”. He gives an example that when a football team is attempting to execute a pass play, no one on the team can have “we are executing a pass play” as the entire content of his intention, since no one can execute a pass play alone. Each player will make a specific contribution to the overall goal. However, as Gilbert (1994) argues, Searle fails to capture the normative relations that form an integral part of collective intentions. For instance, in the example above, the football players are obligated to perform certain actions and, should one fail to do his or her part, the other players have the right to rebuke that teammate. This rebuke exhibits the normativity involved in joint action. Similarly, Bratman (1992), in opposition to Searle, contends that an individual cannot have a shared intention since a collective intention is the complex of individuals’ interrelated and reflexive attitudes. He believes that when “I intend that we do something”, there is something out of control; the important equal role of “you” is neglected in determining what will be done (see also Tollefsen, 2004).
Based on the above arguments, two widely accepted claims have been formed comprising summative and non-summative approaches. According to the former, collective intentionality is the sum of individual intentionality upon which the majority of the members of a group have agreed (Quinton, 1975). Consequently, for example, Group G believes in P if and only if all or some of its members believe in P (Tollefsen, 2002). By contrast, the latter suggests that collective intentionality is not reducible to individual intentionality since the intentional states of the individual members differ either in kind or content from those attributed to the group as a whole (Searle, 1990). Accordingly, for instance, the collective intentionality of Group G being X does not mean that each member’s individual action-intention tends towards X. Thus, a group’s arriving at a conclusion does not indicate that each member of that group individually agrees with the outcome.

The distinction between the summative and non-summative approaches of collective intentionality would seem to be of help in realising how far genuine collectivity is involved in the shared intentionality of a particular group (e.g. a group of planners). Furthermore, it enables us to know the extent to which the information and preferences shared by individuals determine the ‘collective’ decisions. Hence, the question needing to be addressed here is “To what extent does each individual take part in generating the ‘collective’ project estimations made by teams?” Moreover, considering the context in which group decision making occurs can aid in exploring interpretations and dynamics of human collective intentions.

3.10 Conclusion

As stated at the beginning of this chapter, its purpose is to demonstrate the need for a more critical scholarship that moves beyond merely enumerating the causes and consequences of delays to situating the problem within the particular contexts and struggles in which project planners operate. Thus, this chapter examined planners and their roles in construction projects. A key concept in exploring these roles is planning intentionality, which provides a tool with which to examine what role planners’ intentionality, articulated through embodied actions, plays in producing a project plan and thereby affording delays in projects, through planners’ intended and unintended actions.
First addressed was what role planners actually play in construction projects. Predominating the literature is a technicist view of the planner role, wherein the planner is a technician employing a set of tools (i.e. management science techniques and tools) to map out the unfolding of the project over time and estimate its outcomes with respect to time and cost. This view of planners as technicians treats projects as ‘machines’ which should, in theory, behave in a predictable manner and whose failure to perform as expected should be fixable through application of the proper technology (Cicmil et al., 2006; Pollack, 2007; Bredillet, 2008). This task oriented approach is in fact in line with approaches and recommendations given in the Project Management Body of Knowledge (PMBOK) to improve the process of planning. Impressed by this, it seems that previous studies have been motivated to either enhance the knowledgeability and capability of planners (see e.g. Laufer et al., 1994; Winch and Kelsey, 2005; Dvir et al., 2003) or to improve maturation of project management tools and techniques (see e.g. Sriprasert and Dawood, 2003; Baldwin et al., 2009).

This view of projects and of project planners was shown to be inadequate however. First, it assumes that planners are, to a certain extent, “omniscient and independent of the situation to be managed” (Winch, 2006, p. 170), a viewpoint which renders them woefully unprepared for managing a project situated in reality. Second, it discounts planners’ use of judgement, a very real but often neglected aspect of planning. Third, it ignores the need for and ability of planners to interact with the complexity of a project, including its social, political, and ontological aspects. Finally, the technicist view of planners does not explain why cost and time overruns have not shown significant improvement in spite of the advances made in management science.

To address these deficiencies, this chapter turned to the theories of Bent Flyvbjerg and his colleagues, which (1) provides a better understand of the actions, motivations, and behaviour of planners in the dynamic environment of construction projects; (2) seeks to discover why and how planners create plans that result in cost and time overruns; and (3) is unique in addressing planning failures within the context of construction projects. With respect to the latter, Flyvbjerg attributes some to optimism bias, wherein actors see themselves as less likely to experience negative events and more likely to experience positive ones, and some to strategic misrepresentation, wherein planners strategically overestimate benefits and underestimate costs and times in order to derive benefit for
themselves (see also Van Wee, 2007; Williams et al., 2009; Morris et al., 2011; Cicmil and Braddon, 2012; Winch, 2013; Pinto, 2013).

As helpful as these explanations for project cost overruns are, they are still deficient in some areas, and the purpose of this thesis is to address at least some of these. First, Flyvbjerg does not address project time and time overruns but rather emphasises project cost and cost overruns. However, cost overruns are almost always accompanied by time overruns. Second, the relationship and dynamics between optimism bias and strategic misrepresentation has remained largely unexplored. Third, the applicability of Flyvbjerg’s work to relatively small, fixed-price, and lump sum contract projects has not been addressed. Fourth, Flyvbjerg’s work did not address the intentionalities of planners. Fifth, the collective role of planners has been neglected, as the role of planner as an individual has been overemphasised.

To address the above concerns, this chapter has called for more attention to be directed at studying the intentionalities of planners involved in planning the schedule for projects. The agency of planners has intentionality, the deliberative ability to make choices and give shape to action plans, which in turn influences their choices, decisions, and behaviours. Therefore, applying the concept of planning intentionality to planners’ actions to explain why they perform certain actions or operations could aid in understanding how these actions or operations result in intended and unintended project delays. This chapter argued that understanding the conditions leading to intended or unintended mistakes of planners is crucial in reducing their incidence within projects.

In addition, the chapter noted that the decisions made concerning such outcomes of projects as completion time were mainly taken by groups such as committees, teams, or work groups. Yet, a review of the literature yields the surprising result that the research to date has primarily focused on the role of the planner as an individual, a limitation raised and discussed in this chapter. The study of collective decision-making would provide a better understanding of joint decisions made by groups of planners in estimating project completion times as well as explore the way group members move from a diverse set of individual preferences to agreement on a consensual, group estimate (the formation of collective intentionality). The argument made here is guided by three main questions which the present research must investigate: a) Do individuals make more accurate forecasts for group activities than those produced by teams? b) Do
face-to-face meetings help the teams reduce bias in their time estimation? and c) To what extent does each individual take part in generating the ‘collective’ project estimations made by teams?

This chapter in general has provided a detailed description and critical overview of the theoretical background of this research project. It has also discussed the available literature relating to the role planners play in generating inaccurate predictions of completion times and the knowledge gaps in this research area. The next chapter will present and explain the research design and methodology selected to carry out the study.
Chapter 4: Research design and methodology

4.1 Introduction
Prior to conducting any research, it is important to consider and evaluate the underpinning philosophical perspectives and the appropriate research method for the development of knowledge in that particular area. This chapter begins by defining academic research and differentiating it from other types of research. Next it discusses philosophical issues lying in the background of academic research and investigates ontological and epistemological assumptions adopted primarily by social science researchers. The chapter then identifies the research approach to be used herein by differentiating between inductive, deductive, and abductive reasoning, contrasts the qualitative and quantitative research traditions, and outlines the advantages of a mixed-methods research design.

Next, this chapter elucidates and distinguishes the popular research strategies as well as providing an explanation of the rationale behind the research strategies selected for this study. In particular, this section places particular emphasis on experimentation and interview since these are the main research strategies adopted for this research. Afterwards, data collection methods and analysis techniques are discussed. In each of these sections, reasons are provided and inferences drawn to justify the appropriateness of the choice of a particular type of research philosophy, approach, design, strategy, and data collection method. Later, in order to ensure the trustworthiness and quality of the research, this chapter discusses the appropriate criteria for ensuring its reliability and validity. Finally, the ethical considerations of the research are explained, and a brief summary and conclusions are provided.

4.2 Understanding ‘research’
“The scientist is not the person who knows a lot but rather the person who is not prepared to give up the search for truth” (Popper, 1989, p. 334)

We live in an information-dominated world. Like it or not, we are bombarded and affected by facts, figures, news, and ideas; we are connected to countless information sources such as TV, internet, newspapers, radio, and cell phones. And many of these sources use the term “research” to disseminate and vindicate the information they provide (Walliman, 2006). Politicians usually justify their decisions based upon “the
research”; newspapers report the findings of surveys carried out by agencies and companies; TV documentaries tell people about discoveries found through research; advertising companies encourage people to buy a particular brand or product by highlighting the results of their research (Saunders et al., 2009).

However, there is a big difference between using the term ‘research’ in everyday speech and what scholars address in their works. Watson (1987) declares that academic research is not merely about what is already know but, rather, is concerned with what is currently unknown, unrealised, or misinterpreted. In this sense, research can be viewed as a “voyage of discovery” (Fellows and Liu, 2008, p. 4). For Saunders et al. (2009), academic research is “something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge” (p. 5); moreover, they state, this type of research should have the following characteristics:

- Data are collected systematically.
- Data are interpreted systematically.
- There is a clear purpose: to find things out.

In the context of project management, Easterby-Smith et al. (2012) define research as a way of accelerating the process of understanding and distinguish between three types of research in management studies: pure, applied, and action research. Pure research aims to understand and expand knowledge and establish theoretical propositions—its outcome ‘might’ have practical implications as well. Pure research can be categorised into three forms:

1. **Discover**, which happens when a new theory or idea emerges from empirical research that may revolutionise our understanding of a particular topic. In its pure form, this type of research is rare.

2. **Invention**, which occurs when a unique technique, idea, or method is invented to solve particular problems.

3. **Reflection**, which takes place when an existing idea, method, or theory is reassessed in a different organisational or social context. Results of this type would cause those conventional ideas, methods, or theories to be revised and modified.
The second type of research is *applied research*, which attempts to provide solutions for managers or clients and to improve the productivity and efficiency of practical applications (Fellows and Liu, 2008). This type of research is very similar to consultancy and is often undertaken by people in a project-oriented industry, including organisations, agencies, and universities (Saunders et al., 2009). Applied researchers are interested in explaining “what” is happening rather than describing “why” it has happened (Easterby-Smith et al., 2012).

*Action research* is another common type of research in management studies. The rationale behind action research is that “research should lead to change, and therefore that change should be incorporated into the research process itself” (Easterby-Smith et al., 2012, p. 8). This research is normally carried out by small groups of individuals in a problem-solving team seeking to explain how understanding can be changed and new paradigms can emerge.

In the framework of this thesis, the researcher tried to be systematic, critical, and empirical, as well as to have academic integrity and to carry out pure research through reflection, which is based on critical re-investigation of previous ideas and theories.

### 4.3 Research philosophy

The term ‘research philosophy’ refers to the development and nature of knowledge in a particular field. Easterby-Smith et al. (2012, p. 2) argue that it is “unwise” to carry out management research without an awareness of background philosophical issues. The choice of research philosophy depicts why the research is conducted (Holden and Lynch, 2004); how the researcher perceives and ‘views’ the world (Saunders et al., 2009); and why specific research approaches or methods are chosen (Guba and Lincoln, 1994).

Saunders et al. (2009), drawing on Burrell and Morgan (1979), identify two major ways of thinking about research philosophy: ontologically and epistemologically. As discussed in Chapter 2 of this thesis, these two philosophical approaches influence the subjects being researched, and this influence translates into different worldviews, which form a “basic set of beliefs that guide action” (Creswell, 2009, p. 6). Others have called them ‘paradigms’ (Guba and Lincoln, 1994) or epistemologies and ontologies (Crotty, 1998). It is important to consider worldview before selecting the appropriate method for any research (Creswell, 2009; Saunders et al., 2009). Therefore, in the following
subsections, explanations of the characteristics of different research paradigms commonly used in management research are provided along with justifications for the selected research philosophy underpinning the nature of that particular research.

4.3.1 Ontological considerations
Ontology relates to the nature of reality and is concerned with the assumptions researchers hold about the way the world operates (Fellows and Liu, 2008; Saunders et al., 2009). Researchers have primarily addressed two important ontological considerations: objective and subjective reality (see e.g. Saunders et al., 2009; Gill and Johnson, 2010; Bryman, 2012; Easterby-Smith et al., 2012). However, many of these researchers used different labels to describe the same ontological perspectives within their works. For example, while Easterby-Smith et al. (2012) employed the terms ‘realism’ and ‘relativism’, Bryman (2012) employed ‘objectivism’ and ‘constructionism’, respectively. This thesis uses Saunders et al.’s (2009) terminology, which labelled these respective concepts as “objectivism” and “subjectivism”.

Objectivism is based on a realist philosophical underpinning (Pollack, 2007), which views meaningful reality as existing independently and apart from the consciousness of social actors (Crotty, 1998). For objectivists, meaning is already inherent within the object being examined (external to their minds), and the properties of that object are measurable and testable. Therefore, the researcher’s role is to construct meaning and interpret reality (Guba and Lincoln, 1994). This approach, in fact, came from the natural sciences to the social sciences (Gray, 2004). Consequently, many social scientists attempted to discover truth and law-like generalisations in the social sciences based on statistics by using methods that were successful in the natural sciences (Easterby-Smith et al., 2012). This view formalised the knowledge and gave rise to many quantitative studies aiming to identify the factors and variables influencing social issues (Candy, 1989).

In contrast, subjectivism views social phenomena as being created by the actions of social actors (Saunders et al., 2009) and not as something existing solely within the perceptions of individuals. Thus, they are a consequence of the actions of humans (Lincoln et al., 2011), and, subjectivists imply, investigating different interpretations of the social actors involved in a situation in which they interact with other members is important. For them, there is no such thing as ‘absolute reality’, and hence reality is
constantly changing (Husserl, 1946 cited in Easterby-Smith et al., 2012). In this perspective, the role of the researcher is “to understand the subjective reality of the actors in order to be able to make sense of and understand their motives, actions and intentions in a way that is meaningful” (Saunders et al., 2009, p. 111). The difficulty here, however, is to investigate appropriately the relationships between individual’s perceptions, actions, and the effect of external factors (Easterby-Smith et al., 2012).

4.3.2 Epistemological considerations

Epistemological considerations are based on a “general set of assumptions about the best ways of inquiring into the nature of the world” (Easterby-Smith et al., 2012, p. 18). Two main modern epistemological views explore how acceptable knowledge can be achieved: positivism and interpretivism (Saunders et al., 2009; Bryman, 2012). Table 4.1 below summarises the key features of these worldviews based on ontological and epistemological considerations.

<table>
<thead>
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<th>Table 4.1: Comparison of positivism and interpretivism.</th>
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<td><strong>Ontology:</strong> the researcher’s view of the nature of reality or being</td>
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<tr>
<td>External, objective, and independent of social actors</td>
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<tr>
<td><strong>Epistemology:</strong> the researcher’s view regarding what constitutes acceptable knowledge</td>
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Within social science, positivism believes that social phenomena should be studied using the methods of natural and physical science and assumes that “the social world exists externally, and that its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection or intuition” (Easterby-Smith et al., 2012, p. 22). The researchers following positivism’s line of thinking believe that the social reality is observable (and quantifiable) and that the outcomes of their research can be considered law-like generalisations (Gill and Johnson, 2010). Many of the current quantitative, statistical, and empirical studies are based on the positivist position (Tadajewski et al., 2011). Saunders et al. (2009) believe that one advantage of positivism is that it enables the researcher to adopt a “value-free” approach, being independent of the process and not interacting with subjects—neither affecting nor being affected by the subjects of the research. This value-free, or
objective, approach allows other researchers to use the results of that study in their works. However, the opponents of positivism argue that the social world is too complicated for researchers to theorise, so they claim that positivists’ interest is not to advance knowledge but rather solely to support powerful members of society (Habermas, 1972).

In contrast to positivism, interpretivism maintains that understanding differences between the actions of social actors and interpreting those is essential (Fellows and Liu, 2008). The aim of interpretivists is to obtain an understanding of the attitudes, cultures, and feelings of the actors by interpreting their perceptions (Lincoln et al., 2011). Their approach resembles the subjectivists’ view in a way, as both views reality and truth as being socially constructed by the persons involved in the social action. Saunders et al. (2009) mention that the challenge for interpretivist researchers is to adopt an “empathetic stance”, that is to say, to enter the social world of the research subjects and make sense of it as they ‘actually’ do (see also Weick, 1979). Adopting such a stance requires “extensive discussion with the participants, in order to achieve agreement on the representation (description) of their truth and reality and subsequent, further discussion to verify that the researcher’s representation is correct” (Fellows and Liu, 2008, p. 18). However, the difficulty with the interpretivist approach is that its findings cannot be generalised to a larger group of people because different people may interpret the same issue differently in different social settings, such as within organisations (Easterby-Smith et al., 2012).

4.3.3 Other philosophical positions
Apart from those dominant paradigms mentioned above, other philosophical positions requiring mentioning have arisen over the last few decades, including critical realism, critical theory (CMS), post-positivism, pragmatism, and social constructivism. A general overview of these philosophical positions is presented in the following subsections.

4.3.3.1 Critical realism
Bhaskar (1978) is known as the progenitor of critical realism. In Bhaskar’s terminology, realism provides the link between the researcher and what is being researched within the natural science community. However, it was further believed that social science must be critical of its object (Sayer, 1992). Critical realists raise the epistemological question of
how we can come to know about the reality of social actors (Greenwood, 1999). The main argument of critical realists is that what people experience in the real world actually consists of images of the things and not the things themselves (Saunders et al., 2009). To put it differently, what people see is only part of the bigger picture (Bhaskar, 1978). Unlike positivism, which assumes the existence of law-like generalisations or regularities in social settings, critical realism accepts that there is a reality but considers it not easy to apprehend because social entities such as organisations and individuals within that organisation have different powers to act and conflicting intents (Easton, 2010). Therefore, considering the context of the situations in which social actors are involved is essential in order to evaluate their actions critically (Easterby-Smith et al., 2012).

4.3.3.2 Critical theory

A social theory that emerged from the Frankfurt School, critical theory examines the constraints of society and culture in order to promote rationality, freedom, individuality, and community (Tadajewski et al., 2011). Drawing on critical theory, Alvesson and Willmott (1992) proposed the critical management studies (CMS) approach. They employed critical theory as a method to investigate how management practices work as political activities in a power-oriented world of projects and to develop what being ‘critical’ means within management studies. Notably, this approach has been discussed and used in Chapter 2 and 3 of this thesis.

4.3.3.3 Postpositivism

In postpositivism, the worldview is that of a modified version of positivism (Popper, 1989) more applicable for quantitative research than qualitative research (Creswell, 2009). The difference between postpositivism and positivism is that the former challenges the conventional assumption of the absolute truth of knowledge (Phillips and Burbules, 2000) and claims that we cannot be “positive about our claims of knowledge when studying the behaviour and actions of humans” (Creswell, 2009, p. 24). The primary aim of postpositivist researchers is to identify the causes of problems and their effects on outcomes through statistical analysis. Thus, they believe that truth and reality exist “out there” in the world and that their duty is to test and verify the laws and theories that govern the world. Lincoln et al. (2011) recommend that researchers following this line of thinking minimise their interactions with their research subjects and employ qualitative methods and descriptive data to support their arguments.
4.3.3.4 Pragmatism

The pragmatist worldview contends that knowledge and understanding are derived from lived experiences of humans with their environments on a continuous basis (Easterby-Smith et al., 2012). Thorpe and Holt (2008) mention that, in pragmatism, no proposition, structure, or category shapes knowledge. They argue that pragmatism “regards theories as tools or instruments in the human endeavour to cope with situations and events in life and “to construct meaning by applying concepts in an experimental way” (p. 169). In management research, Zald (1993) as well as Wicks and Freeman (1998) emphasised that pragmatism potentially offers “a way out of the positivism”. Because pragmatists believe that there are multiple realities and different ways of interpreting the world, demonstrating the entire picture of what happened in a particular research is impossible (Saunders et al., 2009). Thus, Cicmil et al. (2006, p. 677) note, the advantage of pragmatic research is “co-production of knowledge between the researcher and the researched (e.g. PM practitioner)” which can explain the connection between action and reflection (see also Calori, 2002).

4.3.3.5 Social constructivism

Social constructivism is a learning theory and maintains that “all human knowledge is warranted by our social process” (Thorpe and Holt, 2008, p. 56). It is typically associated with qualitative studies and has garnered considerable popularity in recent years (Osborne, 1996). Researchers who follow this line of thinking seek to obtain an understanding of the world in which their subjects live and work; and their goal is to rely as much as possible on the participants’ views of the situation (Creswell, 2009). They often collect their data through direct observations (e.g. ethnography) or discussion with open-ended questions (e.g. unstructured interviews) or interaction with the subjects—e.g. a case study (Lincoln et al., 2011). Constructivist researchers also focus on the context in which the processes of interaction between different actors take place in order to understand and make sense of the viewpoint that they have about the world in terms of personal, cultural, and historical issues. Crotty (1998, p. 43) expresses the following beliefs of social constructivists:

- “Meanings are constructed by human beings as they engage with the world they are interpreting;
- Humans engage with their world and make sense of it based on their historical and social perspectives; and
The basic generation of meaning is always social, arising in and out of interaction with a human community”.

4.3.4 The selected research philosophy
The choice of philosophical foundation is important since it shapes the foundation of the research and the conduct of inquiry (Creswell, 2009). In the present research, based on the research aim and objectives, pragmatism was chosen as the research paradigm for the following reasons:

- Tashakkori and Teddlie (2003) contend that, for mixed-methods researchers, pragmatism is the most ideal option since it permits researchers to use multiple methods of data collection in a single study. Pragmatism allows many approaches to data collection and analysis, avoiding subscription to only one method. Accordingly, quantitative data were collected from experimental studies, as well as qualitative data from the experiments’ subjects and interviews with practitioners.

- Creswell (2009) explains that pragmatists’ main concern is to understand the research problem and identify research questions properly, rather than focusing on methods first. This is in line with the adopted approach in this research. In fact, the reason for doing experiments was not mainly to accept or reject a pre-defined hypothesis but rather to obtain a better understanding of people’s process with regard to time estimation and how they fail to meet their deadlines. In fact, the reason for video-recording some of the experimental sessions was to enhance this level of understanding.

- The main questions that pragmatist researchers aim to answer are “what” and “how” types of question, which are similar to the research question of the present study, e.g. how do planners fail to estimate the completion time of projects?

- Creswell and Plano Clark (2011) suggest that researchers using the convergent research design (i.e. performing both quantitative and qualitative study at the same time), as with the Chapter 6 of this study, should work with “pragmatism to provide an ‘umbrella’ paradigm to the research study…pragmatism is well suited for guiding the work of merging the two approaches into a larger understanding” (p. 78). This allows the researcher to move back and forth
between abstract conceptualisation and experimentation and between the experience of interviewees and the meaning they make of that experience.

- Cicmil et al. (2006) encourage project management scholars to use pragmatic philosophical consideration to generate knowledge and build theory within their studies. They believe that pragmatism enhances understanding of “the actors’ moral and ethical motives”, gains a “closer insight into intentions and personal drives of individual actors”, and identifies “patterns of communicative relating among individuals and groups and how they are being negotiated in the context” (p. 676). In fact, all these issues are part of the main objectives of the present research.

Thus, adopting the pragmatism paradigm influenced the design of the present research in such a way that the “primary emphasis is not on ‘universals’ (i.e. elements of perceived ‘good practice’) but on a range of atypical things and activities experienced as significant by actors in the local context” (Cicmil et al., 2006, p. 677). Therefore, following pragmatism, the aim is to provide a holistic and shared understanding of human action and its meaning by applying concepts in an experimental way (see Thorpe and Holt, 2008).

4.4 Research approach

Based on the relationship between theory and research, three major methods of reasoning emerge: deductive (where theory guides research); inductive (where theory is an outcome of research); and abductive (where theory and knowledge are developed concurrently) (Bryman and Bell, 2007; Fellows and Liu, 2008; Creswell, 2009; Alvesson and Sköldberg, 2009). It should be noted that these research approaches can be used either independently or concurrently by a researcher within a study, e.g. a deductive-inductive approach (Walliman, 2006).

The choice of research approach is very important because it helps researchers to make better informed decisions concerning research design and data collection method (Saunders et al., 2009; Easterby-Smith et al., 2012). For example, Creswell (2009) states that if a considerable literature exists to define a theoretical structure and hypothesis of a research topic, the appropriate approach is the deductive approach; but for a new topic having little existing literature, the suitable approach is induction. In addition, selecting the appropriate research approach enables researchers to consider the
advantages and disadvantages of their chosen research strategies and select the one which provides a greater understanding of the research questions. Another advantage of having prior knowledge about different research approaches is that it provides researchers an opportunity to more efficiently respond to research limitations. For example, when there is a small sample of research subjects, inductive reasoning leads to better results than the deductive approach (Saunders et al., 2009).

The main characteristics of deductive, inductive, and abductive approaches as well as the differences between them are discussed in the following subsections. They have also been summarised in Table 4.2 at the end of this section.

4.4.1 Deductive approach

Deductive reasoning is to move from a general statement towards a specific one, informally called a ‘top-down’ approach (Fellows and Liu, 2008). It starts with the general theory or a known fact—which is mostly drawn from the academic literature—and then makes a specific hypothesis related to that theory or fact. Thereafter, deduction employs quantitative research strategies and empirical observation to validate or reject the generated theory (Bryman, 2012) or to modify it through replications of the study (Creswell, 2009).

Deductive reasoning is widely used in natural science and scientific research where “laws present the basis of explanation, allow the anticipation of phenomena, predict their occurrence and therefore permit them to be controlled” (Saunders et al., 2009, p. 124). By means of this, science is seen to proceed by trial and error within the boundaries of existing knowledge (Fellows and Liu, 2008); when one theory is rejected, another is recommended and tested, and hence the fittest theory survives (Walliman, 2006). Gill and Johnson (2010) and Saunders et al. (2009) suggest that social science researchers who use a deductive approach:

- Should be aware of the logic of deduction, e.g. the researcher should be independent of the process under investigation.
- Should know how to use the operationalisation process as a way to measure facts quantitatively.
- Should select a sufficient sample size for the purpose of generalisability of the results.
4.4.2 Inductive approach

In the inductive form of reasoning, the researcher moves from specific observation to broader generalisations and theories, informally called a ‘bottom-up’ approach (Fellows and Liu, 2008). Through induction, researchers develop or generate theory(ies) as the outcome of their data analysis (Saunders et al., 2009). The process begins with data collection through specific observations of certain social phenomena, often obtained through interviews or pilot studies followed by data analysis. The outcome of induction may be the generation of a new conclusion or theory and/or the development of a conceptual framework (Bryman, 2012).

Inductive reasoning aims to explain “why” and “how” things are happening from the respondents’ point of view—rather than describing “what” is happening (Creswell, 2009; Saunders et al., 2009). Thus, this approach is employed more by researchers in qualitative studies than in quantitative ones. For these researchers, there is a higher likelihood that the theories that inductively develop from systematic empirical research will move towards discovery of a binding principle, and hence it is more likely that these theories will be useful, plausible, and accessible (Partington, 2000). Grounded theorists, for instance, generate theories based on the views of participants and put this as the conclusion of their studies (Creswell, 2009). However, inductive reasoning and theory building do not aim to ‘prove’ or ‘disprove’ a particular theory. Rather, they attempt to extract implicit knowledge, patterns, and meanings through a process of data collection and analysis (Gray, 2004).

As opposed to the deductive approach, induction needs a relatively small sample of research subjects because it deals with issues and events that have already taken place (Saunders et al., 2009). In addition, induction provides a better understanding of the meanings of participants’ actions and behaviours than deduction. However, as Walliman (2006) argues, “purely inductive reasoning proved to be unwieldy and haphazard, and in practice was rarely applied to the letter” (p. 9). It could also prevent the researcher from obtaining an understanding of different theoretical perspectives and of exploring a phenomenon (Hyde, 2000). Furthermore, doing research based on the inductive approach also carries the risk of not obtaining useful data patterns or not achieving a robust conclusion (Saunders et al., 2009).
4.4.3 Abductive reasoning

Saunders et al. (2009) note that researchers may assume a rigid division between inductive or deductive reasoning and thus assume that research ‘must’ be based on one or the other of them. However, this would be misleading, because these two approaches not only can be integrated, but this combination can provide increased advantages (see also Miles and Huberman, 1994). The abductive approach employs the results of this integration, which is a “theory-forming or interpretive inference” that goes deeper than the other two approaches and obtains a more thorough understanding of the data (Alvesson and Sköldberg, 2009). Ultimately, it reaches a hypothesis or theory that provides the best explanation for the achieved data because it carries the possibility of capturing and taking advantage of the systemic character of data both empirically and theoretically (Josephson and Josephson, 1996).

The proponents of this approach claim that most advances in science were based neither on the pattern of pure deduction nor of pure induction; rather, they were often realised by virtue of a single, discerning leap (see e.g. Taylor et al., 2002). It should be noted that, however, abductive reasoning has received less research attention than the deductive and inductive approaches from researchers of social science and methodology, possibly because of the difficulty associated with it and its novelty (Kovács and Spens, 2005).

Abduction, similar to induction, starts with a real-life observation and with some background knowledge about the literature of the topic. The next step is explaining patterns, discovering themes, and examining phenomena in order to produce or change a theory through subsequent data collection (Saunders et al., 2009). This approach moves back and forth between deductive and inductive approaches in order to integrate them and to gain more theoretical insights during the process (see Figure 4.1). Through this process, some unanticipated empirical findings might even emerge (Dubois and Gadde, 2002). Thus, abductive reasoning provides the researcher the opportunity to discover new things or relationships between the language, meanings, and theoretical concepts under a different situational-context (Kovács and Spens, 2005). It also links different knowledge domains in order to discover the commonalities and analogies between them. As a result, abductive reasoning “creates fruitful cross-fertilisation where new combinations are developed through a mixture of established theoretical models and
new concepts derived from the confrontation with reality” (Dubois and Gadde, 2002, p. 559).

Figure 4.1: The abductive research process (Kovács and Spens, 2005).

4.4.4 The selected research approach

The abductive approach suits this thesis best due to the following reasons. First, this study is based on a mixed-methods research design with two parts: experimental procedures and semi-structured interviews. The former is in line with the deductive approach since the author seeks to investigate the existing approaches towards inaccuracies in time estimation based on a few hypotheses. In contrast, the latter deals with the inductive approach because the aim is to explain why and how things happen from the respondents’ points of view. Therefore, abductive reasoning, as an integration of induction and deduction, can help to make better sense of the collected data and to find answers for the research questions.

Second, Saunders et al. (2009) suggest that when there is much literature within one context, but less in the particular context in which the research is conducted, an abductive approach is appropriate. Such is the case with this thesis, where there is considerable literature concerning the explanations for inaccurate predictions of project cost but less specialising in the inaccurate estimates of project completion time. Therefore, using abductive reasoning would give the opportunity to discover fresh insights regarding the effect of the explanations on project time estimations.

Third, as discussed, in the deductive approach, the researcher moves from theory to findings, whereas in the inductive approach, the move is from observations to theory. However, in this thesis the researcher goes neither from data to theory nor from theory
to data; rather the move here is back and forth between data sources and analysis, a pattern which enables an author to “expand his understanding of both theory and empirical phenomena” (Dubois and Gadde, 2002, p. 555). This movement between empirical observation and theory is in line with the abductive approach (Kovács and Spens, 2005; Saunders et al., 2009).

Fourth, deductive reasoning has a tendency to construct a rigid structure and contains a high level of objectivity, whereas the inductive approach carries the risk of failing to collect credible data and to achieve generalisability (Saunders et al., 2009). The abductive approach, however, overcomes these deficiencies by explaining and investigating phenomena in order to gain knowledge of the structures and patterns of a specific situation (Alvesson and Sköldberg, 2009). Therefore, abduction can provide a deeper understanding than using solely an inductive or a deductive approach for the present research.

As mentioned previously, Table 4.2 below provides a summary of the differences between deduction, induction, and abduction.

<table>
<thead>
<tr>
<th>Logic</th>
<th>Deduction</th>
<th>Induction</th>
<th>Abduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalisability</td>
<td>In deductive inference, when the premises are true, the conclusion must also be true.</td>
<td>In inductive inference, known premises are used to generate untested conclusions.</td>
<td>In abductive inference, known premises are used to generate testable conclusions.</td>
</tr>
<tr>
<td>Use of data</td>
<td>Data collection is used to evaluate propositions or hypotheses related to an existing theory.</td>
<td>Data collection is used to explore a phenomenon, identify themes and patterns, and create a conceptual framework.</td>
<td>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.</td>
</tr>
<tr>
<td>Theory</td>
<td>Theory falsification or verification</td>
<td>Theory generation and building</td>
<td>Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory</td>
</tr>
</tbody>
</table>

Source: (Adopted from Saunders et al., 2009; Creswell, 2009; Kovács and Spens, 2005)
4.5 Research design

Research design is concerned with plans and procedures that span the decisions from broad assumptions to detailed methods of data collection and analysis (Creswell, 2009). The overall decision about research design informs the researchers about the methods employed in data collection, the limitations and ethical issues associated with carrying out that particular research, and the types of answers that might be achieved from the analysis (Yin, 2009). Creswell (2009) notes that the choice of research design can be influenced by many issues such as the context of the research subject, the researcher’s philosophical perspective, the research questions, the selected research method, and the data sources.

In the social sciences, researchers often design and conduct their research based on three methods: qualitative, quantitative, and mixed-methods (Saunders et al., 2009; Creswell, 2009). The following subsections elaborate each of these methods (see Table 4.3 for a summary).

<table>
<thead>
<tr>
<th>Quantitative Methods</th>
<th>Qualitative Methods</th>
<th>Mixed-Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-determined</td>
<td>Emergent methods</td>
<td>Both pre-determined and emergent methods</td>
</tr>
<tr>
<td>Instrument-based questions</td>
<td>Open-ended questions</td>
<td>Both open- and closed-ended questions</td>
</tr>
<tr>
<td>Performance data, attitude data, observational data, and census data</td>
<td>Interview data, observation data, document data, and audiovisual data</td>
<td>Multiple forms of data drawing on all possibilities</td>
</tr>
<tr>
<td>Statistical interpretation</td>
<td>Themes, patterns interpretation</td>
<td>Across-databases interpretation</td>
</tr>
</tbody>
</table>

Source: (Creswell, 2009, p. 12)

4.5.1 Qualitative research

Qualitative research is defined as “a subjective approach which includes examining and reflecting on perceptions in order to gain understanding of social and human activities” (Hussey and Hussey, 1997, p. 20). As the term ‘qualitative’ implies, this method focuses on the qualities of entities as well as the meanings and interpretations of words (Denzin and Lincoln, 2011). The qualitative research method initially focuses on exploring and collecting data through a variety of techniques such as interviews, case studies, and ethnography. Then, it analyses the data inductively, moving from particularities to a general theme and so towards a holistic understanding of the subject.
The last step involves interpreting the findings based on the context of the study (Fellows and Liu, 2008).

The qualitative research method typically supports the interpretivism and pragmatism worldviews (Krathwohl, 2009) as it seeks to understand specific information about the values, opinions, behaviours, and social contexts of particular populations (Saunders et al., 2009). Creswell (2009) points out that qualitative research is designed to study the social and cultural aspects of everyday life of individuals and communities and can provide rich descriptions of the real world.

Through qualitative studies, researchers are able to make sense of the complex interrelations of a given situation and intangible factors that may not be readily apparent, e.g. social norms, socio-economic status, gender roles, religion, and so on (Denzin and Lincoln, 2011). Moreover, qualitative studies are useful in providing an in-depth analysis of a particular process where there is a limited number of participants or test subjects or where very little is known about the phenomenon (Ghauri and Grønhaug, 2005). Although the results of qualitative studies may provide a robust understanding of the research problem, these results are more contextual rather than being generalised findings (Saunders et al., 2009).

4.5.2 Quantitative research

Quantitative research typically takes an objective approach to focus on the measurement of quantity, the analysis of numerical data, and the causal relationships between variables (Creswell, 2009). As the term *quantity* implies, this method is associated with measuring the scale, range, and frequency of a phenomenon with the aim of testing or verifying a theory. Quantitative study often employs different structured methods such as questionnaires, surveys, and experiments to collect the required data. It then uses the deductive approach to develop and/or validate hypotheses concerning a particular phenomenon (Creswell, 2009) and/or to investigate the relationships between variables (Saunders et al., 2009) by using statistical analysis techniques such as correlations, relative frequencies, or differences between means. Fellows and Liu (2008) indicate three key approaches to conducting quantitative research: “asking questions of respondents by questionnaires and interviews; carrying out experiments; and ‘desk research’ using data collected by others” (p. 98).
The quantitative method of research was originally designed for use in natural science to investigate highly detailed and structured natural phenomena (Saunders et al., 2009). In social science, however, Flick (2006) argues that the Columbia School gave rise to widespread use of quantitative research and laid its current foundations, which regard quantitative research as more realistic and popular. The advantage of using the quantitative approach is that the findings can be easily presented statistically (Yin, 2009) and are protected against biases and the influence of external factors (Creswell, 2009). Based on this, it is argued that the results obtained from quantitative studies are more generalisable and neutral (Johnson and Christensen, 2008). In contrast, many contend that quantitative studies reduce the chance of exploring other areas of the research (Saunders et al., 2009) and do not provide a clear picture of the reality (Easterby-Smith et al., 2012). Furthermore, in quantitative methods, participants often answer to a certain number of closed questions, where there is no chance of adding extra information to enhance the researcher’s understanding of the topic under investigation (Cooper and Schindler, 2011).

4.5.3 Mixed-methods design

Mixed-methods research is a combination of the quantitative and qualitative approaches. As Johnson and Onwuegbuzie (2004) put forward, the goal of mixed-methods research is not to replace either of these approaches but rather for each to complement the other by drawing from the strengths and minimising the weaknesses of each in a single research study. This research design has grown in scope and popularity in recent years because it provides a more comprehensive picture of research problems and enhances confidence in the findings (see e.g. Ghauri and Grønhaug, 2005; Creswell, 2009). Morris (2010), for example, suggests that using mixed-methods research is a useful strategy in project management research because it encourages PM scholars to carry out qualitative research aside from their pure quantitative studies.

Researchers could have many reasons for mixing quantitative and qualitative methods within one study. For example, researchers have the opportunity to employ multiple methods for data collection, rather than limiting themselves to a single data-gathering technique. They can also benefit from both statistical and text analysis techniques for analysing data, instead of being restricted to one or the other (Creswell and Plano Clark, 2011; Bryman, 2012). In addition, mixed-methods research will enhance the integrity
and generalisability of the findings and hence its theoretical contribution (Tashakkori and Teddlie, 2003; Easterby-Smith et al., 2012).

One important decision regarding mixed-methods design is the level of interaction between quantitative and qualitative studies (Creswell and Plano Clark, 2011). Greene (2007, p. 120) claims that this decision is the “most salient and critical” decision for designing a mixed-methods study. She distinguished between two general options for researchers in this regard: independent and interactive levels of interaction. In the former, qualitative and quantitative studies are kept separate and distinct so that the research questions, the data collection, and the method of analysis differ over the two studies. The researchers, therefore, only mix these studies when they want to draw a conclusion at the end of their studies. In contrast, the latter, interactive, occurs where there is a direct relationship between the quantitative and qualitative studies which can interact at any point in the research process and in many different ways. In this case, the two methods are mixed before the final interpretation.

Another important issue that can differentiate between the types of mixed-methods design is timing (Saunders et al., 2009), i.e. the time and order in which researchers collect the data or use the results from the two sets of data within one study. Saunders et al. (2009) put forward that mixed-methods research can be carried out either at the same time (parallel) or one after the other (sequentially). Creswell and Plano Clark (2011) go further and identify six different types of mixed-methods designs based on parallel and sequential methods. They are summarised below in Table 4.4.

<table>
<thead>
<tr>
<th>Major Mixed-methods types of designs</th>
<th>Design purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convergent Design</td>
<td>Need a more complete understanding of a topic</td>
</tr>
<tr>
<td></td>
<td>Need to validate or corroborate quantitative scales</td>
</tr>
<tr>
<td>Explanatory Design</td>
<td>Need to explain quantitative results</td>
</tr>
<tr>
<td>Exploratory Design</td>
<td>Need to test or measure qualitative exploratory findings</td>
</tr>
<tr>
<td>Embedded Design</td>
<td>Need preliminary exploration before an experimental trial (sequential/before)</td>
</tr>
<tr>
<td></td>
<td>Need a more complete understanding of an experimental trial, such as the</td>
</tr>
<tr>
<td></td>
<td>process and outcomes (concurrent/during)</td>
</tr>
<tr>
<td>Transformative Design</td>
<td>Need to conduct research that identifies and challenges social injustices</td>
</tr>
<tr>
<td>Multiphase Design</td>
<td>Need to implement multiple phases to address a program objective, such as</td>
</tr>
<tr>
<td></td>
<td>for program development and evaluation</td>
</tr>
</tbody>
</table>

Source: (Creswell and Plano Clark, 2011, p. 73)
4.5.4 The selected research design

This thesis is based on mixed-methods research, which combines the quantitative and qualitative approaches. This research design provides a more thorough picture of research problems than either of these do alone (see Creswell, 2009). As noted, mixed-methods research can bring together the strengths and weaknesses of quantitative methods (such as large sample size and generalisability of results) with those of qualitative methods (including small sample size and in-depth understanding). In this thesis, rich data from experiments are precious assets. When these data are combined with the credible qualitative data from interviews with practitioners, it provides a “powerful mix” (Miles and Huberman, 1994, p. 42).

4.6 Research strategy

After selecting an appropriate research design, the researcher should determine the strategies of inquiry that provide specific directions for procedures of the research and link them to actual practice (Walliman, 2006). The decision concerning the choice of the research strategy is influenced by many issues such as research questions, objectives, philosophical underpinnings, extent of existing knowledge, amount of time available, and other availability of other resources (Easterby-Smith et al., 2012).

4.6.1 Major research strategies

Different research strategies are available to researchers doing qualitative and/or quantitative studies (see Table 4.5). The research strategies described below can be found in most research methodology books (see e.g. Guba and Lincoln, 1994; Walliman, 2006; Creswell, 2009; Saunders et al., 2009; Easterby-Smith et al., 2012; Bryman, 2012).

Experiment: this strategy uses quantitative analysis to determine how a specific treatment affects the outcome(s). Normally, this influence is assessed by providing a “specific treatment to one group (experimental group) and withholding it from another (control group) and then determining how both groups scored on an outcome” (Creswell, 2009, p. 14). There are two main types of experiment: a laboratory experiment, which is conducted in a laboratory setting and under controlled conditions, and a field experiment, which is conducted in the natural environment (Yin, 2009). Wohlin et al. (2000) note that one advantage of experiments is that they can not only examine in which situations claims are true but can also provide a context in which
certain standards, methods, and tools are recommended for use. Furthermore, experiments enable researchers to manipulate behaviour directly, precisely, and systematically so as to focus on specific variables while controlling the remaining variables (Yin, 2009). Both types of experiments can help researchers to answer ‘how’ and ‘why’ questions in exploratory and explanatory studies (Saunders et al., 2009). However, it is argued that the findings from experimental research cannot be generalised to the real world of organisations (Creswell, 2009).

**Survey**: this strategy tends to be used in exploratory and descriptive research with the deductive approach (Creswell, 2009). In general, the survey strategy allows the collection of a large amount of data from a sizeable population, often through the use of questionnaires (postal or E-mail), internet polls, interviews, documents, and observations. Furthermore, this strategy gives the researcher better control over the process (Fellows and Liu, 2008). The important point about surveys is that they should have a sufficient response rate in order to be acceptably representative of the whole population. However, many survey studies face the problem of high rates of “non-response” (Ghauri and Grønhaug, 2005). In addition, it is argued that surveys are time consuming, and researchers often complain that their progress is delayed due to not receiving responses from recipients on time (Saunders et al., 2009).

**Case study**: this method is an extensive examination of a single or a few instances of a phenomenon of interest in real-life settings, when the boundaries between context and phenomenon are not evident (Yin, 2009; Thomas, 2004). Generally, a case study method is used when the researcher wants to produce an in-depth understanding of the events, relationships, experiences or processes, and all other sets of issues that are naturally occurring in organisational settings (Yin, 2009). This form of research is good for answering ‘why’, ‘how’, and ‘what’ questions in exploratory and explanatory studies (Saunders et al., 2009). The most obvious strength of a case study is that researchers are able to use various techniques for data collection such as documentation, interviews, direct observation, archival records, and questionnaires (Saunders et al., 2009). However, as with experimental research, generalisability of findings to the whole discipline is an issue (Creswell, 2009).

**Action research**: in this strategy, the researcher actively participates in the research process in order to better observe, identify, and evaluate the case (Fellows and Liu,
Action research also gives researchers the opportunity to have better involvement with the members of the organisation and talk with experienced people directly.

**Grounded theory**: this strategy is based on the inductive approach, which ultimately aims to develop theory through a series of in-depth interviews. As Creswell (2009) declares, grounded theory helps researchers to “derive a general, abstract theory of a process, action, or interaction grounded in the views of participants” (p. 14). As a result, researchers can better explain and interpret social phenomena within the context of study. However, it is argued that to develop or build a theory, a researcher needs to have access to varied sources of data and cases, which can be a complex procedure and a lengthy task (Saunders et al., 2009).

**Ethnography research**: this strategy aims to “study an intact cultural group in a natural setting over a prolonged period of time by collecting, primarily, observation and interview data” (Creswell, 2009, p. 13). Through the ethnography method, the researcher becomes a part of the group and observes the situations, behaviours, and social world of the organisation in order to gain an understanding of what, how, and why specific behaviour or patterns occur (Fellows and Liu, 2008). Therefore, a high level of trust needs to be built between researchers and participants (Saunders et al., 2009). Yin (2009) contends that the ethnography strategy is one of the most in-depth qualitative research methods possible and can result in interesting findings about the people, the organisations, and the contexts within which they interact. However, it is argued that this strategy is time consuming, as researchers must immerse themselves in the social world being researched (Saunders et al., 2009). Another concern about ethnography studies is the difficulty of generalising findings, which are based on the data of a single organisation, to broader contexts.

**Archival research**: this strategy aims to search, extract, and examine administrative records and documents from original archival records (Creswell, 2009), thus enabling researchers to find answers for questions that focus on the past and for questions whose answers change over time. Archival research can be used in exploratory, descriptive, and explanatory studies. The challenge of using this strategy is that data could be missing or the researcher could be refused access for reasons of confidentiality (Saunders et al., 2009).
Table 4.5 below summarises the main purpose and application of each of the above research strategies.

Table 4.5: Research strategies.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Purpose of strategy</th>
<th>Suitable for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>To study causal links and relationships and to test a theory, hypothesis, or claim</td>
<td>- Bounded problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Natural sciences, social science, psychology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Small and atypical groups</td>
</tr>
<tr>
<td>Survey</td>
<td>To provide a quantitative description of trends, attitudes, or opinions of a population by studying a sample of that population</td>
<td>- Large amount of data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Easy to understand and explain to ordinary people</td>
</tr>
<tr>
<td>Case study</td>
<td>To explore in-depth a program, event, activity, or process</td>
<td>- Those who wish to gain a rich understanding of the research context</td>
</tr>
<tr>
<td>Action research</td>
<td>To learn from the results of scientific knowledge and theory by participating in a research activity</td>
<td>- Those who need practitioners’ experiences in their study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Forming a relationship between practitioners and researchers</td>
</tr>
<tr>
<td>Grounded theory</td>
<td>To generate theory from data in the process of conducting research</td>
<td>- Researchers who wish to predict and explain people’s behaviour</td>
</tr>
<tr>
<td>Ethnography</td>
<td>To explain the social world the research subjects inhabit in the way they would describe it</td>
<td>- Those who aim to have a better interpretation and understanding of the particular context</td>
</tr>
<tr>
<td>Archival research</td>
<td>To make use of administrative records and documents as the principal source of data</td>
<td>- Those who wish to sort and organise older documents</td>
</tr>
</tbody>
</table>

Source: (adopted from Saunders et al., 2009; Creswell, 2009; and Fellows and Liu, 2008)

4.6.2 The selected research strategy

The experimental research strategy was chosen to address the research questions of this thesis. In fact, experiment provides a relatively novel method of inquiry (Hartono et al., 2013) and has been applied to the study of many issues in the social sciences, such as group productivity (Sutter et al., 2009); group and individual behaviours (Gillet et al., 2009); cultural diversity (Cox et al., 1991); decision-to-bid strategies (Oo et al., 2008); confidence in estimation (Sniezek and Henry, 1990); level of measured individualism-collectivism (Chatman and Barsade, 1995); and power relations (Weick and Guinote, 2010).

One main reason for using the experimental strategy was due to certain practical and ethical difficulties involved in obtaining data to explore the dynamics behind (under)estimation of project completion time, especially when the estimate is made by the group, through conventional research methods such as questionnaires, interviews, and case studies. These difficulties are also addressed by Wang (1997), Kutsch et al. (2011), and Love et al. (2012). They are as follows:
First, if planners and forecasters have distorted the cost and time of the project intentionally to get a project started, they are not likely to tell researchers or others that this is the case due to legal, economic, moral, and other reasons (Flyvbjerg, 2009). Similarly, Love et al. (2012) point out that there is always “a potential for interviewees to intentionally or unintentionally conceal information” (p. 570).

Second, it is difficult to access real past analytical details of project forecasts, notes, and documentation. As a matter of fact, many clients often tend not to share such details in the public domain. Even if the data were accessible, they contain statistical procedures, computerised databases, and complex mathematical models, the details of which lay people and even stakeholders do not understand (Wachs, 1989).

Third, understanding the intentions of planners’ actions, and the way they produce collective estimation, is a challenging task. It is argued that conventional analyses are based on the vague idea of group decision-making policies and cannot generate any information about the “actual intentional states of the members” (Tollefsen, 2002, p. 29). Therefore, it is difficult to demonstrate accessible and realistic views of people that lead to estimation errors.

Fourth, there are certain variations between one project and another in relation to project ownership, project size, and location. As these variations influence the process and procedure of forecasting and the way planners make their decisions concerning project time, one cannot therefore generalise the results obtained from interviews or direct observation to other projects. However, in the present study, the advantage of conducting an experiment is that all participants will expose the same case, size, and complexity of the project under controlled conditions.

Fifth, since the present research’s aim is to investigate the process of time estimation, experimentation provides the opportunity to observe this process and compare it with real-life situations. Furthermore, by carrying out the experiment, variables of interest can be systematically manipulated and other external and irrelevant factors can be controlled or blocked (Roberts and Ilardi, 2003).
4.6.3 Advantages and disadvantages of the experimental approach

As Saunders et al. (2009) point out, researchers should be aware of the advantages and disadvantages of their chosen research strategies in order to manage threats and strengthen benefits.

It is undeniable that the experimental approach is underutilised in the management discipline in contrast to other research strategies such as case study, ethnography, and survey research (Gabbott and Hogg, 2000; Punnett and Shenkar, 2007). This apparent dearth of experiments in the management discipline implies that the application of this method in management research seems to be problematic. Christensen (2007) points out that, for some scholars (e.g. Bannister, 1966), the main limitation of experiments is that the experimental tasks are not subject to the full range of external factors because their “findings are obtained in an artificial and sterile atmosphere which precludes any generalisation to a real life situation” (p. 39). Opponents of experiments also note that using student subjects impairs the validity of results (Dearman and Beard, 2005). Thus, social scientists were led to believe that this criticism of the experimental approach “invalidates the use of the experiment in social science research” (Gabbott and Hogg, 2000, p. 389). In fact, these criticisms might be true to a certain extent since construction projects are prone to uncertain, complex, and dynamic environments, often becoming ever more complex (Kunz et al., 2010). However, there are several ways that these criticisms can be attenuated.

For example, supporters of the experimental approach believe that the above criticism is “overstated” and that this approach can bring distinctive advantages to social and behavioural sciences (see e.g. Gabbott and Hogg, 2000; Greenberg and Tomlinson, 2004; Christensen, 2007; Coolican, 2014). The main advantage of the experiment is the level of control that researchers can have over irrelevant variables and extraneous influences (Saunders et al., 2009). For example, as Buehler et al. (2010) argue, experimental studies conducted inside the lab can help planning research because they are tightly controlled and can shed light on basic processes of time estimation (see also König, 2005). The experiment also allows researchers to observe the effects of the same stimuli on similar subjects in a way that is both practically and ethically achievable (Coolican, 2014). In addition, researchers can manipulate the variables of study by specifying particular conditions to isolate a particular phenomenon (Gray, 2004; Fellows and Liu, 2008). For instance, in recent years many experimental studies have
examined the psychological mechanisms that underlie people’s optimistic forecasts in longer real-world tasks that contained intervening events (see e.g. Newby-Clark et al., 2000; Buehler and Griffin, 2003).

4.7 Key features of experiment

The experiment has some major features common to all experimental research studies such as specifying variables, defining a research hypothesis, and designing the experiments themselves. Therefore, in the following subsections, some of the terminologies regarding experiments are discussed to provide a better understanding of this research strategy.

4.7.1 Types of experiment

There are two main types of experiments: laboratory and field experiments, each having its own pros and cons. A laboratory experiment is an experiment that is conducted in the laboratory under controlled conditions, so that causal inferences can be made (Shadish et al., 2002). Here, the researcher manipulates the independent variables to observe and measure their effects on dependent variables. Generally, the laboratory experiment allows for better control of the environment and thus can eliminate the effects of confounding (extraneous) variables (Fellows and Liu, 2008). This type of experiment is mostly used in physical sciences since evidence has shown that what happens in the lab is equally valid in the broader world. Moreover, the lab-based experiment provides a better understanding of the qualitative research process and offers insights into the nature of relationships and interactions (Saunders et al., 2009). However, it has some weaknesses that need to be considered. First, the results of lab experiments are perceived as not being generalisable to real-world situations, especially in the social and psychological sciences where humans are the object of the experiments (Levitt and List, 2006). Second, it is argued that, in lab-based experiments, the experimenter may attempt to obtain their ideal results by deceiving participants or by placing them in situations to select options which would not be their personal choices (Levitt and List, 2006; List, 2007).

As opposed to laboratory experiments, field experiments are those experiments conducted in the natural environment. They represent an empirical approach that “bridges laboratory data and naturally-occurring data” (List, 2007, p. 3). The challenge that researchers conducting field experiments might have is to actively manipulate
variables and carefully control the influence of extraneous variables (Christensen, 2007).

There are certain notable differences between lab-based experiments and field experiments. For example, researchers carrying out field experiments can make stronger inferences than those working on lab-based data alone. The reason for this is that the former are not subject to the artificiality problem of the laboratory situation, which can influence the way in which participants respond to stimuli (Schram, 2005). Furthermore, it is contended that field experiments provide more well-founded and reliable information to policymakers than lab-based experiments (List, 2007). On the contrary, it is much harder to control and observe the confounding variables in field experiments than in lab-based experiments. Additionally, field experiments are more costly, lengthy, and difficult to conduct than those carried out in a laboratory (McQueen and Knussen, 2002).

Another difference between field and lab experiments relates to the internal and external validity of findings. Internal validity refers to the ability to draw a confident conclusion that the dependent variable was influenced solely by the independent variable and not by extraneous factors, whereas external validity refers to the ability to conclude that the results can be generalised to other people or settings (Loewenstein, 1999). It is argued that lab-based experiments have high internal validity and low external validity. The opposite holds for field experiments (Schram, 2005).

Based on the above discussion, the laboratory experiment was selected for use in this thesis for the following reasons. First, lab-based experiments allowed the present research to exclude extraneous influences and those factors known as “Acts of God”, such as inclement weather. Second, one of the objectives of this thesis is to differentiate between optimism bias and strategic misrepresentation in the absence of organisational and political pressures. In fact, laboratory experiments provide the opportunity to observe subjects’ actions and behaviours in the absence of these pressures. Third, as mentioned, due to the research topic of this thesis, in field experiments, the chance of obtaining ‘reliable’ results or valid responses is very small (Love et al., 2012). Fourth, field experiments are lengthy and costly. They require more financial support, resources, and manpower than lab experiments, and, since the researcher was self-funded, paying the costs of field experiments was not an option. Last but not least, it is
often argued that the main disadvantage of lab-based experiments, in comparison with field experiments, is that the results cannot be generalised to the real world of practice (Saunders et al., 2009). To cover up this deficiency and enhance the applicability and generalisability of findings, the author has conducted a few interviews with practitioners.

4.7.2 Variables
The essence of the experimental approach is that it provides excellent control techniques, thus affording the researcher the ability to manipulate variables and observe their effects (Christensen, 2007). Variables are entities subject to variation whose values are observed by researchers (Creswell, 2009). Each experiment contains two major types of variables: dependent (also called criterion, outcome, or effect variables), and independent variables (also called treatment, antecedent, or predictor variables). As Saunders et al. (2009) declare, the aim of experimental studies is to answer “how” and “why” the independent variable(s) (treatment) explains or predicts the dependent variable. To find answers to these questions, researchers manipulate one or more independent variables to observe and assess the influence of that/those on the dependent variable(s).

4.7.3 Experimental group and control group
Normally, any sample of experiment participants is divided into two groups, which, as far as possible, are similar in all respects (Fellows and Liu, 2008). Having matched the samples in the two groups, the experimental researchers provide a specific treatment to one group and withhold it from another group to determine how both groups scored on an outcome (Creswell, 2009). The group which receives the treatment(s) is called the ‘experimental’ group, whereas the group which receives no treatment is called the ‘control’ group.

4.7.4 Hypotheses
The variables help the researcher to answer research questions or to make predictions about the result of the research. These predictions are called ‘hypotheses’, and they must be investigated through the research. They are generally derived from the literature (Creswell, 2009) or from known facts (Fellows and Liu, 2008). In general, hypotheses must be proposed in such a way that they can either be confirmed or disproved (Gray,
 Researchers mainly adopt the deductive approach to test hypotheses in different ways in order to produce a theory (Saunders et al., 2009).

There are two types of hypotheses in a typical experiment: a null and an alternative hypothesis. As Fellows and Liu (2008) define, when independent variables do not affect dependent variables, this is known as a null hypothesis (H0). The null hypothesis makes a prediction that there is no significant difference (or relationship) between groups in the general population. In contrast, if independent variables affect the dependent variables, this is called an alternative hypothesis (H1) (Creswell, 2009). Experimental researchers must then test these hypotheses to decide either to accept or reject them. It should be noted that, however, it is not possible to accept the alternative hypothesis with absolute certainty. In fact, the conclusion from experimental research will always be subject to some errors (sampling error) since each sample is drawn from a given population and is likely to differ to some degree from the entire population (Cohen et al., 2007). Therefore, rejecting the null hypothesis when in fact it is true is called a Type I error, whereas accepting the null hypothesis when it is false is called a Type II error (Gray, 2004). Table 4.6 shows the relationship between the research hypothesis and the two types of error.

<table>
<thead>
<tr>
<th>Decision made on null hypothesis</th>
<th>Hypothesis is true</th>
<th>Hypothesis is false</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis is rejected</td>
<td>Type I error</td>
<td>Correct decision</td>
</tr>
<tr>
<td>Hypothesis is not rejected</td>
<td>Correct decision</td>
<td>Type II error</td>
</tr>
</tbody>
</table>

Source: (Gray, 2004, p. 303)

### 4.7.5 Sampling and population size

The terms ‘sample’ and ‘population’ are often used interchangeably, although they are two very distinct implications. The term ‘population’ is used to denote a “group of individuals, objects, or items from which samples are taken for measurement”, whereas a sample is a “finite part of a statistical population whose properties are used to make estimates about the population as a whole” (Singh, 2007, p. 88). Generally, researchers do not possess complete information about the characteristics of the population of interest to their studies due to lack of access to the whole statistical population, which, if even possible, would be costly and time consuming. Therefore, they must employ a representative sample whose size (i.e. ‘sample size’) is such that it truly represents the entire population (Fellows and Liu, 2008). A sample size that is too large wastes time,
effort, resources, and money, but one too small fails to provide reliable answers to research questions and so causes the test to lack power and lessens the size of its confidence interval (Gray, 2004). This latter, i.e. confidence interval is a range of values of the measure of interest; it is so named because, when it is based on a sample of adequate size, we are confident that the true value of the measure lies within that interval, given that our null hypothesis is true.

In order to estimate the sample size for this thesis, the Cohen Statistical Power Analysis was used. This method is one of the most widely used approaches in the behavioural sciences in calculating a required sampling size (see Cappelleri et al., 1994; Chuan, 2006; Lenth, 2001; Jean et al., 2010). Cohen (1988) identified four factors to determine the adequate sample size for any given statistical test, namely significance level, effect size, desired power, and estimated variance. These factors are described below.

The significance level of a statistical hypothesis is the probability of wrongly rejecting a true null hypothesis and so of committing a Type I error. In other words, given that the null hypothesis is true, significance level is the probability of an event that is unlikely to have arisen by chance. It is also known as the p-value and is often fixed at $\alpha = 0.05$ (see Cohen, 1988). If the researcher assumes a less stringent (i.e. a larger value of) alpha, the risk of wrongly rejecting the null hypothesis $H_0$ increases. Conversely, selecting a smaller value of alpha decreases the risk of rejecting a ‘true’ $H_0$ but typically at the expense of a larger sample size. An $\alpha = 0.05$ thus provides a good balance of statistical accuracy and economy (Ary et al., 1996).

The next factor to be determined is the effect size, which refers to the size of the differences between two groups. Effect size, typically denoted as $r$, measures “the distance or discrepancy between the null hypothesis and a specified value of the alternative hypothesis” (Chuan, 2006, p. 80). It simply aims to identify the strength of the conclusions about group differences or the relationships among variables (Creswell, 2009). Effect size differs from one experiment to another. It is the standardised mean difference between the experimental and control group measure of interest and so is calculated by dividing the difference in the experimental and control group means by the standard deviation. Cohen (1992) provided rules of thumb for determining the effect sizes with regard to type of statistical analysis. He suggested that an $r$ of 0.1 represents a small effect size, 0.3 represents a medium effect size, and 0.5 represents a large effect
size. The smaller the effect size, the larger must be the sample size (Chuan, 2006). Cohen (1992) argued that a medium effect size is desirable as it could represent an effect that would likely be “visible to the naked eye of a careful observer” (p. 156).

Another factor to be determined is statistical power, which is defined as the probability that a statistical significance test will reject the null hypotheses when it is actually false (Cohen, 1988). Simply, it is the probability of not committing a Type II error, where one fails to reject a false H0. Given that the probability of committing a Type II error is denoted by \( \beta \), where \( 0 \leq \beta \leq 1 \), then statistical power is \( 1 - \beta \).

If power is high, the chance of making a Type II error is reduced, but when it is low, the chances of obtaining a significant effect are reduced and thus so is reliability of results. To avoid these problems, Cohen (1992) suggests fixing statistical power at 0.80 (\( \beta = .20 \)), meaning an 80% chance of rejecting the null hypothesis, given that it is false.

The last factor is standard deviation (SD), which measures the variability of a value of interest. Thus, it is a statistical measure of the dispersion of the value of interest with respect to this value’s probability distribution and would usually be paired with a mean, or average, of the value of interest (Cohen et al., 2007). A low SD indicates values relatively close to the mean, while a high SD indicates ones more highly spread out, covering a larger range of the value of interest. In the statistical experiments described herein, the value of interest would itself be a mean, or average—the sample mean. It will vary because randomly drawn samples will differ and so generate different averages.

In this study, the paired and independent \( t \)-test is used to analyse the experimental data. Hence, by considering Table 2 of Cohen (1992, p. 158), for a predetermined effect size of \( r = 0.30 \) (medium), a significant alpha of .05, and a statistical power of 0.77, the desired sample size is 57. This means that a sample size of 57 or above will be adequate to produce a robust test and so will be capable of answering research objectives using \( t \)-tests.

### 4.7.6 Participant selection

Participants in experimental studies would typically be selected either randomly or non-randomly. According to Creswell (2009), when participants are not randomly selected, the procedure is called a quasi-experiment. In this case, participants can be assigned to a
group based on self-selection or the decision of the researcher. Sometimes, researchers do not have many options to choose from and, therefore, are forced to recruit those participants who are available, e.g. a classroom, an organisation, or a family unit. This is called a convenience sample because the researcher must use formed groups or volunteers (Creswell, 2009). In this case, the sample chosen is not random in nature.

In contrast, in a true experiment, individuals are randomly assigned to groups. Since assignment is random, the chance of being assigned to a specific group is equal among all participants (Coolican, 2014). The selection of participants in a true experiment could be done by using the flip of a fair coin (i.e. one which has equal probability of landing on a head or a tail when flipped) or alternatively by using employing random number generation tables (Shadish et al., 2002). This is to eliminate any variation between the groups that could be caused by participant variables. Many software packages also contain random number generation capabilities. Random choice of participants avoids the selection bias found in the quasi-experiments and allows a stronger conclusion about the relationship between dependent and independent variables to be drawn. Still another method for participant selection or group assignment is provided by Robson (2002). He identifies three processes for allocating participants to a group:

1. The *independent sample*, in which a group of participants is recruited for the experiment as a whole and then individuals are allocated randomly to one or the other of the study’s experimental conditions (this method is used in the primary experimental studies of this thesis);

2. The *matched pairs design*, in which participants are matched in pairs and the two members of each pair are allocated randomly, one to each of the experimental conditions or groups; and

3. The *repeated measure design*, in which a single participant appears under both experimental conditions, and hence the total number of participants would be half the number of participants in the other two designs (this method is used in the pilot study of this thesis).

### 4.7.7 Types of Experimental design

Experimental design enables the researcher to develop strategies by formulating a plan to exert control over the experiment, that is, “who, what, when, where and how the
experiment is to be conducted” (Gray, 2004, p. 76). This helps the researchers to achieve better observation of the experimental process and to interpret its results correctly (Fellows and Liu, 2008). Creswell (2009) identifies the following four types of experimental design procedure:

1) Pre-experimental designs: In pre-experimental design, the researcher studies the experimental group by providing intervention(s) during the experiment. Gray (2004) identifies two types of pre-experimental design: (a) the post-test only with non-equivalent control groups and (b) one group undergoing pre-test/post-test stages. In the former, the treatment is given to the experimental group but not to the control group, at the pre-test stage. Both groups are then given a post-test to ascertain the influence of the treatment. The chance of error in this type of design is high since the subjects of one group may be more intelligent or motivated than those of the other.

In the latter type, there is only one subject group. Researchers measure the group’s value of interest (i.e. the dependent variable) by a pre-test, expose the group members to the condition which comprises the experiment’s independent variable, and then measure its effect on the group’s members by way of a post-test (Gray, 2004). This design is beneficial when researchers seek to compare and contrast the attitudes, behaviours, and actions of participants in two different situations and wish to measure the way these change due to the influence of the treatment(s) (Creswell, 2009).

2) True experimental design: based on this design, the researcher randomly assigns participants to the experimental and control groups. Those assigned to the experimental group would receive the treatment, whereas those in the control group would not receive any treatment. A significant difference in test scores between the two groups indicates that the treatment did influence the members assigned to the experimental group.

3) Quasi-experimental design: in this type of experimental design, the researcher has two groups, the experimental and control groups, but participants are not randomly allocated to them (Creswell, 2009). To increase the validity of quasi-experiments, it is suggested that researchers choose the participants of both groups from the same population (Gray, 2004).

4) Single-subject experimental design: This type of design, which is also known as developmental design (Gray, 2004), involves observing and measuring the behaviours of the participants over time or at a particular point in time (Creswell, 2009). The
difficulty with this type of experimental design is gaining access to the same set of people over a long period (Gray, 2004).

In this thesis, the one-group pre-test and post-test experimental design (Gray, 2004; Creswell, 2009) was chosen for both experiments. The advantage of this type of experimental design is that it enables observation of the influence of introducing independent variables on participants’ behaviours, intentions, and actions as well as offering an understanding of how and why the participants’ estimates of time differ in different situations.

4.8 Data collection methods and techniques

Two main types of data are collected during any research—primary and secondary data (Saunders et al., 2009). Primary data are observed, experienced, or recorded from first-hand sources and are collected by the researchers (Walliman, 2006). They can provide basic information for every aspect of human life and its environment since they are the nearest one can get to the truth. Nevertheless, access to primary data is a challenging and time-consuming task (Walliman, 2006). On the other hand, secondary data refers to those existing data preserved in written sources that interpret primary data. Saunders et al. (2009) introduce three main types of secondary data: documented and recorded data (books, journals), survey-based data, and multi-source secondary data. These data types are less reliable than primary data, and, therefore, it is necessary to check and ensure their quality (Gray, 2004).

There are many ways of collecting and recording primary and secondary data, and some are more reliable than others. Saunders et al. (2009) distinguish between three main types of data collection methods: observation, interview, and questionnaire, and these are discussed in the following subsections. They have also been summarised in Table 4.7 at the end of this section.

4.8.1 Observation

Through the observation method, researchers can directly monitor and evaluate the actions and behaviours of the participants in the research process. Saunders et al. (2009) identify two different methods of observation: participant observation and structured observation. The former is more qualitative and is focused on discovering the meanings of human actions, whereas the latter is quantitative and emphasises the frequency of those actions (Walliman, 2006).
According to Saunders et al. (2009), in participant observation, the researcher can play one of these four different roles: 1) complete participant: the researcher should become a member of the group and should take part in the group activities without revealing his/her true purpose to other group members; 2) complete observer: this is the same as the ‘complete participant’ role, but the researcher does not take part in the activities of the group; 3) observer as participant: the researcher joins a group by revealing his/her purpose and observes the group members’ activities without participating in those activities; and 4) participant as observer: this is the same as the ‘observer as participant’ role, but the researcher engages in the group activities. Figure 4.2 demonstrates the typology of participant observation researcher roles.

![Typology of participant observation researcher roles](image)

Figure 4.2: Typology of participant observation researcher roles (Saunders et al., 2009).

On the contrary, in structured observation the researchers’ focus is more on quantifying behaviour. It should be noted that, however, the structured observation method cannot be used to collect rich data since its function is to explain “how often things happen rather than why they happen” (Saunders et al., 2009, p.300). Therefore, it is suggested that researchers using this method as a part of data collection should supplement it with other data collection methods.

### 4.8.2 Interview

Interview is a deliberative discussion between two or more people in which the interviewer seeks to gather information from the interviewee(s) (Saunders et al., 2009). According to Fellows and Liu (2008), the researcher’s responsibility in collecting data
through interview is to represent interviewees’ views and attitudes fairly and to portray the meanings that underpin their lives and behaviours consistently. A well-conducted interview is a very flexible tool with a wide range of applications for eliciting rich data (Seidman, 1991; Walliman, 2006). Furthermore, unlike experiments or surveys which require a large number of participants, interviews can be done with fewer people. In addition, the direct contact with participants gives researchers the opportunity to benefit from the interviewees’ constructive suggestions and comments during the sessions (Shneiderman and Plaisant, 2005). Saunders et al. (2009) introduce three types of interviews, each having certain purposes and objectives. They are as follows:

- Structured interview: this type of interview is based on a set of pre-determined and standardised questions which are short and clearly worded. The researcher should ask exactly the same questions to all participants in the same tone of voice to avoid any bias. These questions are often closed questions which require short and precise answers that limit the interaction between the researcher and the participant. It is argued that this type of interview is most appropriate when the aims and objectives of the study are clearly understood and specific questions are identified (Preece et al., 2002).

- Semi-structured interview: in this type of interview, the researcher has a list of themes and questions that may change from interview to interview. Furthermore, the order of questions may be modified based on the flow of the discussion between the interviewer and the interviewee(s). This type of interview occurs in an open framework that allows the interviewer not just to find answers but also the reasons for those answers. Saunders et al. (2009) note that, when it is important to understand the reasons for the behaviours, opinions, or decisions of participants, it is best to conduct semi-structured or in-depth interviews. The semi-structured interview uses open-ended questions. Some of those are defined before the interviews, such as “tell me about…”, and some arise naturally during the interview, such as “you said a moment ago…can you tell me why?” (Creswell, 2009)

- Unstructured interview: this type of interview is informal in its nature and contains some open-ended questions which give the interviewees the opportunity to express their opinions freely. Here, the direction of the interview is not pre-determined; rather, it is based on the flow of conversation between
the interviewer and interviewees. Therefore, it is very important that the interviewer have a clear idea about different aspects of the issues in relation to the topic area (Gray, 2004). Unstructured interviews can produce rich and large data since interviewers can pose questions about new issues as they arise.

4.8.3 Questionnaire

Questionnaire is one of the most popular methods of data collection because it enables researchers to have a wider audience than do interviews (Saunders et al., 2009). However, designing a good questionnaire seems to be a challenging task for researchers (Walliman, 2006). In fact, the design of the questionnaire influences response rate and reliability of collected data. Another issue that makes the design of the questionnaire significant is the likelihood that researchers will have only one opportunity to collect data from those individuals who completed the questionnaire once (and chose to remain anonymous) (Oppenheim, 2000). Saunders et al. (2009) identify two types of questionnaire based on type of contact between researcher and respondent, the self-administered and the interviewer-administered questionnaire. The former is usually completed by the respondents and is administered either electronically using the internet or posted to respondents by post. The latter is often completed by the researchers based on the respondents’ answers. This type of questionnaire can be done by telephone or face-to-face interviews.

4.8.4 The selected data collection method

As mentioned in Section 4.5, the mixed-methods research design, which incorporates experimental studies and interviews, was chosen for the present research. These methods need both quantitative and qualitative data to be collected separately. Three types of data were collected in the present research. The quantitative data were collected through experiments. The features and characteristics of experimental data were discussed earlier (see Section 4.7).

Another type of collected data was through participant observation during experimental sessions. In so doing, the researcher played the role of ‘observer as participant’ (Saunders et al., 2009), meaning that he attended the sessions by introducing himself and revealing his identity to research participants. He also explained the experimental procedures and what they needed to accomplish. Then, the researcher asked them to initiate the task. While they were performing the task, he jotted down their insights and
observations as they occurred during the sessions. These notes and observations contain valuable information regarding the roles each participant play in the process of decision making, including who was more influential in making decisions and why; how the communication process went; and how they reacted when they failed to estimate properly, etc. Due to the importance of these observations, some of the sessions were video-recorded and were used later in the data analysis.

The third type of data was collected through semi-structured interviews with the subjects of the experiments and also with practitioners. The main reason for choosing a semi-structured type of interview was to better understand the experience of participants and the meaning they make of that experience (see e.g. Seidman, 1991). Furthermore, through semi-structured interviews, interviewees may use words or ideas in a particular way, and the opportunity to probe these meanings adds significance and depth to the data. The interviewees may also lead the discussion into areas that the researcher had not previously considered (Saunders et al., 2009). Before starting to carry out semi-structured interviews, a few themes and questions were outlined, which were based on the literature review and the author’s own experiences. However, these questions often resulted in a series of other questions depending on the flow of the conversations.

The interviews in both experiments were all group interviews (three people per group). The reason for doing group interviews was that most projects are planned and carried out by groups, and also the interest of this research was in investigating how a ‘group’ errs in its estimates of time ‘collectively’. Saunders et al. (2009) believe that group interactions may result in highly productive discussions and rich data. A dynamic group of interviewees can respond to the questions and evaluate them more effectively, leading to the emergence of new ideas or concepts. They can also challenge each other’s points of view, thereby providing more information to support their positions during the discussion (Gray, 2004).

Seven individual interviews were also conducted with experienced project planners working in construction projects. This was done mainly to overcome the inherent deficiency of the experimental approach, which is the generalisability of laboratory findings to a real world situation. Other justifications for conducting semi-structured interviews with practitioners were to understand how they make their decisions regarding the completion time of projects; to discover the level of their interactions with
other planners; and to recognise why their estimates are highly unlikely to be accurate. As mentioned previously, Table 4.7 below provides a summary of the differences between different data collection techniques.

<table>
<thead>
<tr>
<th>Data collection</th>
<th>Purpose</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>To get to the root of ‘what is going on’ in social settings</td>
<td>Useful for researchers working within their organisations</td>
<td>It is time consuming and can cause difficulties for the researcher.</td>
</tr>
<tr>
<td>Structured observation</td>
<td>To quantify behaviours and to understand why things happen</td>
<td>It results in highly reliable findings, and it can record the relationship between events.</td>
<td>The observer must be in the research when the phenomena under research are occurring.</td>
</tr>
<tr>
<td>Structured interview</td>
<td>To gain a quantitative result from the conducted sample</td>
<td>It is best suited to descriptive studies, and the results are quantifiable.</td>
<td>Cannot be used to explore people's reasons for their views or feelings about the issues</td>
</tr>
<tr>
<td>Semi-structured interview</td>
<td>To help the researcher determine the causal relationships between variables</td>
<td>It provides the researcher the opportunity to ask questions in areas of his/her interests.</td>
<td>Need to meet sufficient number of people in order to make general comparisons</td>
</tr>
<tr>
<td>Unstructured interview</td>
<td>To understand the reasons for interviewee’s decisions, attitudes, and opinions</td>
<td>Participants can uncover new issues, and so it is best suited for exploratory studies.</td>
<td>Quantifying and analysing the results is difficult.</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>To gather information from respondents with multiple questions</td>
<td>It takes less time to analyse the results and is best suited for large-scale surveys.</td>
<td>It does not offer the participants choices that actually reflect their real feelings</td>
</tr>
<tr>
<td>Open-ended questions</td>
<td>To gather information from respondents with multiple and descriptive questions</td>
<td>It allows participants to include more information, including feelings, attitudes, etc. concerning the subject.</td>
<td>The response rate is often lower than closed-ended questions and it is harder to analyse than closed-ended</td>
</tr>
</tbody>
</table>

Source: (Saunders et al., 2009)

4.9 Analysing data in mixed-methods research

In general, data analysis in mixed-methods research involves analysing separately the quantitative data using quantitative data analysis techniques and the qualitative data using qualitative data analysis techniques within the same study. This analysis involves analysing both sets of data, employing techniques that “mix” or “merge” the quantitative and qualitative results. Tashakkori and Teddlie (2003) note that integrating quantitative and qualitative findings “in a coherent and meaningful way that yields strong meta-inferences” is the most complex step for the researchers in a mixed-methods study. Therefore, guidelines and exemplars are needed for conducting this type of research. The guideline employed in this thesis is based on Creswell and Plano Clark’s (2011) book, “Designing and Conducting Mixed Methods Research".
This thesis contains two mixed-methods studies, each having a different design due to their differing purposes and research questions. The type of mixed-methods design chosen for the first study of this research (see Chapter 6) is the convergent parallel design. This is the most popular mixed-methods approach used by scholars across disciplines (Creswell and Plano Clark, 2011). As can be seen from Table 4.4, the aim of this strategy is to collect and analyse both quantitative and qualitative data during the same phase of the research process followed by integration of results and an overall interpretation. The rationale of this approach is to “obtain different but complementary data on the same topic” (Morse, 1991, p. 122). The researchers mostly use this method in order to compare and contrast the outcomes of their quantitative statistical results with qualitative findings for corroboration and validation purposes (Creswell and Plano Clark, 2011).

The main reason that the convergent parallel design is used in the first study was to achieve complementary quantitative and qualitative results and to develop a better understanding of the research problem. Additionally, in that particular study, the assumption was that the quantitative and qualitative data both have equal value in addressing the research problem—this is actually one of the main presumptions of the convergent parallel design (Creswell and Plano Clark, 2011). Furthermore, as there was only a single chance to meet the research participants, this strategy afforded the opportunity to collect both types of quantitative and qualitative data in one visit.

Drawing on Creswell and Plano Clark (2011), four major steps are defined to implement the procedures of the convergent parallel design method in this thesis (see Figure 4.3). The first step is to separately collect quantitative data from the experiment and qualitative data from the interviews. Next, both types of data sets should be analysed independently using their own relevant data analysis techniques. In the third step, the sets of results obtained from the previous step should be merged by applying different strategies such as comparing and contrasting the results in a table and/or transforming one type of result into the other type of data. In the last step, the findings should be summarised and interpreted in order to demonstrate “to what extent and in what ways results from the two types of data converge, diverge, and relate to each other” (Creswell and Plano Clark, 2011, p. 79).
Another type of mixed-methods design chosen for the second study of this research (see Chapter 7) is the sequential explanatory design. As can be seen from Table 4.4, this type of design begins with collection and analysis of quantitative data and then follows up with a qualitative study. The rationale of this approach is to use qualitative data to explain or expand on quantitative results. Creswell and Plano Clark (2011) note that researchers use this method primarily to “assess trends and relationships with quantitative data but also be able to explain the mechanism or reasons behind the resultant trends” (p. 82).

The mixed-methods sequential explanatory design is very popular among researchers in both social and behavioural sciences due to its straightforwardness (Ivankova et al., 2006). Drawing on Creswell and Plano Clark (2011), four major steps are defined to implement a two-phase explanatory design (see Figure 4.4). The first step is to collect quantitative data from the experiment and then to collect qualitative data from interviews. Next, the quantitative data should be analysed through inferential statistics or descriptive statistics, and the results are determined and interpreted. In the third step, the qualitative data should be analysed following from the experimental results. In the last step, the findings should be summarised and discussed and the extent to which the qualitative results help to explain the quantitative results noted. The challenges here are
“how and when to connect the quantitative and qualitative phases during the research process, and how to integrate the results of both phases of the study to answer the research questions” (Ivankova et al., 2006, p. 4).

Figure 4.4: The basic procedures in implementing an explanatory design (Creswell and Plano Clark, 2011).

In the following sub-sections, the different methods of analysing quantitative and qualitative data used in this thesis will be discussed.

4.9.1 Analysing quantitative data

As mentioned earlier, the quantitative data of this research are collected from designed experiments. Coolican (2014) points out that after identifying the type of quantitative data (categorical or numerical), and formulating the research hypothesis, the most important decision is the selection of appropriate statistical tests. Gray (2004) notes that the type of statistical test depends on the following issues:

- The type of hypothesis: for example the hypotheses related to the characteristics of groups vs. the hypotheses concerned with relationships between variables.
- The assumptions about the distribution of population: for example when the data are normally distributed compared with data that are not.
- The level of measurement of the variables in the hypothesis: for example, non-parametric tests are only suitable for nominal and ordinal data, but parametric tests can be used with interval and ratio data.

In the designed experiments, as the aim is to compare the likelihood of differences between two groups influenced by different variables, the paired t-test is the most ideal choice (Sprent, 2000). The t-test is a type of parametric or distribution dependent test, and the validity of its results depends on certain data assumptions. The aim of the t-test
is to compare the means of the two groups to establish whether there is any significant
difference between them. If the p-value associated with the t-test is lower than 0.05,
then there is evidence to reject the null hypothesis. Coolican (2014) suggests that when
there are two sets of data from one group and the researchers wish to compare their
differences, they have to use a within-subjects t-test (similar to that used in Chapter 7 of
this thesis), and when the two samples of data have come from two different groups, the
choice of statistical test is a between-subjects t-test (similar to that used in Chapter 6 of
this thesis).

The next step after conducting the t-test is to use the diagrams, graphs and charts to
explore and understand the data as well as identifying the relationships between
variables and groups. Coolican (2014) states that using statistical methods in
combination with graphical representation forms a powerful tool with which to analyse
quantitative data. The choice of graphical representation of data mainly depends on the
research questions and objectives. The representation of data should likely serve the
following purposes:

- To present the data visually.
- To show trends over time.
- To show and compare changes.
- To compare the relationship between quantities.
- To explore data and identify the highest and lowest values.
- To communicate the meaning of large volumes of data in summarised form.

In this thesis, multiple line charts and scatter diagrams are used to visualise the
numerical data in a graphical format and to represent the differences between
values/variables. Multiple line charts are a useful way to compare two or more variables
in the same chart and to show patterns or trends over certain variables. Scatter diagrams
are also suitable for representing and comparing various sets of data. Aside from this,
they can depict whether there is any correlation between sets of data and determine how
points are clustered around a regression line.
4.9.2 Analysing qualitative data

Qualitative data analysis involves coding the data, dividing the text into small units, assigning a label to each unit, and then grouping the codes into themes. Saunders et al. (2009) liken the process of qualitative data analysis to completing a jigsaw puzzle in which the pieces represent data. These pieces of data and the relationships between them help researchers to represent the picture of reality. However, identifying the relationships and analysing qualitative data is a demanding process, and should not be seen as an easy option.

Saunders et al. (2009) express that there are different methods of analysing qualitative data depending on the type of data, the methods used in data collection, research subjects, and the study’s design and objectives. While some procedures can be used deductively, such as data categories and codes to analyse data being derived from a literature review and/or a predetermined analytical framework, other procedures can be set out inductively, where codes emerge from the data and the research process.

In this thesis, three methods of qualitative data analysis are used. These methods are as follows:

1. Thematic analysis: Thematic analysis involves the identification of emerging themes through careful reading and re-reading of the data. This analysis is a form of pattern recognition within the data (Miles and Huberman, 1994). This method of analysis is used in Chapters 5 and 6 of the present research. According to Miles and Huberman (1994), the first step in conducting thematic analysis is to become familiar with the transcripts through reading them and listening to the tapes several times. The next step is to categorise the transcripts and attach them to diverse verbatim quotations and specific evidence obtained from the interviewees. Later, the voluminous and unstructured individual data from the transcripts should be coded carefully to reduce and organise the texts into relatively few general categories (Fellows and Liu, 2008). This helps to provide an emergent structure and framework within which data analysis can be pursued later. The coding process can be carried out either manually by using highlighter markers or using Nvivo software. After coding and labelling data, the concepts with similar contents should be recognised. These concepts can be developed into categories. Strauss and Corbin (1998) point out that, after developing categories and sub-categories, researchers can then attempt
to detect patterns (or themes). Figure 4.5 demonstrates the process of conducting thematic analysis.

![Figure 4.5: The process of conducting thematic analysis.](image)

2. **Conversation analysis**: Conversation Analysis (CA) is the study of talk-in-interaction to capture what people communicate, how they communicate, and the consequences thereof (Goffman, 1974). The procedure to analyse the qualitative data through CA is similar to thematic analysis, but the transcripts and its level of details differ significantly. CA uses the system of transcription symbols with a comprehensive range of standardised conventions which was developed to facilitate the interpretation and understanding of interaction in different settings. This system is useful for the present research because one of the main objectives was to investigate the interaction among group members to see how they arrive at a single estimation through negotiation and agreement.

   Indeed, CA transcripts are formidably complex to the untrained eye since there are an immeasurable number of phenomena in any particular segment of conversation, which incorporate such details as the precise beginning and end-points of turns, overlaps, stress, laughter, the duration of pauses, and different vocalisations (Hutchby and Wooffitt, 2008). The reason for the detailed transcription within CA was its suitability for a variety of purposes such as studying social interaction (Goffman, 1974; Heritage, 1990), turn-taking (Sacks et al., 1974), action-formation (Davidson, 1984), and word-selection (Schegloff, 1972) in different contexts including linguistics, sociology, anthropology, speech-communication and psychology, and anthropology. However, as Hutchby and Wooffitt (2008, p. 71) note, “No transcription system exists which is able, or even lays claim to being able, to capture all the possible features of talk that may be observable”. For this reason,
only those symbols which were most helpful in formulating subsequent interpretations and findings of this research were used (see Table 4.8).

Table 4.8: CA transcription conventions.

<table>
<thead>
<tr>
<th>Transcription Element</th>
<th>Meaning</th>
<th>Transcription Element</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ or ↓</td>
<td>Marked rise or fall in pitch</td>
<td>(.)</td>
<td>Small pauses</td>
</tr>
<tr>
<td>Underlining</td>
<td>Used for emphasis</td>
<td>(1.5)</td>
<td>Silences (time in seconds)</td>
</tr>
<tr>
<td>UPPER-CASE LETTERS</td>
<td>Indicate increased volume</td>
<td>[ ]</td>
<td>Overlaps, cases of simultaneous speech or interruptions</td>
</tr>
<tr>
<td>()</td>
<td>Analyst’s comment about something going on in the talk</td>
<td>no:::</td>
<td>Sounds that are stretched or drawn out (number of :: indicates the length of stretching)</td>
</tr>
<tr>
<td>&gt; word &lt;</td>
<td>Noticeably faster speech</td>
<td>.tk</td>
<td>Sign of disagreement by stopping another person</td>
</tr>
<tr>
<td>=</td>
<td>no break or gap</td>
<td>£smile£</td>
<td>Laughter</td>
</tr>
</tbody>
</table>

Source: (Jefferson, 2004)

3. **Content analysis**: Content analysis is a form of qualitative study which focuses on the explicit and implicit meanings that surround strategic communications. Specifically, content analysis is rooted in 1950s’ communication studies, where it followed the sender/receiver model in order to provide a quantified analysis of recurring or persistent and easily identifiable parts of a text’s content, an application also referred to as manifest content (White and Marsh, 2006). This form of analysis has continued its development and, in its most current form, the content analysis method can be defined as a systematic, replicable technique to make inferences about a text, where the notion of inference plays a key role in determining the purpose and object of methodological study (Weber, 1990; Krippendorff, 2004). Inference in content analysis results from a series of analytical constructs that allow the researcher to go back and forth between a text and its context to describe the phenomena (White and Marsh, 2006). In other words, content analysis has become more complex in its approach and can go beyond identifying and subsequently quantifying terms. This ‘beyond’ is characterised by an understanding of communications as essentially rich in both explicit and implicit content, which should always be studied from a strategic point of view, that is, paying close attention to intentionality, expectations, and construction of meanings (Krippendorff, 2004). The aim of content analysis therefore is to obtain a condensed...
description of the phenomenon through classification of many words of the text into content-related categories (Weber, 1990).

The type of content analysis used in Chapter 8 of this thesis is qualitative content analysis. The main purpose of qualitative content analysis is “to capture the meanings, emphasis, and themes of messages and to understand the organisation and process of how they are presented” (Altheide, 1996, p. 33). Thus, unlike quantitative analysis, where the researcher begins with a set of established relationships, in qualitative analysis the researcher intends to use the data gathered to challenge presupposed relationships and to propose the construction of relationships neglected or missed by previous research efforts. In qualitative studies, the focus is not so much on the frequency of use of any certain term or particle but rather on the social meaning (explicit and implicit) that can be inferred in the types of categorisation and identity terms used in the text (Hsieh and Shannon, 2005). Therefore, qualitative content analysis is highly propositional, for it is characterised by the proposition of relationships and hypotheses concerning new relationships.

4.10 Credibility of Research Findings

Any social science research needs to pursue the principle of methodological rigour and practical adherence to the criteria that renders it a trustworthy enquiry into the world of social science (Saunders et al., 2009). According to Morse et al. (2002), “Without rigour research is worthless, becomes fiction and loses its utility” (p. 3). Judgements relating to the quality of rigour of social sciences research are commonly discussed in terms of reliability, validity, and generalisability (Kvale, 1996; Gray, 2004; Creswell and Plano Clark, 2011). However, as Creswell and Plano Clark (2011) argue, the criteria for assessing the quality of mixed-methods studies are not yet clearly defined. They suggest that researchers can benefit from the standards for qualitative and quantitative research.

4.10.1 Reliability

According to Saunders et al. (2009), reliability refers to the extent to which researchers find stability or consistency within data collection techniques or analysis procedures. This is associated with issues such as whether a study can be repeated in other, similar research settings and produce the same results (Creswell, 2009; Saunders et al., 2009; Bryman, 2012). The following issues were considered to ensure reliability of the mixed-methods research performed during this study.
First, documentation of research procedures is necessary so that, if others were to perform the same research again, the process could be repeated and the same results would be achieved (Yin, 2009). It should be noted that, following the “Code of Good Research Conduct”, which is provided by the research institution of the researcher, all documents regarding this thesis, such as interview transcripts, consent forms, audio and video recorded files, experimental data, and analysis have to be kept for a minimum period of five years after the date of publication. During this time, the data will be accessible to any third party who wishes to do so, through contacting the author of this thesis or his supervisory team.

Second, there is concern about errors and biases in experimental procedures. Therefore, researchers must enhance the reliability of the quantitative results of experiments (Saunders et al., 2009). From a quantitative study perspective, reliability means that scores received from participants are consistent and yield the same results on repeated trials (Creswell and Plano Clark, 2011). However, it may not always be “possible to replicate social, organisational or behavioural conditions in a laboratory setting” (Gray, 2004, p. 77). Therefore, the following procedures are carried out to improve the reliability of experiments:

A pilot experiment was carried out prior to the main experiments being conducted, and its results were analysed and interpreted.

- The collected data from the experimental studies are attached to this thesis as an appendix.
- The consistency of the data collected through the experimental procedure was investigated statistically by calculating reliability coefficients.
- The results from experimental studies were compared to those reported in previous similar studies.
- The test-retest reliability was conducted (Creswell, 2009), which involves implementing the analysis twice at two different points in time to make sure that there is no change in the quality or construct being measured.
- The internal consistency reliability was executed in one of the experiments, which involves judging the consistency of results by performing a replication of the same test.
Third, the reliability of the findings from qualitative research needs to be assessed. It should be noted that the meaning of reliability for a qualitative study is different from that in quantitative research. The reason for this is that human behaviour is not static and changes continuously depending on various influencing factors (Creswell, 2009). Therefore, a similar qualitative study with different participants in a different setting or context may not necessarily result in the same findings. As Gibbs (2007) defines, qualitative reliability indicates that the researcher’s approach is consistent across different studies and different projects. But how can researchers achieve this consistency in their approach?

Creswell and Plano Clark (2011) suggest that researchers can use the “intercoder agreement” procedure to improve the reliability of their qualitative findings. This involves hiring several individuals to code a transcript and then comparing the achieved codes and themes to see whether or not they are similar. However, in the present study, there was no funding or opportunity available to perform an intercoder agreement procedure. Instead, the following steps were carried out to make sure that the results from the semi-structured interviews are reliable:

- The assumptions and theories behind the research were presented and published as a conference paper and a journal paper, respectively.
- The mixed-methods design is used as the method of data collection so that the qualitative data is supported by quantitative data.
- The procedure of data collection through interviews is explained and the interview questions are discussed.
- The transcripts are double checked to make sure that they do not contain obvious mistakes during transcription.
- All interviews are recorded in high quality and the files are stored on the researcher’s personal computer.
- Some of the interviews are video-recorded and their video files are available.

4.10.2 Validity

Validity refers to the process of checking the accuracy of findings by employing certain procedures in order to explain what is really happening in the situation (Creswell, 2009).
In other words, the data should give a true reflection of what is being studied. According to Saunders et al. (2009), the research questions and the appropriate inferences of the results influence mostly the validity of the findings. There are two important types of validity: internal and external. The former refers to the extent to which findings can accurately describe reality, whereas the latter refers to the ability of researchers to generalise findings across different settings (Hoepfl, 1997). It is argued that the results of lab-based experiments mostly have high internal validity and low external validity, whereas the opposite holds true for qualitative studies (Schram, 2005; Creswell, 2009; Saunders et al., 2009).

As with reliability, the process of validity differs between quantitative and qualitative studies. Creswell and Plano Clark (2011) argue that researchers should be aware of the potential threats to the internal and external validity of experiments. In experiments, internal validity threats refer to any issues that threaten the researcher’s ability to draw correct inferences from the data about the subjects of that particular experiment (Creswell, 2009). One of the advantages of experimental studies is that “randomisation” enhances control over threats to internal validity (Gray, 2004). In this thesis, the internal validity of experimental findings was improved by minimising the effect of extraneous factors. For example, the participants were asked to turn off their phones or not to leave the class during while experiments were underway. Furthermore, the following issues mentioned by Gray (2004) for improving the internal validity of laboratory experiments were taken into consideration:

- Maturation effects were controlled. This refers to the fact that people learn over time, especially when they are repeating a task.
- There was no instrumentation effect in the experiments of the present thesis. This effect refers to the changes in the observer or experimenter used to assess the test results.
- The researcher tried to avoid a large time gap between the pre-test and post-test stages.
- The pre-test stage may have made the participants competitive and thus may have influenced their actions at the post-test stage.
As opposed to the high internal validity of experiments, external validity is always an issue (Saunders et al., 2009; Creswell, 2009). Creswell and Plano Clark (2011) explain that external validity threats arise when researchers generalise their inferences to a large group of individuals, to other settings, and to other situations. To enhance the external validity of the quantitative findings of this thesis, seven semi-structured interviews were carried out with project planners in order to ascertain whether the results varied between laboratory and real world settings. Furthermore, one journal paper was submitted and one conference paper was presented with the experimental results to enhance the validity and credibility of the research’s findings.

In qualitative studies, internal validity refers to the extent to which researchers infer a meaning that the participant intended to convey (Saunders et al., 2009). The internal validity of the qualitative data collected through semi-structured interviews was enhanced by adopting six strategies suggested by Merriam (1998). They are as follows:

- Triangulation: (using two or more methods).
- Member checks (sending the tentative interpretations of the results to the participants and asking them if the results were plausible).
- Long-term observation (e.g. participant observation).
- Peer examination (sending the results to the supervisory team or colleagues).
- Participatory or collaborative modes of research (having a research and data collection team).
- Clarifying the researcher’s biases (through consideration of worldview and theoretical orientation at the beginning of the study).

Another aspect of validity in qualitative research relates to external validity. This refers to the extent to which the results can be generalised to the entire population (Saunders et al., 2009) and, in fact, constitutes the main problem with the interview method of data collection, since interviews are mainly based on a small and unrepresentative number of cases. This thesis used experimental data to overcome this difficulty and enhance the external validity of the interviews’ data.
4.11 Ethical considerations

The ethics of research is characterised by the appropriateness of the researcher’s behaviour regarding the rights of the research participants or those who are affected by the research (Gray, 2004). Israel and Hay (2006, p. 1) remind social scientists that the aim of social science is to “make the world a better place” rather than doing systematic harm to people and communities. Referring to the work of Habermas (1972), they warn that society is more concerned with technical or economic improvements and less aware of ethical issues. Therefore, researchers are responsible for developing strategies that protect research participants and mitigate the risk of causing physical, mental, social, or economic harm to them. Many of these strategies can be found in the published ethical codes and guidelines of institutes or organisations. Miles and Huberman (1994) addressed the following set of ethical issues that can arise at the planning, implementation, and reporting stages of a research:

- Informed consent (Do participants have full knowledge of what is involved?)
- Harm and risk (Can the study hurt participants?)
- Honesty and trust (Is the researcher being truthful in presenting data?)
- Privacy, confidentiality, and anonymity (Will the study intrude too much into group behaviours?)
- Intervention and advocacy (What should researchers do if participants display harmful or illegal behaviour?)

In this research, the ethical issues were considered in both experiments and interviews. Before the experiments began, an email was sent to each subject in each experiment to remind him or her of the date of the experiment. In this email, the informed consent form was attached (see Appendix C). On this form, they were instructed that they were free to decide to take part in the research on the basis of a fully informed and voluntary decision. The participants were also notified that the experiments did not involve any hazards and discomforts. On the day of the experiment, based on the principle of respect for participants, the participants were told that they could decline to answer questions or to carry out the experiment at any stage of the research.

In the interview session, the interviewees were informed that sound recording was taking place in the room and that the interviews would be transcribed verbatim and
saved as encrypted files on a password-protected computer. They were also told that direct quotations would be used only if they were typical and that all information used for publication would be anonymised to protect the identities of the research participants. Additionally, the following steps were carried out to make sure that all ethical issues are taken into consideration:

- The procedure of on-going consent check was carried out at all stages of the research.
- The privacy and autonomy of participants was respected.
- The participants were informed that data would not be disclosed to a third party under any circumstances and that their quotes would be used anonymously.
- The research participants were told that the data would be treated with the strictest of confidence.
- The participants were informed that they would be invited to view and agree to drafts of publications prior to submission.
- The ethics form for this research was filled in and submitted to both supervisors.
- One of the researcher’s supervisors is a member of the ethics committee of the University of Manchester. He twice reviewed and commented on the ethics form of this research.

4.12 Conclusion

This chapter described the overall research process, provided justifications for the chosen research methodology, and explained the methods that will be used to analyse the data in the next chapters are described.

Initially, the ontological and epistemological assumptions behind this research were articulated, and different philosophical positions were evaluated in order to illustrate how the researcher perceives and ‘views’ the world and why specific research approaches or methods were chosen. As a result, pragmatism was chosen as the research philosophy since the main concern of the author is to provide a holistic and shared understanding of “human action and its meaning” (Thorpe and Holt, 2008).
Different research approaches, including abductive, inductive, and deductive, were also discussed in order to make better-informed decisions about the research design and data collection method. Accordingly, the abductive approach was selected for the mixed-methods studies of this research since it provides a more thorough understanding of the data and also allows the researcher to move back and forth between data sources and analysis in the quantitative-qualitative research design. However, to analyse the data from interviews with practitioners, the deductive approach was selected, since the researcher’s aim was to retest existing findings (from Chapter 6 and 7) in a broader context (Elo and Kyngäs, 2008).

Three main research designs—qualitative, quantitative, and mixed-methods—were evaluated in order to determine their appropriateness for this study, and the mixed-methods design was selected, since it provides a more comprehensive picture of research problems than either of the others do alone. Two types of mixed-methods studies were selected for use and are presented in Chapters 6 (convergent parallel design) and 7 (explanatory sequential design). The difference in the type of their designs relates to the particular purpose and research questions of each chapter (Creswell and Plano Clark, 2011). However, in both types of mixed-methods design, the author’s perception towards the quantitative and qualitative data of this research is that they both have equal value in addressing the research problem.

In addition, the main purpose and application of the major research strategies including experiment, survey, case study, ethnography, archival research, and grounded theory were explained. Accordingly, the experimental research strategy was chosen to address the research questions of this thesis due to certain practical and ethical difficulties involved in obtaining data to explore the dynamics behind (under)estimation of project completion times, especially when the estimate is made by a group, through other prevailing research methods such as case study and ethnography. In addition, in order to manage threats and strengthen the benefits of the experimental approach, its advantages and disadvantages were pointed out and an explanation of the key features common to all experimental research studies was given.

Moreover, different data collection methods and techniques such as experimentation, observation, interview, and questionnaire were reviewed. In order to collect quantitative data, experimentation was selected, whereas to collect qualitative data, participant
observation (during the sessions of the experiments) and semi-structured interviews were chosen. The observation method allows the researcher to understand the role each participant plays in the process of decision making as well as understanding how the communication process goes; and how participants react when they fail to estimate properly (Saunders et al., 2009). In addition, semi-structured interviews with the subjects of the experiments enable the researcher to better understand the experience of participants and the meaning they make of that experience (Seidman, 1991). In support of this, qualitative data was collected through seven interviews with experienced project planners working in construction projects in order to understand how in reality planners make their decisions regarding project completion times and to identify the challenges and difficulties they face. These interviews also give more credibility to the findings of the experimental studies of this thesis.

Additionally, the reliability and validity of mixed-methods studies were evaluated in order to assure the quality and rigour of the research. For each quantitative study and qualitative study, a set of criteria were defined separately to be checked at a later stage of the research, such as carrying out a pilot study prior to the main study, attaching the experimental data to the thesis, double checking transcripts, avoiding a large time gap between different stages of an experiment, conducting interviews with practitioners, and presenting and publishing conference and journal papers regarding the research. Besides checking the reliability and validity of the research, the ethical issues that need to be considered in order to protect research participants and to mitigate the risk of causing them harm were also emphasised. These considerations include emailing an informed consent form to participants prior to the experiments, informing participants that the data would not be disclosed to a third party, inviting the participants to view and agree to drafts of publications prior to submission, and submitting an ethics form to both supervisors prior to data collection.

Chapter 5 will describe the review of previous studies investigating forecasting inaccuracies and will present the details of the pilot study conducted as part of this research and its outcome.
Chapter 5: Pilot study and review of previous research on time underestimation

5.1 Introduction

The overall aim of this chapter is to review previous studies investigating forecasting inaccuracies and to present the outcomes of the pilot study, both of which were performed in order to ensure that the planned research design was best suited to accomplish the research’s objectives. This chapter, thus, is split into two sections. The first section reviews the research methods adopted by previous studies to investigate time underestimation. This review found that the majority of these studies were rooted in psychological research. This chapter then highlighted the advantages of applying the approaches used in these studies to the problem of time underestimation and also explained why and how construction management can benefit from the insights proposed by behavioural and cognitive scientists in psychology.

The second part of this chapter presents details concerning the data collection procedures used and the outcomes of the pilot study carried out prior to the main study. Following is a discussion of the initial findings drawn from the pilot experiment and interviews with 12 students pursuing a PhD in Project Management. The purposes of the pilot study were to gather research hypotheses, to enhance the appropriateness of the research questions, and to identify any potential problems associated with the mixed-methods research design so that they could be rectified prior to the main research’s being conducted. Next, the lessons learnt from the pilot study are highlighted and reviewed, and the chapter concludes with an overview of the research hypotheses derived from the literature review and pilot study.

5.2 Time estimation in psychological research

Scanning the literature reveals that researchers in construction management tend mostly to explain the reasons behind underestimation of time in terms of technical and managerial problems (see Chapter 2). However, the appropriateness of this functionalist approach has been criticised by many scholars of project management for placing too much emphasis on technology and project management tools and techniques and so ignoring the role of human agency, power relations, and meaning-making in shaping project plans (Fournier and Grey, 2000; Cicmil et al., 2006; Winter et al., 2006). Even
those construction scholars who did examine the latter issues in their studies did not explore how these human-related issues can affect project time estimation (Goodman et al., 2001; Crossan et al., 2005).

Unlike construction management scholars, the behavioural and cognitive scientists in psychology focused more on human-related issues and attempted to explore ‘how’ the time of different tasks and projects is often underestimated and what influences this tendency (see e.g. Kahneman and Tversky, 1973). The main finding and contribution of cognitive scientists was that underestimation is mainly due to the forecasters’ optimistic plans about the future, which was discussed in the guise of ‘planning fallacy’ (see Chapter 3). The majority of behavioural and cognitive studies have used experiments to manipulate the effect of such differing factors as incentives (Buehler et al., 1994), the degree of focus on future plans (Lovallo and Kahneman, 2003; Buehler and Griffin, 2003), motivation (Byram, 1997; Buehler et al., 1997), intentions (Gollwitzer, 1999; Koole and Van’t Spijker, 2000; Koehler and Poon, 2006), group discussion (Sanna et al., 2005; Balafoutas et al., 2014), power (Weick and Guinote, 2010), anchoring effects (König, 2005), temporality (Eyal et al., 2004), and memory bias (Roy and Christenfeld, 2008) on time estimation in order to measure the mediating cognitive mechanisms. The majority of these studies are published in psychological journals with high impact factors such as Organisational Behaviour and Human Decision Processes, Journal of Personality and Social Psychology, Personality and Social Psychology Bulletin, and Applied Cognitive Psychology.

Recently, Halkjelsvik and Jørgensen (2012), in their review of studies on judgement-based predictions of performance time, call for research attention to be directed at investigating psychological findings regarding completion time predictions in the engineering and management literature. Their review found only one study, sited in the engineering literature and related to software development, which considered judgement-based estimation (see Jørgensen, 2004). They thus claimed that their paper was “the first comprehensive review on performance time predictions that integrates research from engineering, management science, and psychology” (p. 239).

After reviewing 31 published papers from psychological journals regarding “time”, “time estimation”, and “forecasting inaccuracies”, the researcher realised that applying approaches and insights drawn from behavioural and cognitive psychology to the study
of project time could possibly be helpful in understanding how project planners underestimate project completion times. In point of fact, this thesis also constitutes a call to construction management researchers to turn their attention towards time estimation as rooted in the behavioural and cognitive literature. The advantages involved in this engagement are discussed below.

Construction management can benefit from the strategies and techniques developed in psychological research—which are known as debiasing techniques—for reducing planners’ tendency to repeatedly underestimate task- and project-completion times (Buehler et al., 2012). These techniques, strategies, and methods are extracted from the psychological literature and summarised in Table 5.1 below.

### Table 5.1: Different debiasing techniques, strategies, and methods proposed by cognitive researchers.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Debiasing technique</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacGregor (2001)</td>
<td>Decomposition</td>
<td>This method splits the task into several subtasks that can be more easily estimated and then aggregates those estimates to generate a total estimate.</td>
</tr>
<tr>
<td>Kahneman and Tversky (1979)</td>
<td>Outside view</td>
<td>This approach encourages people to consider past similar experiences rather than focusing only on the task at hand.</td>
</tr>
<tr>
<td>Buehler et al. (2012)</td>
<td>Using neutral observer</td>
<td>This strategy implies that a neutral person is more inclined to consider potential impediments and drawbacks and less inclined to produce optimistic plans.</td>
</tr>
<tr>
<td>Byram (1997)</td>
<td>Writing surprises</td>
<td>This technique is based on writing and predicting the things that could go wrong during task implementation before the actual start.</td>
</tr>
<tr>
<td>Newby-Clark et al. (2000)</td>
<td>Using multiple scenarios</td>
<td>This technique encourages people to draw alternative images of the future by defining different scenarios (optimistic, best guess, pessimistic) with different information that might otherwise be ignored.</td>
</tr>
<tr>
<td>Buehler et al. (1994)</td>
<td>Recalling past prediction failures</td>
<td>This strategy persuades people to sharpen their attention to previous failures at the time of making decisions about future plans.</td>
</tr>
<tr>
<td>Kruger and Evans (2004)</td>
<td>Unpacking activities</td>
<td>This method breaks down the task figuratively into subcomponents and makes a single estimate. It, however, differs from decomposition in terms of operationalisation, underlying theory, and predictions.</td>
</tr>
</tbody>
</table>

Source: Field work

To determine what engineers or managers believe are the reasons for underestimation of time (and cost), construction management scholars tend mainly to use surveys or questionnaire-based studies. Halkjelsvik and Jørgensen (2012) point out that these prevailing research methods, however, are not “good methods for evaluating the validity of practitioners’ beliefs” in the engineering and management discipline (p. 239). Similarly, in Chapter 2 of this thesis, the argument was made that such methods do not allow construction management scholars to find answers for certain research questions,
such as how and why planners repeatedly underestimate the time of completing projects; how a group of planners errs in its estimates ‘collectively’; and what are the underlying motivational processes that influence planners’ estimates.

On the contrary, a review of the cognitive research literature on time estimation revealed that many of these studies pose more challenging questions as well as offer a useful basis from which to address those questions. It is suggested, therefore, that researchers in construction management can benefit from addressing these research questions in their studies of project time/cost overruns and investigate them in the context of construction projects. For this reason, different types of research questions raised by behavioural and cognitive scientists are extracted and presented in Table 5.2 below.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buehler et al. (1994)</td>
<td>Why and how do people underestimate their task completion times?</td>
</tr>
<tr>
<td>Buehler et al. (2005)</td>
<td>How do group discussions affect optimistic biases in time estimation?</td>
</tr>
<tr>
<td>Buehler et al. (2010)</td>
<td>Do task completion predictions influence actual completion times, and, if so, when?</td>
</tr>
<tr>
<td>Buehler et al. (2012)</td>
<td>What is the effect of third-person imagery on task completion estimates?</td>
</tr>
<tr>
<td>Byram (1997)</td>
<td>What are the cognitive and motivational processes underlying time prediction?</td>
</tr>
<tr>
<td>Connolly and Dean (1997)</td>
<td>How can the ‘decomposition’ technique affect the time estimates?</td>
</tr>
<tr>
<td>Hinds (1999)</td>
<td>What are the effects of expertise and debiasing methods on time estimations of novice performance?</td>
</tr>
<tr>
<td>Kanten (2011)</td>
<td>What is the effect of construal level on predictions of task duration?</td>
</tr>
<tr>
<td>Koehler and Poon (2006)</td>
<td>How can the strength of current intentions affect time estimations?</td>
</tr>
<tr>
<td>Koole and van’t Spijker (2000)</td>
<td>What are the effects of implementation intentions on actual and predicted task-completion times?</td>
</tr>
<tr>
<td>Kruger and Evans (2004)</td>
<td>How does unpacking reduce the planning fallacy?</td>
</tr>
<tr>
<td>Newby-Clark et al. (2000)</td>
<td>How does using the multiple-scenarios technique affect the optimism/pessimism bias?</td>
</tr>
<tr>
<td>Peetz et al. (2010)</td>
<td>How does temporal distance affect task completion predictions?</td>
</tr>
<tr>
<td>Pezzo et al. (2006)</td>
<td>How can the self-presentation motive affect the planning fallacy?</td>
</tr>
<tr>
<td>Roy and Christenfeld (2008)</td>
<td>What is the effect of task length on predicted duration?</td>
</tr>
<tr>
<td>Sanna et al. (2005)</td>
<td>How does temporal framing influence the group planning fallacy?</td>
</tr>
<tr>
<td>Thomas et al. (2003)</td>
<td>What are the effects of task experience and complexity on prediction accuracy?</td>
</tr>
</tbody>
</table>

Source: Field work

According to Halkjelsvik and Jørgensen (2012), there are two ways to make estimations about the time of activities: one using expert judgements and the other using formal estimation models. The difference between these two lies in the final step, producing
estimates for the total project or a project activity, which constitutes the “quantification step”, i.e. the step where an understanding of the time estimation is translated into a quantitative measure of completion time. Jørgensen (2007) argues that the quantification step of expert judgement estimation goes through a cognitive process and is intuition based, whereas in formal models of estimation, it is analytical and mechanical based. He argues that, in projects, planners not only use extensive estimation models and tools but also use their expert judgement to a large extent in producing time estimates (see also Blattberg and Hoch, 1990; Goodwin, 2000).

However, reviewing models developed to estimate construction duration, e.g. the BTC model (Bromilow et al., 1980), it was found that construction researchers mainly focused on the former and neglected the latter (see e.g. Chan and Kumaraswamy, 2002; Love et al., 2005; Hoffman et al., 2007). Put another way, construction research is more inclined to improve the estimation accuracy of the formal models by finding important factors and variables affecting construction time through questionnaire studies or literature review and less inclined to consider the significance of expert (human) judgements in estimating time. The focus of this thesis is on the latter case, with which the behavioural and cognitive literature deals primarily and not the construction management literature.

Therefore, based on the points mentioned above, in the remainder of this thesis, the researcher combines those approaches and insights from behavioural and cognitive psychology that are relevant to the study of project time. This allows the researcher to pin down the process people go through in order to generate time estimates as well as explore the dynamics of their interaction when they are part of a group and seek to reach a consensual ‘group’ decision.

5.3 Pilot study
A pilot study is a small-scale study conducted in order to test and evaluate logistics and gather information prior to a larger study’s being conducted. It provides advance warning of any potential problems, enhances the appropriateness and suitability of research questions, and improves the quality and efficiency of the main research (Gray, 2004; Walliman, 2006; Saunders et al., 2009). Cohen et al. (2007) argue that researchers doing experimental studies must carry out a pilot test in order to identify “possible snags”, which could potentially destroy the experiment, and ensure that everything is set
up correctly. Thus, it is of crucial importance because it improves the design of the experiment prior to investing a great amount of time and effort in it. It is suggested that the pilot study should be followed by initial analysis and production of results so that the researcher can check the statistical and analytical processes to determine whether or not they are efficacious (Fellows and Liu, 2008).

In this research, the pilot study was aimed at gathering hypotheses and checking whether mixed-methods design was suitable for answering the research questions. Furthermore, since the experimental approach is not popular in management studies, the pilot study gave an initial understanding and overview of the advantages and disadvantages of this method. A pilot study also allows formulation of interview questions and receipt of feedback from the participants so that they can be addressed in the main research.

5.3.1 Pilot experiment
The pilot experiment was concerned with estimating the time the participant needed to move a set of balls from Box A (filled with colourful balls) to Box B (empty). The idea of using balls in this experiment was drawn from Muren (2004), who asked her participants to estimate the number of green balls in a transparent plastic container filled with white and green Styrofoam balls.

Previous studies on time estimation found that people estimating duration for activities requiring less than five minutes tended to overestimate the duration (Thomas et al., 2003; Burt and Kemp, 1994). Thomas et al. (2003), for example, note that, “People tend to make pessimistically biased predictions on well-structured tasks, which range in duration from less than 15 seconds to 4 minutes” (p. 670). Since the activity that was chosen for the pilot experiment was short, it was therefore expected that participants overestimate the time to perform the task. This led to the following hypothesis:

H1: people are pessimistic in estimating the time required to complete activities of short duration.

5.3.1.1 Experimental procedure in the pilot study
To conduct the pilot experiment, twelve colleagues doing PhDs in Project Management at the University of Manchester were invited to carry out a test regarding project planning. The average age of the participants was 33.9 years. The participants’ selection
method was convenience sampling—whereby researchers survey friends, students, or colleagues (Creswell, 2009). There were two reasons that this method was chosen: first, to receive comments and suggestions from other PhD students regarding to the present research; and second, it was easiest to recruit PhD colleagues to conduct the pilot study due to their availability and perceptions of the academic research.

The pilot experiment was carried out over two weeks in February and March 2011. This is what Coolican (2014) refers as elapsed time which is the time to dissipate any learning or fatigue effects on experimental subjects. Since the pilot experiment’s design was based on pre-test/post-test, each participant was asked to choose two schedules by using an online scheduling tool, called Doodle poll (available at http://www.doodle.com). In this poll, 24 schedules were defined so that they could choose the time that was most convenient for them. The participants were also reminded of the importance of their punctual attendance at the time they had chosen.

At the pre-test stage of the pilot experiment, the participants were initially given the informed consent form, and were asked to read it and, if agreed with what was asked of them, sign it (see Appendix C). The consent form informed them that sound recording was going to take place in the room and that their quotes would be used anonymously.

Next, the participants were asked to complete an individual pre-task questionnaire consisting of two sections (see Appendix D). The first section concerned such participant details as names, addresses, fields of study, ages, and email addresses. The second section asked the following question:

“How long does it take for you to move the balls from box A to box B?”

Before they answered the above question, the following statement was repeated for the participants:

“You should bear in mind that you can only move 2 balls simultaneously. Also, if your hands touch box B or any balls drop from your hands, you will get a negative score”.

To make sure that the participants fully understood the task, the researcher showed them the way it should be done. After each participant made their estimates, they were asked to remove their watches and not to use any other form of time-monitoring device during performance of the task. Subsequently, they were told to initiate the task and move the balls from Box A to Box B (see Figure 5.1) and their performance was timed until they
had finished moving all the balls. At the end, the participants were reminded of the date of the second phase of the pilot experiment.

![Figure 5.1: Box A and Box B used for the pilot experiment.](image)

After two weeks, the post-test stage was begun with the same participants and in the same room. At the post-test stage, each of the 12 participants was assigned into three different categories and each category was given a different amount of information. Accordingly, Category A (Participants 1 to 4) was given the average of the actual and estimated time achieved by all 12 participants at the pre-test stage; Category B (Participants 5 to 8) was given the average of the actual time achieved by all 12 participants; and Category C (Participants 9 to 12) was only given their own previous actual time.

Similarly to Phase 1, each participant attended individually at the time he/she had chosen on Doodle poll. At the beginning of the session, the participants were given a pre-task questionnaire having three sections (see Appendix E). In the first section, the participants were asked to identify their task interest and task familiarity on a scale from 1 (very much) to 11 (not at all). In the second section, they were asked to do a LOT-R test. This is a well-accepted test designed by Scheir et al. (1994) that contains ten multiple-choice questions. The aim of this test is to recognise how optimistic people are in their normal lives. The possible range of total score in a LOT-R test is 0-24: scores of 0-13 show low optimism; 14-18 shows moderate optimism; and 19-24 shows high optimism. In the third section, participants were given a different amount of information based on the categories to which they were assigned (A, B, or C).

After filling out the pre-task questionnaire, the participants were informed that the task would be similar to that they had performed two weeks ago (moving the balls from Box A to B). Afterwards, they were asked to re-estimate the time to perform the task based
on the new information that they had received. When they had made their estimates, they were then asked to perform the task. After finishing the task, the participants were interviewed in order to obtain more details about their opinions and ideas regarding the experiment as well as to receive feedback for consideration in the main research. Finally, a gourmet chocolate candy bar was given to each participant to show appreciation for their participation in the study.

5.3.1.2 Data analysis and results
Each participant’s estimated and actual completion time for both pre-test and post-test stages were converted into a minute-and-second format (see Table 5.3), and the results from the LOT-R test were calculated. Based on that, the average of the LOT-R test results for participants under categories A, B, and C were 14.7, 17.7, and 14, respectively, demonstrating that all three categories were in the normal range of optimism bias (14 < LOT-R < 18). In addition, the participants’ task interest and task familiarity were measured. It is argued that if task interest/familiarity differs significantly among the participants, then the researcher should not rely on the results (Baron and Treiman, 1980). In this pilot study, however, all research participants exhibited approximately similar task interest and familiarity (see Table 5.3).

<table>
<thead>
<tr>
<th>Participants</th>
<th>Category A</th>
<th>Category B</th>
<th>Category C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(LOT-R) test result average</td>
<td>13.5</td>
<td>14.7</td>
<td>17.7</td>
</tr>
<tr>
<td>Task familiarity average</td>
<td>6.3</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Task interest average</td>
<td>6.5</td>
<td>2.2</td>
<td>2.7</td>
</tr>
<tr>
<td>Estimated time (pre-test) (m:s)</td>
<td>8:00</td>
<td>5:30</td>
<td>7:00</td>
</tr>
<tr>
<td>Actual time (pre-test) (m:s)</td>
<td>2:13</td>
<td>1:44</td>
<td>1:56</td>
</tr>
<tr>
<td>Estimated time (post-test) (m:s)</td>
<td>2:15</td>
<td>2:00</td>
<td>2:45</td>
</tr>
</tbody>
</table>

Source: Field work

Next, the percentage of estimation bias with respect to actual completion time, i.e. the difference between estimated and actual completion times divided by actual completion time multiplied by 100, was calculated (see Halkjelsvik and Jørgensen, 2012). For
example, an estimation bias of 20% means that the person overestimated the time by 20%, while an estimation bias of -20% shows that the person underestimated the time by 20%. Figure 5.2 illustrates the estimation bias for all 12 participants of the pilot study at both pre-test and post-test stages.

![Figure 5.2: Estimation bias at pre-test and post-test stages.](image)

As can be seen from Figure 5.2, only two participants at both pre-test and post-test stages underestimated the time, while the majority overestimated the time in both situations, thus confirming the initial hypothesis that people tend to be pessimistic when estimating duration of short activities (see also Thomas et al., 2003). This pessimism bias might be the case in situations where people predict the time of tasks for the first time and have no prior experience or knowledge of them. Therefore, they adopt “a safe estimation strategy” to ensure that tasks can be completed earlier and the remaining time can be used to do something else (Burt and Kemp, 1994).

Furthermore, the average of the predicted time of the task in the pre-test stage was 4m 43s, which is nearly twice the average of the actual time of the task (2m 17s). However, this difference became negative in the post-test stage, where average actual time was 1m 58s, and average predicted time was 2m 20s. Thus, participants made more accurate estimates in the post-test stage, possibly due to two reasons. One concerns the effect of learning from previous experiences as well as learning while doing the task on estimation accuracy (Tukel et al., 2008), and another relates to the importance of distributional information, which participants obtained about their own estimate or their peers’ estimates from the researcher. This echoes the importance of the reference class forecasting method, which urges planners to obtain distributional information about previous projects and learn from them (Kahneman and Tversky, 1979).
The result of the pilot experiment also demonstrates that those participants in Category C made more accurate estimates than participants in the other two categories. What distinguished participants in Category C from those in Categories A and B was that they had knowledge concerning their ‘own’ estimated and actual times at the pre-test stage, whereas the participants in the latter groups had knowledge concerning the average of the estimated and actual times of the ‘whole sample’. This demonstrates people’s belief in their own efficacy and their heavy reliance on their own performance rather than that of others (see Bandura, 2001).

Additionally, it could be also argued that participants in Categories A and B showed the effect of overconfidence bias, which is the tendency of individuals to consider themselves above average. As a result, they were more certain about their own judgements, capabilities, and levels of functioning than others and made more inaccurate estimates (see e.g. Griffin et al., 1990; Kruger, 1999). In one experiment, Lichtenstein and Fischhoff (1977) found that the participants were confident that their answers were correct 65 to 70 per cent of the time but were correct only about 50 per cent of the time.

5.3.2 Semi-Structured Interviews

The overall aim of doing semi-structured interviews in the pilot study was to gain insight into what participants had experienced during the pilot experiment and into how they had arrived at their estimates. Also, as the interviewees were PhD students in Project Management, it allowed the researcher to benefit from their constructive suggestions and comments for the future research. In addition, some of the interviewees had also worked in the construction industry at one time, and they provided input regarding this during the interview process. The interviews were conducted with all 12 participants after the second session of the experiment. Each interview took between five and 15 minutes to complete.

5.3.2.1 Interview procedure

The following framework was used for the interview process to ensure that a coherent and organised perspective was presented to each interviewee (see Figure 5.3). In the first step, the aim of the research and the purpose of the interview were briefly explained to the interviewees. The researcher also tried to create an atmosphere in which the interviewees felt comfortable enough to talk freely about their opinions and
feelings. In so doing, the interviewees were asked some opening questions such as “tell me about your research” or “what do you think about the PhD process?”, and so on, to encourage interviewees to start talking and participate in the discussion. In the next step, they were asked some general questions about time estimation and the way they plan their daily activities (see Table 5.4). After that, interviewees were asked some specific questions about the experiment and the way they estimated the duration of the task (see Table 5.5).

![Figure 5.3: Interview framework of the pilot study.](image)

It should be noted that, since the interviews were semi-structured in nature, other questions also evolved and were asked during each interview. Also, at some point, the researcher allowed the direction of interviews to be guided by the interests and experiences of the interviewees. Towards the end of the interview, the interviewees were asked to give their feedback and comments in order to be considered in the future research. After finishing each interview, all interview recordings were transcribed and typed. Then, the transcripts were checked twice in order to rule out any possible typing errors.

### Table 5.4: General interview questions of the pilot study.

<table>
<thead>
<tr>
<th>Question</th>
<th>Aim of question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 How did you feel after doing the experiment?</td>
<td>This question encourages the interviewees to do a self-evaluation and explain their intentions and personal beliefs.</td>
</tr>
<tr>
<td>2 How do you make decisions regarding to the time of your daily activities?</td>
<td>This question aims at understanding what criteria interviewees consider prior to estimating the time they need for their normal daily activities.</td>
</tr>
<tr>
<td>3 Are you an optimistic or pessimistic person? Why do you think so?</td>
<td>This question causes the interviewees to psychologically evaluate their perceptions and thoughts about their present and future activities.</td>
</tr>
</tbody>
</table>

Source: Field work
Table 5.5: Specific interview questions of pilot study.

<table>
<thead>
<tr>
<th>Question</th>
<th>Aim of question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did you estimate the time needed to do the experiment in both sessions?</td>
<td>This question is designed to understand the intentions and rationales behind interviewees’ decisions about the planned time.</td>
</tr>
<tr>
<td>How do you explain the difference between what you predicted and what you achieved?</td>
<td>This question causes participants to think about the problems and difficulties they encountered during the experiment. As a result, they will explain the reasons for the inaccuracies of their estimates.</td>
</tr>
<tr>
<td>When I gave you the average actual time taken by previous people (or your own actual time), did it change your mind? If yes, in what way?</td>
<td>This question attempts to determine how a sense of competition with others (and self) can influence time estimation. It reveals whether competitive participants produce more accurate estimates than less competitive ones.</td>
</tr>
</tbody>
</table>

Source: Field work

5.3.2.2 Data analysis

The source of the qualitative data was verbatim transcripts of the semi-structured interviews. The challenge was therefore to put these transcripts into a format that would allow an appropriate analysis of the findings. To do so, the inductive approach was adopted to identify relationships between the data, develop questions and hypotheses, and ascertain which themes or issues to follow up and concentrate on (Saunders et al., 2009).

The first step to do inductive analysis was reading the transcripts and listening to the tapes several times in order to become familiar with the data. Later, the data were grouped by categorising and attaching them to diverse verbatim quotations and specific evidence obtained from interviewees (see Table 5.6). In the next step, the voluminous and unstructured individual data from the transcripts were coded in order to reduce and organise them into a relatively few general categories (Fellows and Liu, 2008). This coding process not only distils data but also provides an emergent structure and framework with which to pursue data analysis later on. The coding process involved using highlighter markers of different colours to colour code the collected data manually and noting key points of the collected data in the margins. This allowed the researcher to attach labels to each segment of data so as to make comparisons with other data segments. Apart from manual coding, NVivo 9 was also used to organise, categorise, and store the data. Table 5.6 presents the initial codes that emerged from this step along with corresponding quotations of research participants.
Table 5.6: Initial codes emerging from pilot study.

<table>
<thead>
<tr>
<th>Quotes</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>“The first time I wasn’t quite sure exactly what happened there or what’s going on”. (Interviewee 2)</td>
<td>Knowledge</td>
</tr>
<tr>
<td>“Familiarity is one reason. The first time, I had no idea about the task. Also, when I saw the actual average time, I said so I can do it like others”. (Interviewee 4)</td>
<td>Previous experiences</td>
</tr>
<tr>
<td>“The previous average time gives you an idea that, okay, maybe it doesn’t take that long”. (Interviewee 2)</td>
<td></td>
</tr>
<tr>
<td>“I think the second estimation is always better than the first one”. (Interviewee 6)</td>
<td>Prediction bias</td>
</tr>
<tr>
<td>“I think the second time, I learnt from the previous experiences”. (Interviewee 11)</td>
<td></td>
</tr>
<tr>
<td>“You always tend to underestimate in terms of just how much you are able to do and unfortunately you always see if you work really hard on things”. (Interviewee 2)</td>
<td>Interest maximisation</td>
</tr>
<tr>
<td>“Certain tasks I underestimate all the time but in my mind I like to be able to achieve that”. (Interviewee 12)</td>
<td>Competitio (incentives)</td>
</tr>
<tr>
<td>“People will still overestimate or underestimate how much they do basically”. (Interviewee 6)</td>
<td>Unpredictable issues in plan</td>
</tr>
<tr>
<td>“I often miss the deadlines like submitting the report. However, it depends on the type of task. I underestimate certain types of tasks, and for some tasks I overestimate the time”. (Interviewee 5)</td>
<td></td>
</tr>
<tr>
<td>“People are like contractors, who really just want to try to get as much money as possible or they are not going to really, you know, come clean with that, and then it depends on the project’s contract. It depends on the organisational environment”. (Interviewee 2)</td>
<td></td>
</tr>
<tr>
<td>“In the second time when I noticed what the average time of others was, I changed my estimation. However, I was not too confident that I could achieve a better time. But, finally, I decided to give a lower time than the average time. Therefore, I tried to do my best to beat others”. (Interviewee 3)</td>
<td></td>
</tr>
<tr>
<td>“I got more interested in knowing my results and other people’s results more than doing it, actually”. (Interviewee 9)</td>
<td></td>
</tr>
<tr>
<td>“You know how people actually estimate things, but I do think that there are too many obstacles out there, which you might not be able to cover with this basically”. (Interviewee 2)</td>
<td></td>
</tr>
<tr>
<td>“I think people like to make sure to leave themselves with an extra amount of time and make sure that they do not fail”. (Interviewee 10)</td>
<td></td>
</tr>
<tr>
<td>“People do not disclose what they really believe in the real world of projects”. “I think the human mind and also people have completely different expectations and how people perceive things is really different”. (Interviewee 9)</td>
<td>Human-related issues</td>
</tr>
<tr>
<td>“I saw people in the project meeting, each of them defending their priority and then their priority clashes, and each thinks that their work is more important than others”. (Interviewee 7)</td>
<td>Collective estimation</td>
</tr>
<tr>
<td>“In real projects, the group of people decides on estimation, not individuals”. (Interviewee 7)</td>
<td></td>
</tr>
<tr>
<td>“So I just think technique is one way to sort of help to put a format there to rationalise the whole procedure of estimation, but at the same time it is not the one solution that can keep everything under control”. (Interviewee 2)</td>
<td>Technical issues</td>
</tr>
<tr>
<td>“The second issue is the external people who work for the project— that they are able to complete on time”. (Interviewee 7)</td>
<td>External factors</td>
</tr>
</tbody>
</table>

Source: Field work

5.3.2.3 Developing categories and hypotheses

After coding and labelling data, the researcher started to develop the concepts with similar contents into categories by recognising relationships between concepts. For example, it was found that different levels of information and knowledge seemed to have influenced the time estimation. The following statement from Participant 9 depicts this relationship:
“The first time, I was worried about the knowledge - how am I going to do this? Will it be laborious? Will I drop something? Do I have to be cautious? Did I understand the rules? But, the second time I knew all of that.”

The aforementioned response from Participant 9 implies that, when people have less information about a task, they are more uncertain in their prediction of its time. Thus, having distributional information can help them resolve many unknowns. This finding suggests that having more information leads people to make increasingly strategic rather than optimistic decisions, especially in a competitive setting (see also Steinel and De Dreu, 2004) and so highlights the relationship between competition and time estimation. With regard to competition, Participant 2 mentioned the following:

“Competition-wise, I know I am a very competitive person. It gives me more pressure to get it done sooner”.

The above statement illustrates that competition and incentive to “win” influenced Participant 2 to carry out his work faster and finish sooner. In fact, this tendency is prevalent in projects as well, manifesting when contractors bid for projects and promise to finish the project sooner than others and with less financial outlay. Unfortunately, in most of these situations, project owners are looking for contractors who say these very things, despite the fact that the winning bidder may actually be the one with the worst possible outcome (Assaf and Al-Hejji, 2006).

Some participants also talked about the relationship between the plan and time estimation. For example, Participant 1 mentioned the unpredictability of the future in making plans, noting the following:

“There are too many things that you are not going to be taking into account in your plans”.

The above statement refers to the many variables and issues that need to be considered in determining a detailed plan. As discussed in Chapter 3, detailed planning is time consuming and costly (Rondinelli, 1982), and having a complete and up-to-date plan could be impossible (Koskela and Howell, 2002). Participants pointed out two general issues regarding problems with a detailed project plan. The first concerned the human-related issues. For example, Participant 9 noted the following:

“You could have all the assistant technology to go ahead and facilitate all support people’s work but then when it comes to human management, how a person is actually used to the system, how they actually manage it is another story”.

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The above statement clearly indicates that even having technical knowledge and expertise may not be helpful when it comes to humans. As Gemünden and Lechler (1997) assert, project success depends primarily on human factors and the human ability to communicate in interactive situations. Similarly, Participant 2, with 10 years’ experience in construction projects, echoes the importance of human-related issues:

“I have seen projects that are due. I mean most of the time they are dealing with people where they just cannot get to the agreement to get things done or make it happen”.

The above response shows that one reason for delay occurrence in projects is that people cannot deal with each other effectively, due to such reasons as opposing interests, beliefs, characters, opinions, and thinking styles, which can affect people’s beliefs, goals, intentions, and preferences (Deutsch, 2005).

The second issue to which participants referred regarding the detailed project plan concerned the influence of the external environment on the plan. For example, Participant 6 stated:

“I think when the external environment does not play a major role, my planning is generally accurate”.

According to the above statement, Participant 6 contends that the external environment is the most important thing affecting her plan. Similarly, Participant 1 raised the same point by making an example. He noted:

“You know there are external factors, for example for course work; we did lots of course work during our education life and its time we know that there are a lot of external factors affecting, you know, our prediction about time”.

As can be seen, Participant 1 gave a real-life example regarding the influence of the external environment on the accuracy and validity of plans. This is consistent with what Mead (1934) states, that human behaviours and actions are influenced by the external environment as well as by previous experiences, since an individual as ‘self’ is powered by the meaning-making of surroundings.

Another important pattern found through the data analysis concerned the influence of joint decisions on the quality of time estimation. When Participant 2 was asked about his experiences with project overruns and time estimation, he said:
“I personally think that time estimation requires a lot of different sort of things to come together, as a joint effort”.

The aforementioned statement lends support to the argument made in Chapter 3 of the present study, that planning and estimating project time is carried out by groups such as committees and teams through a joint effort. However, joint decision making is not so straightforward in reality, when individuals with different, and often conflicting, preferences participate in a collaborative activity to arrive at some consensus about the outcomes of a project, such as completion time. Accordingly, Participant 7 referred to the issue of making joint decisions in teams, noting:

“In projects you require people to collaborate and decide jointly, but that’s where a lot of problems happen. I saw people in the project meeting, each of them defending their priority and then their priority clashes, and each thinks that their work is more important than others”.

The above statement is based on Participant 7’s experiences in working at an airport. She mentioned the obstacles with which team members of an organisation are often faced, including priority clashes, tension, superiority, and assertiveness of some members over others. In fact, these issues reduce team performance and satisfaction by contributing to a stressful and disruptive work environment (Pondy, 1967; Huang, 2010).

Therefore, the above findings and discussion and a review of the literature provided in Chapters 2 and 3 lead to identification of the following patterns and relationships:

1. Different levels of information and knowledge can cause people to take more optimistic or strategic decisions, especially in a competitive setting.
2. Competition and incentive to “win” affect people’s judgements concerning time estimation.
3. Unpredictability of the project plan can be due to human-related issues and external issues.
4. The process of making joint decisions can affect the quality of time estimation.

5.3.3 Lessons learnt from the pilot study

The pilot study offered the chance to learn and take any insights gained into the main study, where any issues could then be ironed out. Thus, it suggested the following issues that the next phase of research should consider:
• **Focusing on completion time**: in the time estimation literature, researchers often distinguish between performance time predictions (see e.g. Burt and Kemp, 1994; Hinds, 1999) and completion time predictions (see e.g. Buehler et al., 1994; Kruger and Evans, 2004). The former, which was used in the pilot study, refers to the duration prediction, e.g. how many minutes, hours, or days will be needed to perform a particular task, whereas the latter pertains to deadline estimation (delivery time), e.g. when the task will be finished. It is argued that inaccurate duration and completion estimates are not necessarily caused by the same underlying mechanisms (Halkjelsvik and Jørgensen, 2012). In fact, estimating completion time is the issue that project planners mostly deal with in real projects. Completion time estimation is also more complex and inclusive than duration estimation in the sense that “accuracy depends on a host of other factors in addition to time on task, such as the ability to predict interruptions, the presence and duration of intervening events, and when one will start working on the task” (Kanten, 2011, p. 1038). In asking participants to estimate completion time, Buehler et al. (1994) suggest that the researcher tell the participants what the time is and then ask them, at what time do you think you will finish this task? Thus, in the main experimental research, the focus should be on task completion estimates rather than on predicting task duration.

• **Considering longer tasks**: as the results of the pilot study have shown, the tasks lasting less than five minutes (short tasks) are likely to be overestimated (see also Roy et al., 2005). However, underestimation was most likely for longer tasks (Connolly and Dean, 1997; Buehler and Griffin, 2003). Since projects are not short activities, the researcher should therefore choose a longer task as the subject of the main experimental study.

• **Conducting group tasks**: As the findings of the pilot study show, planning and estimating project time is a task to be carried out by groups through a joint effort. There is strong evidence that groups behave and act differently from individuals in many circumstances in terms of identifying problems and generating possible solutions (Sutter et al., 2009). According to the results from the pilot study, there are certain problems and challenges involved in joint decision making in interactive situations, whereas individual decision making
is not subject to any of these communication problems and conflicts (Tajfel, 1982). Therefore, unlike the pilot study, the focus of the main experimental studies of this research should be on group-based estimations, rather than individual predictions.

- Gender bias: The review of the literature and the pilot study results reflected no discernible effect of gender on time prediction and actual task completion times, and gender did not account for any variance in bias (see also Weick and Guinote, 2010). Therefore, the main experimental studies should not incorporate gender difference as a possible influence on the findings.

5.4 Summary

This chapter was divided into two sections. The first section explained that the majority of studies investigating time underestimation are rooted in behavioural and cognitive psychology. After reviewing many of these studies, it was found that they mainly used experiments to manipulate the effect of different factors (e.g. incentives, motivation, group discussion, power, and temporality) on time estimation in order to measure mediating cognitive mechanisms and explore their influence and the reasons behind that influence. The benefits of combining approaches and insights from psychological studies to the study of project time have therefore been highlighted. These including understanding debiasing techniques and strategies for reducing planners’ tendency to repeatedly underestimate task completion times; focusing on more thought-provoking research questions that reveal the meaning of planners’ actions; and considering the significance of expert (human) judgements in producing time estimations.

In the second section, the details of the pilot study of this research were discussed and elaborated. The aim of the pilot study was to enhance the appropriateness of the research questions and gather hypotheses as well as check whether mixed-methods design (experiment and interviews) was suitable for answering the research questions. Twelve PhD students participated in a pre-test and post-test experimental type regarding time estimation. This experiment showed that, in the pre-test stage, participants showed a high tendency to overestimate the time to perform the task, a finding consistent with previous studies, which found that people tend to overestimate the duration for activities lasting less than five minutes (see e.g. Thomas et al., 2003). This might be due to the participants having no prior experience of the task and, thus, adopting a safe estimation
strategy. However, at the post-test stage, participants were assigned to different categories based on different amounts of information, and the tendency to overestimate task completion time decreased substantially. This seemed to be due either to learning from their previous experience and/or to distributional information they were given. It was also found that those participants who were given information about their ‘own’ estimated and actual time (Category C) made more accurate time estimates than participants in the other two categories, thus demonstrating that people are likely to have faith in their own efficacy and thus rely heavily on their own performance rather than on that of others (Bandura, 2001).

After the post-test stage, all twelve participants were interviewed to find out how they had arrived at their estimates and to collect their suggestions and comments for consideration in future research. Through analysing the interview data, it was found that a) different levels of information and knowledge can affect the quality of time estimation; b) competitive behaviours of people can influence their judgement concerning time estimation; c) unpredictability of the project plan can be due to human-related issues and external issues; and d) group decision making can change the quality of time estimation.

It is worth noting that obtaining significant results was not the aim of the pilot study. The aim instead was to evaluate the potentialities of the mixed-methods approach and ascertain its suitability for application to a full-scale study. With this in mind, a presentation and elaboration of the details of the main mixed-methods studies of this research will be provided in the following two chapters.
Chapter 6: Biased estimation of completion time: intended vs. unintended perspective

6.1 Introduction

In Chapter 3, the concept of “planning intentionality” was discussed, which refers to the intentionality behind planners’ actions to explain why they perform certain actions or operations. Using this concept, the explanations provided for forecasting inaccuracy is revisited—optimism bias and strategic misrepresentation (see Flyvbjerg et al., 2009), leading to the unintended and intended perspectives. However, the relationship and dynamics between these two explanations remain underexplored and require further explanation. Research to date has tended to focus exclusively on explaining either one or the other but has not considered the interplay of both optimism bias (unintended) and strategic misrepresentation (intended) in a given project context. More importantly, these explanations have mainly been studied in the context of megaprojects (see e.g. Love et al., 2012; Dominic and Smith, 2014), and one needs to know whether they are applicable to other sizes or types of projects (see Flyvbjerg’s et al., 2009 call for research).

Based on the findings of the pilot study presented in Chapter 5 and a review of the literature on optimism bias and strategic misrepresentation, it was found that “knowledge” and “incentives” are the key situational variables differentiating these two explanations of behaviour. This chapter describes an experiment that was therefore designed and conducted to test the effect of these variables on estimations of project time. The experiment compares the time estimates of two groups in two different situations. Participants of one group had no prior knowledge concerning the completion time of the task, whereas those in the other group had prior knowledge of the average of the actual time taken by previous groups. Moreover, participants of one group were incentivised to make more accurate estimations whereas members of the other group were offered no incentives. The experiment was followed by semi-structured group interviews during which qualitative data from experimental subjects was collected. By analysing this qualitative data, other variables differentiating between optimism bias and strategic misrepresentation emerged, leading to a more profound interpretation and greater understanding of the interrelationships between the two explanations for forecasting inaccuracy.
The diagram shown in Figure 6.1 shows the structure of the convergent mixed-methods research design and the overall research process.

![Diagram of research process]

**Figure 6.1: Outline of the research process in Chapter 6.**

### 6.2 Experiment 1

Gray (2004), drawing on Keppel et al. (1992), classifies experimental research into two steps: the planning stage and the operational stage (see Figure 6.2).

At the planning stage, the researcher needs to explain what the purpose of the experiment is as well as review the relevant literature and underlying theories. At the conclusion of this stage, it should be possible to formulate research hypotheses and identify the dependent variables (the subject of the research) and independent variables (variables that affect the dependent variable).
In the operational stage, researchers conduct the experiment they had planned earlier, and its results, output in a statistical format, will be analysed using both descriptive and inferential statistics. At this point, researchers should be able to point out whether certain treatments (independent variables) may produce a statistically significant effect on a particular outcome (dependent variables). In addition, researchers can now infer the results of hypothesis testing. For example, if statistical findings reveal that the experimental group scores substantially higher than the value expected for the control group, they would accept the alternative hypothesis and conclude that there is a significant difference between the two groups.

It should be noted that, however, it is not possible to accept the alternative hypothesis with complete certainty. In fact, the conclusion from experimental research will always be subject to some errors (sampling error), since each sample is drawn from a given population and is likely to differ to some degree from the entire population (Cohen et al., 2007). Therefore, it is essential to report the errors and indicate the limitations of experiments at their conclusions.

Figure 6.2: Two stages of experimental research (Source: Gray, 2004, adopted from Keppel et al., 1992).
6.2.1 Planning stage

An experiment’s planning stage gives an overview of the key issues requiring consideration prior to the design and implementation of the experiment. In the context of this study, this stage was conducted based on reviewing the relevant literature and theories as discussed in Chapters 3 and 5. In the planning stage, the rationale of the research is explained along with the development of research questions. Next comes defining the research hypothesis and identifying independent and dependent variables. The following subsections discuss these issues in more detail.

6.2.1.1 Identifying the issue of interest

As mentioned earlier, recent attempts by Flyvbjerg and his colleagues in project planning, have questioned the adequacy and accuracy of the project plan and the role of planners in producing biased estimates of project cost, which in turn might cause project delays. Accordingly, the notions of optimism bias (Lovallo and Kahneman, 2003; Buehler et al., 2010; Kutsch et al., 2011) and strategic misrepresentation (Flyvbjerg et al., 2009; Pinto, 2013; Winch, 2013) have highlighted how the act of planning is far from being a rational process and have shown that cognitive and political/organisational biases are prone to lead to inaccurate planning estimates. Notwithstanding developments in our understanding of optimism bias and strategic misrepresentation, the interrelationships between these ideas remain underexplored. The research to date has tended to focus on one or the other but not on both of them in a single context (with the notable exception of Flyvbjerg et al., 2009, on megaprojects). To contribute to this issue, the concept of planning intentionality was developed in Chapter 3 of this thesis to represent optimism bias as unintended actions of planners and strategic misrepresentation as intended actions of planners. It was argued that, however, these explanations are not mutually exclusive, and the purpose here is to explore just how these dynamics play out in the planning of projects.

6.2.1.2 Reviewing relevant literature and theories

According to the concept of planning intentionality, planners go through an adaptive self-regulatory process which allows them to adjust their behaviour to specific requirements and to respond to a certain situation in a specific manner. However, their behaviours can be changed based on variations of different situational variables (Epley and Dunning, 2000; Fishbach et al., 2003; Gavetti et al., 2007). Gavetti et al. (2007), for example, note that the way individuals and groups behave and act is a “product of the
immediate social environment” (p. 530), which is influenced by a complex net of influencing variables derived from the situation and the social context in which they occur. This turns the research interest towards identifying the variables related to the situational context in which forecasts are produced, which, it is argued, can affect the intentionality of planners.

Based on the literature reviewed and the findings of the pilot study, “knowledge” and “incentive” were found to be key influential variables impacting project time estimation. These two variables allowed too for a clear distinction between unintended and intended actions of planners (optimism bias vs. strategic misrepresentation).

The influence of knowledge and level of information on the accuracy of time estimation was first observed by Kahneman and Tversky (1979) while they were developing the reference class forecasting method. They encouraged planners to take an “outside view” and gain information from a class of similar projects rather than adopting an “inside view” based on the project at hand and the details thereof. The first systematic use of this method in practice took place under the auspices of the HM Treasury and the UK Department of Transport, and its aim was diminishing the impact of optimism bias in order to produce more accurate estimates of a project’s costs, benefits, and duration (Flyvbjerg and COWI, 2004).

Another factor which is important in forecasting and which significantly influences time predictions is incentives (Byram, 1997). Previous research has examined the effect of incentives and rewards on many issues such as quality of judgements (see e.g. Newby-Clark et al., 2000), performance (see e.g. Henry, 1994), goal commitment (see e.g. Locke and Latham, 1990), and speedy completion of tasks (see e.g. Roy et al., 2005). Henry (1994), for example, found that while monetary incentives strengthened commitment and effort, they worsened time estimations. One reason for this might be that monetary incentives induce participants to believe that they have an unrealistic amount of control over the task at hand and are thus immune from making mistakes (Byram, 1997). In addition, monetary incentives are based on the presumption of a causal relationship between incentives and labour outcomes. Such a presumption precludes the existence of non-linear relations and so constitutes a type of bias to which Taleb (2010) refers as a cognitive and emotional bias towards linearity (p. 225).
There are, however, other types of incentives besides financial ones. For example, Siemiatycki (2010, p. 32) notes, “During the early planning stages when project alternatives are developed and appraised, there are often strong incentives for project supporters to overestimate project benefits and underestimate project costs, so that the scheme has a better chance of obtaining approval” (see also Flyvbjerg et al., 2009). These types of incentives led planners to accentuate the positive outcomes and eliminate the negatives ones when forecasting the time or cost of projects. Flyvbjerg (2008) argues that this type of incentive has a negative effect on the outcome of projects. Alternatively, he suggests that incentives “must be aligned to reward accurate forecasts and punish inaccurate ones” (p. 19). To the best of the author’s knowledge, there has been no published work on the effects of accuracy incentives on team participants in competitive environments and no comparisons with a no-incentive group.

6.2.1.3 Developing questions and hypotheses
Based on the results of the pilot study presented in Chapter 5, it was found that level of knowledge is positively related to the quality of judgements concerning completion times (see also Brodbeck et al., 2007). Moreover, as identified in Chapter 3, one of the assumptions of the concept of strategic misrepresentation is that planners possess knowledge concerning the expected overruns and future outcomes before attempting to adjust their forecasts, whereas optimism bias implies that planners estimate the completion time of projects based on unknown unknowns, the so-called unk-unks (De Meyer et al., 2002).

The argument made above gives rise to the following hypotheses:

H1-1: optimis bias occurs when there is relatively less knowledge;

H1-2: strategic misrepresentation occurs when there is relatively more knowledge.

(Note that H1 refers to an alternative hypothesis, as opposed to the null hypothesis. H1-1 and H1-2 refer to the first and second hypotheses of the experiment). In addition, it should be noted that, in this thesis, ‘knowledge’ will be taken to mean information to which relevance or meaning has been attributed (Bhatt, 2000).

The types of incentives associated with strategic misrepresentation are divergent and misaligned. Indeed, planners are often provided with an incentive to win the tender or please the contractor (Flyvbjerg et al., 2009). This type of incentive may lead to
deliberate misestimating and is similar to that given to experimental subjects in psychological research to encourage them to finish a task more quickly or within a specific time frame (see e.g. Buehler et al., 2005). Previous research has shown that this type of incentive, which emphasises “deliberative adjustments of the original estimate in order to align it with contextual demands”, leads to more biased predictions (Halkjelsvik and Jørgensen, 2012, p. 256). Byram (1997), for example, asked participants to estimate how long they would take to complete an origami task in the lab. Participants in the treatment group were offered a monetary incentive for speedy completion of the task ($4 for finishing within the 25th percentile of all participants, $2 for those in the top half, and $1 for finishing within the 75th percentile), while participants in the control group were offered no monetary incentive. He found that, while the actual completion time was not significantly different between the groups, those in the treatment group (with incentives) underestimated their completion times and made poorer forecasts than those in the control group (no incentives).

In contrast, research has shown that when actors are incentivised on the basis of accuracy, their estimates are more realistic. For example, Buehler et al. (1997) offered participants in the accuracy-incentive condition a $2 reward for predicting their completion time within one minute of the actual time and a $4 reward for predicting it within 30 seconds. They found that this type of incentive for increased accuracy eliminated subjects’ tendency to be overly optimistic and, thus, concluded that “inducements for accuracy may be most appropriate when it is better to err on the side of caution” (p. 245). Therefore, one could assume that planners can produce more accurate forecasts if they are provided with an incentive for the purpose of estimating the task more accurately. Thus, the second hypothesis is as follows:

H1-3: incentives to estimate forecasts with more accuracy reduce optimism bias.

6.2.1.4 Identifying independent and dependent variables

Based on the above explanations, the independent variables of this experiment are knowledge and incentive. Thus, these variables would be manipulated to determine their effect on the dependent variables, which are optimism bias and strategic misrepresentation.
6.2.2 Operational stage

The operational stage of this study had five steps (see Figure 6.2). Initially, the planned experiment was conducted. This was followed by explanations regarding the experimental procedure such as how participants were selected or which type of data were collected or how variations were controlled and so on and so forth. Next, the procedure for analysing data obtained from the experiment was described in order to test the hypotheses developed at the planning stage. Finally, the results were discussed with caution as some results may be due to chance or experimental error. Note that the results are provided in the Findings section (section 6.2.3).

6.2.2.1 Conducting experiment 1

Experiment 1 estimated the time participants needed to finish building a two-storey house using LEGO bricks, which was located in the corner of a rectangular shaped base-plate of dimensions 25 cm x 12.5 cm. The blueprints of this LEGO house were drawn using AutoCAD 2009 (see Appendix F), and its 3D image was sketched with LEGO Digital Designer v.4.3 software (see Figure 6.3). The participants were given these blueprints and the 3D image along with the project brief prior to making their time predictions. After making these, the participants were asked to build the LEGO house, and their achieved time was recorded.

![Image of a LEGO house](image)

Figure 6.3: 3D image of the Apple Tree House designed by LEGO Digital Designer.

Experiment 1 was carried out over four weeks during October 2012. To conduct this experiment, sixty university students aged 22 to 28 agreed to participate on a voluntary
basis. Average age of the participants was 23.7 years. Thirty-three of them were undergraduate students doing Business Studies at Leeds Metropolitan University, and twenty-seven of them were postgraduate students doing Project Management at the University of Manchester. The reason participants were selected from these two particular universities was that the researcher was in contact with two lecturers from these institutions who facilitated liaison with the students. In addition, all participants were fluent in English, as evidenced by their being students at universities where all courses are conducted in English, so that they were able to understand the experiment’s instructions and communicate with their teammates.

The participants’ selection method was based on true experimental design (Creswell, 2009), which was explained in Section 4.7.7. In order to carry out the randomisation, the participants were asked to choose their appropriate schedule by using an online scheduling tool, called Doodle poll (available at http://www.doodle.com). The participants’ names were anonymised on this website so that their classmates or friends could not know who was attending when or where prior to the session. Although subjects were randomly assigned to different groups, in most of the groups the participants knew each other well from previous university courses or activities. This could be an advantage for this research since most of the groups working on a real project are not ad-hoc groups but rather are naturally occurring groups with a longer history of shared experiences (He et al., 2012).

After all participants had completed the Doodle poll, 60 participants were divided into 20 groups of 3 persons each. Groups 1 to 10 were assigned to Category A (control groups), and Group 11 to 20 were assigned to Category B (experimental groups). An email was sent to each participant expressing appreciation to them for their registration as well as reminding them of the date of the experiment. Furthermore, the informed consent form was attached to the email (see Appendix G) and participants were asked to read that and, if willing to participate, sign it either electronically or by printing it out and bringing it on the day of the experiment.

On this day, each group of three appeared at their allocated sessions, and two to three sessions each taking between one to two hours were conducted for two to three groups respectively. The sessions were held in quiet classrooms or conference rooms with a maximum booking of three hours allowed. Furthermore, all participants were informed
that sound recording was to take place inside the room. After collecting the informed consent forms, the participants were asked to complete an individual pre-task questionnaire and write down their details such as names, addresses, fields of study, ages, and email addresses. After participants had completed the questionnaire, they were asked to remove their watches and not to use any other form of time-monitoring device (such as cell phones) during the experiment.

To start the experiment, the participants were told the current time and were asked to write it in their forms. Then, they were informed that they had five minutes to negotiate with their group members and estimate the completion time of the task. The participants were also reminded that they had the project brief, design, and a 3D image of the completed house. After five minutes, they were asked to write down their group estimate, which they had reached through consensus, on their forms. In fact, this opportunity for communication seems to characterise team decision making in many organisational settings (Feri et al., 2010).

In the next step, for those groups assigned to Category A (control groups), no manipulation of any kind was performed. Therefore, after providing their group estimate, they were asked to initiate the task and build the LEGO house. Their performance was timed in order to see when the work was actually completed. Finally, the group members were interviewed to determine what they had experienced during the experiment and how they had arrived at their estimates. The details of these interviews will be discussed later in this chapter.

After finishing the experiment with 10 groups in Category A, the experiments were begun with groups in Category B. Again, each group was given five minutes to negotiate and estimate the completion time to build the LEGO house within their group. After reaching consensus, they were asked to jot down their group estimate on their forms (see Appendix H). In fact, this step was identical to what groups in Category A had previously done. The reason for this repetition was to enhance the validity and reliability of results. In the next step, two situational variations were added to see how these variations would influence the participants. These variations were introduced by making participants more knowledgeable about the possible outcomes of the task and by offering them monetary incentives based on their accuracy. To increase their knowledge of the task, they were informed that the average of the actual time to build
the same LEGO house in the pilot study was 64 minutes. Thereafter, with regard to this information, another 5 minutes was given to them to negotiate with their group members, and, if they so desired, to revise their initial estimate.

To determine the impact of the financial incentive, the selected groups were told that this task was part of a competition and that if they could match their estimated and actual completion times better than the previous group, their names would go into a drawing for a £30 Amazon voucher (£10 for each participant in the group). They, however, did not receive any information about the completion times and about the estimates made by the previous group. Again, five extra minutes was given to them to renegotiate and re-estimate their completion time, if necessary. After collecting their forms, they were asked to initiate the task and build the LEGO house. Their achieved time was recorded by the researcher. At the end of session, they were interviewed, and appreciated for their participation.

After completion of the experiment and before commencing interviews, each participant was asked to answer several questions concerning the task complexity and task interest on a scale ranging from 1 (very much) to 11 (not at all). The participants also were asked to perform a LOT-R test.

6.2.2.2 Describing and analysing data
Each groups’ estimated and actual completion time was converted into minutes. Estimation bias was indexed by the difference between estimated and actual completion times divided by actual completion time multiplied by 100 (similar to Halkjelsvik and Jørgensen, 2012). For groups in Category A, estimation bias was calculated in one condition (see Table 6.1). For groups in Category B, estimation bias was calculated in 3 conditions (see Table 6.2):

- Condition 1: initial estimation bias (identical to groups in Category A);
- Condition 2: estimation bias after participants were informed of the previous group’s average actual times; and
- Condition 3: estimation bias after participants were offered financial incentives.

Previous studies have shown that, when people typically make decisions about the completion times of their activities and fail to meet their deadlines, most of their errors
are expected to be due to delusional optimism (Kruger and Evans, 2004; Roy et al., 2005). Therefore, to observe the direction of optimism bias in participants’ estimates, no manipulation occurred for groups in Category A and groups in Condition 1 of Category B. A t-test was carried out to determine whether there appeared to be any statistical significance between these two groups. The difference in completion times appeared not to be statistically significant (p=0.06 > 0.05), meaning that both groups underestimated the time similarly when no manipulation was involved (confirming hypothesis H1-1). This result was expected since the two above experimental situations were identical. It should be noted that prior to performing the t-test, whether the two data sets for Categories A and B were normally distributed was tested using a z-test. Using Microsoft Excel 2010 to do the analysis, both samples were found to be normally distributed.

Next, the results from the LOT-R test were analysed to determine whether there was a significant difference in optimism between participants assigned to Categories A and B. Since each participant had answered this test individually, 30 results were collected from individuals of Category A and 30 from individuals in Category B. The average of the LOT-R test results for participants in Category A was 16.7, while it was 15.1 for participants in Category B, showing that both groups were in the moderate level of the optimism bias range (14 < LOT-R (moderate level) < 18). This also supports the above results obtained from the t-test.

As mentioned earlier, to observe the effect of strategic misrepresentation (intentional act) in groups assigned to Category B, two manipulations were performed. First, information level was increased among participants by communicating to them the average of the actual times of previous groups (see e.g. Windschitl et al., 2003). Second, a monetary incentive was provided to compare its influence with that on a no-incentive group (see e.g. Byram, 1997). As can be seen from Table 6.1 and Table 6.2, the average estimation bias for groups in Category A and groups in Category B (Condition 1) were 62.7% and 44.4%, respectively. As no manipulation was made for these, it is argued that underestimation was due to optimism bias. By contrast, when the manipulation was introduced by elevating knowledge (Condition 2) and introducing a monetary incentive (Condition 3), the averages of estimation bias decreased substantially, to 16.2% and 19.5%, respectively.
Table 6.1: Groups in Category A.

<table>
<thead>
<tr>
<th>Group Number (min)</th>
<th>Estimated Time (min)</th>
<th>Actual Time (min)</th>
<th>Estimation Bias %</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>25</strong></td>
<td><strong>68</strong></td>
<td><strong>62.7</strong></td>
</tr>
</tbody>
</table>

Source: Field work

Table 6.2: Groups in Category B.

<table>
<thead>
<tr>
<th>Group Number</th>
<th>Initial Estimated Time</th>
<th>Estimates after Learning Actual Time</th>
<th>Estimates after Learning about Competition</th>
<th>Actual Time</th>
<th>Estimation Bias %</th>
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<td>50</td>
<td>60</td>
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<td>43</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td>45</td>
<td>50</td>
<td>42</td>
<td>16.7</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>30</td>
<td>30</td>
<td>46</td>
<td>56.5</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
<td>60</td>
<td>60</td>
<td>65</td>
<td>46.2</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>60</td>
<td>60</td>
<td>80</td>
<td>50</td>
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<tr>
<td>9</td>
<td>30</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td>33.3</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>30.7</strong></td>
<td><strong>49</strong></td>
<td><strong>48</strong></td>
<td><strong>58</strong></td>
<td><strong>44.4</strong></td>
</tr>
</tbody>
</table>

Source: Field work

To assess whether completion time estimates varied in different situations (optimism bias vs. strategic misrepresentation), four t-tests were carried out (n = 60). Two independent-sample t-tests were conducted between groups in Category A and groups under Condition 2 of Category B, and between groups in Category A and groups under Condition 3 of Category B. The results revealed a significant difference for both conditions: (p = 0.000011 < 0.05) and (p = 0.0000075 < 0.05), respectively. As
described earlier, a level of significance, or \( \alpha \) of 0.05 was selected to establish statistical significance for all statistical tests.

Furthermore, two paired-sample \( t \)-tests were conducted to assess the accuracy of the results obtained from the previous analysis. The \( t \)-tests were carried out for groups in Category B and between Condition 1 and Condition 2, and Condition 1 and Condition 3. Again, the results showed a significant difference in both conditions: \( p = 0.00003 < 0.05 \) and \( p = 0.00019 < 0.05 \), respectively (thus confirming hypothesis H1-2). The interpretation and discussion of the above analysis follows in the next section.

### 6.2.3 Findings

Based on the review of the literature on optimism bias and strategic misrepresentation, it was found that “knowledge” and “incentive” are two influential variables on the situational framings of project time estimation. These variables, furthermore, can possibly aid in distinguishing between an optimism bias and a bias due to strategic misrepresentation. The effect of each is discussed below.

#### 6.2.3.1 Effect of knowledge level on forecasting accuracy

Kahneman and Tversky (1979) declared that people often use two types of information to make their predictions about future outcomes, singular information (inside view) and distributional information (outside view). The former includes information and details about the specific task or case under consideration, whereas the latter consists of knowledge about the distribution of outcomes in similar or past situations. Epley and Dunning (2000) suggest that, to enhance accuracy in making decisions about future outcomes, people should use a combination of singular and distributional information. However, in project planning, Flyvbjerg et al. (2005) found that planners mainly use singular information in their decision-making and neglect distributional information. They advised planners to use the reference class forecasting method so as to benefit from distributional information; this method would situate their projects in a statistical distribution of outcomes from a comparable reference class of completed projects.

In fact, the implication of this method has been tested in Experiment 1. To do so, more information and knowledge about the task was provided to the groups under Condition 2 of Category B, which caused them to revise their initial estimates. As a result, their average estimated time changed from 30.7 minutes (Condition 1) to 49 minutes (Condition 2). The results from the \( t \)-test also showed a significant difference between
their new and initial estimates, indicating that these estimates tended to be less biased. This finding confirms the advantage of using the reference class forecasting method in producing time estimates.

However, as Flyvbjerg et al. (2005) put forward, this method is effective when the learning environment is good, knowledge can be shared, and there is minimal scope for deception. In this experiment, however, since the competition was not held between group members, the members had a more cooperative approach towards each other, and so the information was truly shared. Therefore, when participants were faced with the distributional information based on the performance of previous groups, they were able to make better estimates. Figure 6.4 illustrates how 10 groups under Condition 2 of Category B (with distributional information) generated more accurate time estimation than those under Condition 1 (when they had no distributional information). It also compares these two conditions with the groups in Category A (without distributional information). Given that people are generally accurate regarding their perceptions, learning, and reporting of distributional information, it is perhaps surprising that they are not better to apply this information to predictions concerning themselves. Why do people fail to make use of the knowledge gained while observing themselves and others when predicting their own behaviour? This question is answered through analysis of participant interviews and is discussed later in this chapter.

![Figure 6.4: The effects of distributional information on groups’ time estimations.](image-url)
6.2.3.2 Effect of incentives on forecasting accuracy

The results of previous studies on the influence of monetary incentives on time estimation mainly indicate that incentives obscure the outcomes of estimations (see e.g. Buehler et al., 1997; Byram, 1997). Henry and Sniezek (1993), for example, argue that when people perceive that they have the chance to win money or obtain rewards, their judgements become inflated. The authors noted that one reason for this excessive inflation is wishful thinking, in which individuals wish to have perfect performance, and, as a result, overestimate the probability of success and underestimate the probability of unfavourable outcomes. Conversely, based on the results of the present study, it was found that participants in the incentive group ($M = 48$ minutes) made better time predictions than participants in the no-incentive group ($M = 30.7$ minutes), thus confirming the research hypothesis (H1-3) that incentives for increased accuracy of estimation reduce optimism bias in project time estimates. Figure 6.5 shows how groups under Condition 3 of Category B (with accuracy incentives) generated more accurate time estimation than those under Condition 1 (when they were not offered any incentives). It also compares these two conditions with groups in Category A (without incentives).

![Figure 6.5: The effects of incentives on groups’ time estimation.](image)

It should be noted that the reason for the inconsistency of this finding with previous studies (see e.g. Byram, 1997) may be due to the different incentive structure used in
this study. For example, one feature of the incentives in the present study was that incentives were given to groups and not individuals, meaning that rewards were distributed equally to all group members. Another feature was that the incentives were of the all-or-none type, meaning that the whole group could earn it if they showed a good performance and that the whole group would suffer if they performed poorly. Indeed, in real firms, in order to ensure improvement, managers primarily promise all-or-none types of incentives at group level. Therefore, the incentive structure employed in the present study is similar to the type of incentives observed in the real world (see also Hamman et al., 2007). In addition, unlike previous studies, which mainly awarded incentives for speedy completion of the task (see e.g. Byram, 1997), in this study the participants were offered incentives to reward accuracy. Specifically, participants were informed that they could win vouchers if they did a better job matching their estimated time to their achieved time than the previous group.

Another interesting finding was that the monetary incentives had no significant effect on participants’ actual performance. This finding is based on the result of the t-test on the difference between actual times of Category A groups ($M = 68.1$ and $SD = 13.6$) and Condition 3–Category B groups ($M = 56.8$ and $SD = 11.6$), showing no significant difference between the two conditions ($p = 0.061 > 0.05$). This result is also consistent with earlier studies (see e.g. Byram, 1997; Roy et al., 2005). Byram (1997), for example, discovered that, on an origami task, average actual time for both incentive groups and no-incentive groups was equal (see his Experiment 5).

Lastly, and based on informal observation, it was noticed that participants in groups that received an incentive had a higher tendency to cooperate with their teammates than those in no-incentive groups. One reason for this could lie in social exchange theory (Foa and Foa, 1975), which entails that individuals behave according to the following general formula: Behaviour (profits) = Rewards of interaction – costs of interaction. Participants view their individual contributions to the task as a way of reciprocating to the offering of incentives as well as to their peers. Participants will in this case collaborate with their peers, because they see that behaviour as eliciting a positive response on behalf of their peers. In the case of groups that received no incentive, there is no clear and shared understanding of the benefits of the task; profits will not be forthcoming and the activity is therefore not motivated by the expectation of rewards. Another reason might be the competitiveness of individuals in the incentives group.
According to Gillet et al. (2009), competitiveness may affect the distribution of preferences of group members and enhance their level of cooperation. Participants, under this theory, viewed their individual cooperation as causally linked to their individual success and thus the group’s success as directly responsible for their own. This, in turn, aligned the objectives of the participants in the group and resulted in greater cooperation. This echoes the suggestion of Hamman et al. (2007) that organisations can benefit from monetary incentives to resolve a history of coordination failure in their teams.

6.3 Interviews
After conducting the experiment with all 20 groups, each group of three was interviewed separately. The design of the interviews was semi-structured and qualitative in nature, allowing the experience of participants and the meaning they make of that experience to emerge (Seidman, 1991) and understanding of the reasons for their behaviour and preferences to become evident (Saunders et al., 2009). The interviews were conducted in the same location as the experiment. Before commencing the interviews, the purpose of the interview was explained to all groups and they were informed that the session would be tape recorded and all quotations used for publication would be anonymised to protect their identities.

The interviews lasted from 10 to 20 minutes, with the average being 14.3 minutes. The reason for the brevity of the interviews was the participants’ frustration on completion of the experiment. Also, it was not possible to arrange a time with them to carry out the interviews at a later time. After finishing the interviews, as an ethical consideration, the participants were informed that if they wished to see the final draft of the manuscript for publication prior to submission, they were to write down their email addresses in the list so that the draft could be sent to them. Of the 60 participants, five requested the manuscript before submission.

6.3.1 Interview procedure
The framework of the interview procedure was similar to that of the pilot study (see Figure 5.3). Initially, the interviewees were asked some opening questions about their courses and student life to make them feel comfortable enough to start talking and participating in the discussion. In the next step, they were asked some general questions about the role of time in their personal lives and how they plan their everyday activities.
and allocate time to them. These questions are presented in Table 6.3. After that, the interviewees were asked more specific questions about the experiment and the process they went through to estimate the completion time of the task. Some of these questions are illustrated in Table 6.4. However, since the interviews were semi-structured in nature, the sequence of the questions varied and new questions evolved during the interviews (Bryman, 2012).

Furthermore, following the suggestion of Saunders et al. (2009), the researcher made sure to specifically address the questions to each participant and, therefore, allow less confident people to express their opinions and be involved. Besides this, the researcher tried to stimulate discussions among participants and encourage them to talk to each other at some point. For example, questions were asked as to whether or to what extent X influenced the participant’s estimates. This question often prompted a heated discussion among the participants for a few minutes.

Finally, each semi-structured group interview was fully transcribed afterwards, and the transcripts were checked twice in order to minimise any possible typing errors. All transcripts and questionnaires of each group were dated and given a unique identifying number in order to aid in their systematic filing. Accordingly, the transcripts of Group 1, for instance, were coded as G1, and the three members of each group were coded as A, B, and C. For example, the code 11B in transcriptions refers to member B of Group 11.

<table>
<thead>
<tr>
<th>Question</th>
<th>Aim of question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are you a punctual person? Why do you think so?</td>
<td>This question causes the interviewees to evaluate themselves and reveal the causes of their time underestimation in a more organised and comprehensive way.</td>
</tr>
<tr>
<td>2. How do you make decisions regarding the time of your daily activities?</td>
<td>This question aims at understanding what criteria interviewees consider prior to estimating the time they need for their normal daily activities.</td>
</tr>
<tr>
<td>3. How did you feel after doing the experiment?</td>
<td>This question encourages the interviewees to perform a self-evaluation and explain their intentions and personal beliefs.</td>
</tr>
</tbody>
</table>

Source: Field work
Table 6.4: Detailed interview questions of Experiment 1.

<table>
<thead>
<tr>
<th>Question</th>
<th>Aim of question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  How did you make your initial estimation?</td>
<td>This question is designed to understand the rationales behind interviewees’ decisions and the criteria they considered before estimating the time.</td>
</tr>
<tr>
<td>2  Did you change your estimate when I gave you more information about the performance of previous groups? Why?</td>
<td>This question aims to gain an understanding of how more information and knowledge can affect the participants’ estimation.</td>
</tr>
<tr>
<td>3  Did you change your mind about your time estimate when I told you that this task was part of a competition and you could win an Amazon Voucher? Why?</td>
<td>This question attempts to find out how the sense of competition with others can influence people to act strategically and change their time estimates. It also reveals whether competitive people produce more accurate time estimates than those who are less competitive.</td>
</tr>
</tbody>
</table>

Source: Field work

6.3.2 Data analysis

The interview data were analysed based on the general steps defined by Creswell (2009) and Miles and Huberman (1994) (see Figure 6.6). Each of these steps will be described in more detail in the following subsections.

![Figure 6.6: Framework for analysing interview data (after Miles and Huberman, 1994; Creswell, 2009).](image)

6.3.2.1 Organising and preparing the data

Data preparation and data analysis started during data collection. Suggested by Miles and Huberman (1994), self-correcting mechanisms was used which included writing the researcher’s reflections on each group interview and recording his insights and speculations immediately after the interview took place for use in the following
interviews and to improve the validity of the data analysis process. De Wet and Erasmus (2005) propose that starting to think about data analysis from the early stages of data collection helps researchers to obtain a better understanding of interviewees’ feelings and also allows them to revise and improvise the research protocols and data collection plan along the way.

Furthermore, NVivo 9 was used, which is a qualitative data analysis software package produced by QSR International, in order to organise and manage the interview transcripts. Figure 6.7 illustrates the interface of this software containing information about all 20 groups. NVivo was also very useful in the data coding process, which served to reduce and display the data, and facilitate drawing inferences from the data.

![NVivo 9 software interface](image)

Figure 6.7: The interface of the NVivo 9 software.

### 6.3.2.2 Reading through data

The transcripts were read through carefully and repeatedly before the coding process was begun. During the reading, different coloured pens and markers were used in order to highlight important sentences or write notes in the margins. In doing so, simple questions, recommended by Tesch (1990) were considered, e.g. “what’s going on here? And why?” This helped the researcher to gain a general sense of the collected data, detail his thoughts about the topics discussed, and have an overview of recurring themes and emerging patterns.
Afterwards, the interview transcripts were imported from Microsoft Office Word 2010 into NVivo 9 and were read through again. The annotation and memo tools of this software were used to document the written notes and new reflections on the data. These reflections coupled with having regular fruitful meetings with the supervisors were other techniques used to maintain awareness of some of the possible sources of error in the data collection and, as a result, improved the coding process and later data analysis (Boulton and Hammersley, 1996).

6.3.2.3 Data coding

The interview data was coded using abductive reasoning—a combination of deductive and inductive coding. As indicated in Chapter 4, abductive analysis allows a deeper understanding of new meanings from the available data, as well as the various characteristics of phenomena of interest (Alvesson and Sköldberg, 2009). To conduct this analysis, deductive coding was initially used. Thus, prior to reading through transcripts, a coding framework was developed. This framework was informed by reviewing the literature, pre-established study questions, and Experiment 1.

Coding the data deductively allowed focusing particularly on issues that were to be investigated in the study and helped to make the most effective categorisation of the data (Creswell, 2009). In the next stage of abductive analysis, inductive coding was used, allowing codes to emerge from the transcripts so that the recurring patterns could be pulled out. Conducting these two stages of coding led to the development of 49 codes.

Afterwards, the various functions of NVivo 9 were used to test, filter, and manage the codes. According to Fielding and Lee (1998), this process of code management, in which the codes are rearranged and redundant codes are removed, helps researchers to avoid data overload and generate meaningful results. This is similar to what Miles and Huberman (1994) called the data reduction step. It entails that the assembled data should be emphasised, minimised, or set aside completely for the purposes of the project at hand. By conducting this reduction process, the number of codes was reduced from 43 to 21. These codes appear in Table 6.5, along with the type of code (inductive or deductive) together with an example of each found in the transcripts.
<table>
<thead>
<tr>
<th>Codes</th>
<th>Deductive or Inductive</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountability</td>
<td>Inductive</td>
<td>“If I don’t really care about something, then I won’t be punctual”.</td>
</tr>
<tr>
<td>Unintended consequences</td>
<td>Deductive</td>
<td>“I didn’t realise how complex this LEGO gonna be like”.</td>
</tr>
<tr>
<td>Intended consequences</td>
<td>Deductive</td>
<td>“If you just say 64 minutes as the average time and no money, then we would have said 45 minutes”.</td>
</tr>
<tr>
<td>Task’s importance</td>
<td>Inductive</td>
<td>“…You reading the book this is the kind of things important but not urgent. I care about the urgent things first and then do the important things”.</td>
</tr>
<tr>
<td>Knowledge and information</td>
<td>Inductive</td>
<td>“I think we were like, you have to compare yourself to someone, unless you are overly confident! We didn’t really have any information about others, we were just given like a picture and a box of LEGO”.</td>
</tr>
<tr>
<td>Desire and belief</td>
<td>Deductive</td>
<td>“Because we believed in ourselves…I think just we could do it in 30”.</td>
</tr>
<tr>
<td>Commitment to plan</td>
<td>Inductive</td>
<td>“So the plan I make for myself, the informal plans, it is easier to avoid or postpone. But the plan made by others it makes a commitment for me to do”.</td>
</tr>
<tr>
<td>Decision based on previous experience</td>
<td>Inductive</td>
<td>“When I have done it before obviously I am better at it”.</td>
</tr>
<tr>
<td>Deviation from the plan</td>
<td>Deductive</td>
<td>“Sometimes I want to focus on my plan, but always something happens and I lose my concentration”.</td>
</tr>
<tr>
<td>Importance of detailed planning</td>
<td>Deductive</td>
<td>“…good planning beforehand so like in believe that there should be a very good planning to understand all the dependants of the project in the beginning before you even start”.</td>
</tr>
<tr>
<td>Overconfidence</td>
<td>Inductive</td>
<td>“I thought it might be much easier because I looked at the picture and I thought ok this is not hard”.</td>
</tr>
<tr>
<td>Competitiveness</td>
<td>Deductive</td>
<td>“Guys, we have got to get close to our time to beat the m”.</td>
</tr>
<tr>
<td>Plan breakdown</td>
<td>Inductive</td>
<td>“Let’s divide the tasks to 3 to 4, and then assess bases on their importance”.</td>
</tr>
<tr>
<td>Interest</td>
<td>Inductive</td>
<td>“…when you’re working as a group, you have a bit of a dispute, everyone would be trying to serve their interest”.</td>
</tr>
<tr>
<td>Surprises</td>
<td>Inductive</td>
<td>“We didn’t know that unforeseen problems like wrong measurement will happen”</td>
</tr>
<tr>
<td>Lack of experience and skills</td>
<td>Deductive</td>
<td>“But it’s very difficult with these tasks coz I never experienced them before. So I couldn’t experience how long they take, but other than that I am ok”.</td>
</tr>
<tr>
<td>Unpredictability</td>
<td>Inductive</td>
<td>“…maybe the reason is because of some unexpected issues which occurs”.</td>
</tr>
<tr>
<td>Communication and teamwork</td>
<td>Inductive</td>
<td>“…if you cannot deal with these people and cannot set the relationship between them, it will affect the quality of the work”.</td>
</tr>
<tr>
<td>Lack of proper plan</td>
<td>Deductive</td>
<td>“If we knew what we were going to do at first, we could have estimated it better”.</td>
</tr>
<tr>
<td>Technical problems and complexity</td>
<td>Deductive</td>
<td>“Visually, it seems quite easy, but when you actually get into the dimensions, it is quite difficult to build”.</td>
</tr>
<tr>
<td>Temporality</td>
<td>Inductive</td>
<td>“If I have enough time, I don’t do it. But when deadlines are coming, I will do it. I am always like that”.</td>
</tr>
</tbody>
</table>

Source: Field work
6.3.2.4 Developing categories

The second phase of coding was to link initial codes to abstract categories. The purpose of this stage of coding was to assemble the fractured data in new ways by making a connection between them and, consequently, delimit the core category that represents the main theme of the study.

The core category was identified by drawing on recent attempts of Flyvbjerg and his colleagues (see e.g. Flyvbjerg et al., 2009; Winch, 2013; Pinto, 2013) that questioned the role project planners play in producing estimates of project outcomes as well as the review of literature on project delays (Chapter 2). Accordingly, the role of planners was chosen as the core category. Identifying the core category not only reduces the number of units the analyst must work with but also “[has] the potential to explain and predict” (Strauss and Corbin, 1998, p. 113). Miles and Huberman (1994) suggest that, after identifying certain categories, the researcher should start to ask questions about those categories in order to identify relevant sub-categories. For example, with regard to the role of planners, the question was asked as why planners do not learn from previous mistakes in estimating project time. This question, based on reviewing the literature in Chapter 3, resulted in two different answers: the planners might be unintentionally biased in their estimates or they might be intentionally biased. In this way, two sub-categories were developed for planners’ actions, unintended and intended.

Next, the codes that emerged through inductive coding were examined and grouped according to their characteristics and features under each defined sub-category. For instance, future-perfect thinking, surprises, overconfidence bias, and temporality were grouped under the sub-category of “unintended consequences”, as these concepts share various characteristics that are of relevance in explaining what leads planners to make optimistic decisions concerning project times. Table 6.6 illustrates how codes were grouped under each sub-category, and how sub-categories were grouped under the core category.

Strauss and Corbin (1998) point out that, after coding to specify categories and sub-categories, researchers can then attempt to detect patterns in the coding. One such pattern occurs, for example, when future-oriented planners consider past experiences and failures only very rarely and so tend to focus on how a task might be accomplished in the future. Delusional optimism would cause them to often fail in accurately
estimating project completion times. Encoding so as to form categories and sub-categories allows patterns such as this to become evident to a researcher.

Table 6.6: List of categories and integrated codes.

<table>
<thead>
<tr>
<th>Core category</th>
<th>Sub-categories</th>
<th>Codes</th>
<th>Sub-codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of planners</td>
<td>Unintended actions</td>
<td>Future-perfect thinking</td>
<td>- Unpredictability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surprises</td>
<td>- Complexity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overconfidence bias</td>
<td>- Lack of proper plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temporality</td>
<td>- Decisions based on previous experience</td>
</tr>
<tr>
<td></td>
<td>Intended actions</td>
<td>Lack of accountability</td>
<td>- Commitment to plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interest maximisation</td>
<td>- Desire and belief</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Being opportunistic</td>
<td>- Awareness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asymmetric knowledge</td>
<td>- Incentives</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Skills and experience</td>
</tr>
</tbody>
</table>

Source: Field work

6.3.3 Interpretation of findings and discussion

In this section, codes, categories, and memos (observations) will be presented and explained in order to provide insight into this process and to illustrate the process from interview transcripts to final category, sub-categories, and patterns. In addition, key findings are discussed in detail.

As discussed in Chapter 2, much of the research on project delays tends to assume the primacy of the project plan and so conceptualises delays as a consequence of flawed execution. In this thesis, however, by introducing the concept of planning intentionality, it is argued that delays can materialise through intended and unintended mistakes of planners in estimating project time. Flyvbjerg et al. (2009) call these mistakes strategic misrepresentation and optimism bias, respectively. It is not yet clear under what conditions these mistakes tend to occur, or even what issues lead planners to make their decisions optimistically or strategically. In the experiment, the role of “knowledge” and “incentives” was examined in differentiating between these two explanations (optimism bias and strategic misrepresentation, respectively). Additionally, during the coding of transcripts and interview analysis, other issues were uncovered which could cause people to make decisions based on either delusional optimism (unintended situation) or strategic misrepresentation (intended situation). These issues are discussed in the following subsections.
6.3.3.1 Underestimation of time based on unintended actions

As previously noted, when people make decisions about activity completion times, they are at that point in time not aware of the actual outcomes. Thus, their decisions are often based on delusional optimism rather than on a rational weighing of gains, losses, and probabilities (Kahneman and Tversky, 1979). As a result, their estimates are unlikely to be as accurate as they would have liked and so differ from actual outcomes due to excessive optimism (Kruger and Evans, 2004). Many causes have been suggested in many different studies for this unintended failure in estimating project times at the inception stage, including design and scope changes (Hwang et al., 2013), ground conditions (Tommy et al., 2006), improperly managed risk and uncertainty (Jennings, 2012), project complexity (Nkado, 1995), and equipment breakdown and site accidents (Rujaishi and Bashir, 2013). In fact, the majority of these causes are fully known to most in the field of construction due to a high degree of over-citation. Yet the question remains: Why do people not learn from previous failures when they already know the causes?

Results of Experiment 1 confirmed that both experimental and control groups underestimated the time of the task to a remarkable degree. To discover the reasons for this optimistic time prediction and to answer the question posed above, the transcripts were carefully coded, and this resulted in developing four explanations for such a tendency. Each of them is explained below along with the interviewee statements that prompted them.

Future-perfect thinking

Recent research draws on the implications of Schutz and Weick’s work in the context of project management, which relies on the creation of meaning through action oriented to the future perfect (see e.g. Pitsis et al., 2003, Clegg et al., 2006). This concept is based on thinking in the future perfect tense, which implies that planners often think about future actions as if they had already been completed based on the tacit assumption that the future will be like the past. In fact, this assumption is derived from an inherent forward-looking perspective within project management (Gavetti et al., 2007).

During data analysis, it was noticed that many responses from participants reflected this forward-looking perspective, which often led them to base their estimates on previous
success at handling similar tasks. For example, before starting the task, Participant 11A stated:

“When I have done it before obviously I am better at it now”.

However, after he had finished the task in response to the question “How have you made your decision about the completion time” he responded:

“What I have done with the LEGO was very easy. So based on my previous experiences I thought I could finish it very soon. But I was wrong”.

From the above statements, it is clear that Participant 11A made his estimate with certainty by referring back to analogous actions in his past and assuming that future flows would be the same. This issue echoes Schutz’s (1973) argument that “projects of all sorts build on imaginations about the future” (p. 68). The ‘future’ here refers to the state of affairs anticipated by the actors in the present situation, which would be realised in the future (Winch and Kreiner, 2011). As a result, people retrospectively visualise future actions in the present, and these actions may lead to the realisation of pre-defined goals as some point in the future. This is consistent with what Participant 3B noted:

“Actually, we played LEGO in school days. And that was an easy task we could do in 20 minutes. So I was actually thinking that it is similar and we can put bricks over bricks and finish it in 20 minutes”.

The above statements suggest that participants’ approach to the future is vague and fraught with uncertainties. Winch and Kreiner (2011) stated that any imagination about the future may prove to be accurate or inaccurate, but it will be incomplete in relation to the full range of consequences. This is spelled out in the following statement by Participant 4A:

“As I said, I have many experiences with LEGO. So I was confident that it took more than the normal LEGOs. But, to be honest I have never tried a LEGO with that much detail”.

The above response suggests that, although Participant 4A was experienced in LEGOs and knew that this task was going to be harder than one might expect, she could still not foresee how difficult it actually turned out to be. This is consistent with what is argued in Chapter 3, i.e. in case of unintended errors, individuals often believe in an “emergent” planning approach where plans are neither well defined from the onset nor stable throughout the course of implementation. In such a situation, individuals often change their initial plans at any point all the way through to project completion.
(Tryggestad et al., 2010). The participants often used the following terminologies to describe emergent plans:

“I shouldn’t be interested in involving myself in the details, because the plan changes” (11C).
“Sometimes you don’t know in advance if a certain person can finish a certain task in a certain time until the time of action” (8C).
“When something emergency happens, I have to interrupt my plans and re-plan” (1A).
“Sometimes I just write it down and plan my activities...but when the time comes I decide whether to do it or not. It depends on my mood and how I feel at that time” (2C).

The point here is that those who support the emergent planning approach often tend to think in the future perfect tense and, as a result, face many situations that prevent them from following the original plan. Therefore, they often have to use emergent strategies to adapt their plans to these changes (Dvir and Lechler, 2004) as they occur. Häggren and Wilson (2007) suggest that, when unplanned issues emerge at a stage from which they were not apparent earlier, the project team should “adapt to changing conditions and put knowledge into use, or alternatively develop the knowledge needed in order to produce a resolution to the problem” (p. 104). Thus, in order to have a more realistic imagination of the future, planners are advised to draw alternative images of the future by defining different scenarios (optimistic, best guess, pessimistic) with different information that might otherwise be ignored (Newby-Clark et al., 2000).

Surprises

One difficulty that project planners contend with is making their decisions in the face of uncertainty and within bounded forms of rationality (Simon, 1965; Winch, 2001). This makes them unable to recognise the existence of complex scenarios or unexpected surprises that could occur during task implementation, even though they have experienced such surprises in the past (Byram, 1997). Participant 7C raised a similar point in response to the question “Why didn’t your group finish it on time?”, she replied:

“We didn’t know that unforeseen problems like wrong measurement will happen, so we stuck that moment. You saw that, when we went to join the parts together, we found our measurement was wrong. I think, emm, who can predict these thing from the start?”

The above statement communicates that Participant 7C underestimated the time because her group had difficulty thinking of surprises or things that could go wrong during task
performance. She also mentioned that there are always unpredictable issues not foreseeable at the outset. This is, in fact, consistent with Winch’s (2006) argument in construction projects that, for planners, the “journey through time from the present state which one can know about to that desired future state can be long and fraught, with many surprises along the way” (p. 167). Consequently, planners will soon realise that they cannot fully predict the future (Chattopadhyay et al., 2001), and unexpected events will continue to affect projects (Geraldi et al., 2010). This might be due to the unknown unknowns, the so-called unk-unks (De Meyer et al., 2002). These issues are unexpected and emergent and often are due to not apprehending the complexity of projects at the inception stage.

The term ‘complexity’ is mainly employed to describe something which is composed of or has many parts which are intricately structured. A complex system is of such a nature that the system as a whole cannot be fully understood simply by analysing its components because these constitute too many interacting variables (Cilliers, 1998). In Group 18, when Participant 18A noted, “We didn’t think about the complexity of this task in our plan”, he was asked “what do you mean by complexity”, and he gave the following response,

“Complexity to me is the difficulty of the task…especially in a task which involves different people with different skills, where people are from different countries; that always brings complexity”.

The above statement refers to the fact that complexity depends upon many issues that emerge during implementation which are not foreseeable at the very beginning. Participant 18B confirmed his teammate’s statement and believed that understanding complexities before implementation is a very important, but challenging, task. He stated:

“At the beginning of the task it is important to understand the complexity, but relative to what - your experience, your standards, but how to say, it is not so straightforward. Sometimes it gets messed up when you face with much uncertainty in start and you have no experience with regard to that, you know what I mean? That’s where the complexity comes in”.

As can be seen from the above statement, Participant 18B raised three points about task complexity: 1) complexity is not straightforward and easy to predict; 2) someone having no prior experience perceives greater complexity; and 3) complexity is positively related to uncertainty. In addition, different people and different processes can change
the level of complexity in a planned activity. These complexities are sometimes hidden to project planners, but they are involved in projects’ life-cycles, in fact, and can limit the ability of planners to provide an accurate plan at the outset of projects (Williams et al., 2012).

In addition, sometimes people fail to remember that in the past they were interrupted by surprises (Roy et al., 2005). In fact, they recall those surprises only when they re-appear. For example, when Participant 14C was asked “Was this task easy for you?”, he responded with a despondent reaction:

“No, not at all! Like, it is more difficult, like you gotta give everything right, and when you get in to that, suddenly you say I am not sure if you get it right! I thought, I thought yeah, I didn’t realise initially how complex this LEGO gonna be like!”

As can be seen from the statement above, Participant 14C mentioned that, after starting the task, when faced with difficulties, he began to think about problems and obstacles. His response reminds us of the principle that “what is out of sight is out of mind”, and this could be one reason that people often do not consider things that can go wrong (Fischhoff et al., 1978).

Furthermore, for some of the interviewees, the reason for experiencing surprise was the lack of a solid project plan to follow all the way to project completion and success. For instance, Participant 3C stated:

“I think we didn’t plan a fixed timetable for this task and aim to plan things in the procedure of our project. We should first select tools and techniques in order not to have problems later. If we first analyse it better, adopt proper techniques for it, we could reach the better result”.

In addition, Participant 10A had a more extreme view of the plan. She stated that the lack of a proper plan was not only a problem in this experiment but was also one in her academic life. She raised an example:

“You know it is the same when we have coursework as well. If we knew what we were going to do at first, we could have done it better, but to be honest most of the time we are late to submit them because we had not planned it well from the first day”.

As can be seen from the above responses, for both Participants 3C and 10A, having a proper plan is very significant, while also being a challenge. As a result, when they were asked, “Why do you think you could not finish on time”, they placed strong emphasis...
upon planning and the prescribed execution of activities in accordance with plans. This is in line with what supporters of the classical view on planning promote:

“[The] plan is very likely to serve as an anchor...which is almost always seen as a ‘realistic’ best or most likely case” (Flyvbjerg et al., 2009, p. 9).

In an experimental study, Byram (1997), in order to discover the efficacy of thinking of surprises in eliminating the tendency to underestimate, asked participants to list possible problems that could occur when they were trying to complete a task prior to making their final prediction of the task’s completion time. He concluded that if people become aware of possible surprises before making their predictions, then the tendency to underestimate may be lessened (see also Hinds, 1999).

**Overconfidence**

The dominant school of thought in project planning assumes that construction projects are repetitive projects and their execution is routine (see e.g. Bryman et al., 1987; Lundin and Söderholm, 1995). Therefore, based on the their repetitiveness, their continuity, and previous experience with the operations, organisations and project managers hold the assumption that they “know what to do and why and by whom it should be done” (Lundin and Söderholm, 1995, p. 441). However, Kirkebøen (2009) points out that, when such knowledge from past events becomes an anchor with respect to how people make decisions involving future incidents, it triggers overconfidence bias. As he defines it, this bias is a strong tendency to be more certain about judgements than is warranted.

During interviews at the pre-test phase of Experiment 1, it was noticed that participants employed terminologies showing their overconfidence, such as the following:

- “You count to three, it is done!” (17A)
- “It seems like a piece of cake to me” (17B)
- “I am sure that...” (4A)
- “I am realistic...” (18C)
- “I am 100% sure...” (16A)
- “I am confident in myself...” (20C)

In fact, after performing the task, these participants admitted that they did not expect the results and were optimistic in their prediction. For example, Participant 16A stated:
“...and to be honest it was actually just my confidence in myself because I am familiar with LEGO and knew that probably we would be faster than the average, but it seems I wasn’t quite right, haha”.

As can be seen from the aforementioned response, Participant 16A acknowledged that he was optimistic because of being overconfident. This is also a typical issue in projects when planners optimistically claim that they can predict the outcomes of projects accurately due to their confidence in the illusory power of mastery over technical issues and problems should they arise later in projects (Pollack, 2007). This assertion is mainly due to the illusion of identity between self and ultimate reality which is the subject of the Lacanian perspective (Lacan, 1977).

Lacan (1977) notes how the image projected on to a mirror produces an illusion of mastery over a ‘complete’ self, even though a subject can never fully comprehend one’s self without allowing for the (future) identification with ‘others’. Roberts (2005), building on Lacan, argued that “the image of self as the source of autonomous control is also arguably a foundational fantasy for management” (p. 630). So, it is often assumed that managers are rational, purposive actors who learn from the past to act in the present to achieve a desired future (Winch and Kreiner, 2011). Yet, this fantasy of managerial control downplays the possibility that we are often only dimly aware of our own existence (see e.g. Foucault, 1977). A Lacanian perspective therefore suggests that “we can neither leave behind illusory imaginary constructions, nor overcome our fundamental lack” (Driver, 2010, p. 563). As such, what planning often produces is “an irreal world of scientific or scientific reality” (Gunder and Hillier, 2007, p. 482).

Temporality

The dynamic nature of the plan and its development over time enhances the project organisations’ ability to think by itself; to solve problems; and more importantly to seize opportunities that present themselves over the course of the project (Andersen, 1996). Recent research on time perspectives has addressed how temporal cognitive frames—past, present, or future—unconsciously affect individuals’ perceptions of and behaviour regarding time in order to shape contingencies, goals, expectations, and imaginative scenarios (Zimbardo and Boyd, 1999), all of which are important in planning and execution activities (Waller et al., 2001).
For instance, it is argued that individuals with present time perspective live “for the moment” (Pezzo et al., 2006, p. 1361), and believe that planning for the future is somewhat futile. Thus, they take more risks and act impulsively, consequently focusing on short-term perspectives (Zimbardo and Boyd, 1999). For instance, Participant 7B stated:

“You know why it takes too much time for me to do something? It is because I only focus on that thing and cannot think about anything else which can happen later. I know I should concentrate on other things, but I can’t!”

As the statement above shows, Participant 7B holds a present-oriented view which causes her to be unprepared for surprises along the way to the future (Winch, 2006). Another temporal approach is future oriented. Lasane and Jones (1999) declare that individuals with a future-orientation view tend to be more work oriented and on schedule and often achieve more academically. They are more likely to consider the future consequences and have more chances of attaining desired future goals. In an experimental research, Harber et al. (2003) revealed that future-oriented students completed their task earlier than present-oriented students. However, it is claimed that people with future-oriented thinking rarely consider past experiences and failures; rather they tend to focus on future thoughts of how the task might be completed. This issue, as Kahneman and Tversky (1979) note, is one of the reasons that planners often fail to estimate the completion time of projects. For instance, Participant 20B confirmed that he often does not learn from his previous experiences, stating:

“Let me tell you something funny...I tell myself every day, every month, every half a year, I say this time, I really need to set myself and do my stuff early...especially for my coursework and other deadlines. But, again I am always leaving it to the last minute... I have a bad track record of doing so”.

Many participants mentioned similar stories of how they ignored the experiences and failures of similar events that had taken place in the past. In a verbal protocol, Buehler et al. (1994) found that only 7% of participants’ responses referenced past experiences, whereas 74% of responses centred on future plans. This is surmised to be the case with a future-oriented perspective (Zimbardo and Boyd, 1999).

Finally, past-orientated individuals are more likely to contemplate past incidents instead of focusing on either the present or future (Pezzo et al., 2006). In this case, recalling past scenarios affects their decisions about the present and future; if their past experience was generally positive, then their decision is based on a past-positive
orientation, and if it was negative, then they may be preoccupied with negative feelings and memories about the task at hand. For example, Participant 7A stated:

“…because I played it when I was a kid. I was very good at it. I thought 20 minutes for each floor is enough time. I don’t know what experience others have in doing it. I am not sure now”.

The aforementioned statement shows that Participant 7A underestimated the time because she made her decision based on her memory of the LEGO game from her childhood. This, in fact, refers to a past-oriented view.

Therefore, it could be argued that the above time perspectives can create the possibility of delay since they could influence planners’ delusional optimism and their view about the time involved a project. Similarly, Jackson et al. (2003) argue that delay is associated with “a negative evaluation of past, a fatalistic or negative view of present, and a positive view of future” (p. 20). Therefore, it is important to understand how temporal perspectives could influence one’s approach to planning and thereby lead to a multiple range of consequences (see Chan, 2012).

6.3.3.2 Underestimation of time due to intended actions

To accomplish strategic misrepresentation, planners must develop a high-quality project plan that can be approved by project sponsors (Flyvbjerg et al., 2009). Although Flyvbjerg’s focus on strategic misrepresentation is mainly devoted to megaprojects, which are by nature under economic and political pressures, this study argues that this concept can be extended to smaller scale projects or tasks. In fact, whenever people intend to manipulate, conceal, or misrepresent information in order to influence others and safeguard their own outcomes, they are engaging in strategic misrepresentation. For example, car sellers might deliberately hide technical problems of cars which they sell (Schweitzer and Croson, 1999). To explain this intended action through the folk concept (Malle and Knobe, 1997), the car seller described here has the desire to sell a faulty car and the belief that he will be able to do so. His intention is to hide the defects of the car to get a better price, and he apparently believes he has the ability to convince a buyer to purchase it in spite of its flaws. Moreover, he is aware of his actions. Therefore, in line with the argument made in Chapter 3, the car seller’s action is intended.

Steinel and De Dreu (2004) argue that in the case of strategic misrepresentation, decision makers find themselves in the so-called information dilemma: “Should they
provide accurate information to achieve high collective outcomes or strategically misrepresent their preferences to secure good personal outcomes?” (p. 420). Those who choose the latter, in fact, mislead others about the structure of the decision-making task. The important question that needs to be answered here is why do decision makers engage in such activities?

In Experiment 1, the competitive incentive was used to make the situation conducive to the use of misrepresentation. Then, the interview data collected from those ten groups in Category B were analysed to answer the above question. Through coding the transcripts, four issues explaining the possible motives underlying strategic misrepresentation and their intentional actions were found. Each is explained below along with the corresponding interviewee statements.

Lack of accountability

As Siegel-Jacobs and Yates (1996) point out, people are accountable when their performance is monitored or when the consequences of their actions or behaviours are evaluated. DePaulo (1992) asserts that when accountability and transparency structures are dysfunctional or absent, people are likely to suppress and misrepresent their true feelings and thoughts. For this reason, it was expected to observe more use of misrepresentation in Experiment 1 because participants were told that their responses would be kept strictly confidential and anonymous, and, thus, they were less accountable for the outcomes of their actions. In other words, No accountability structure was defined.

One example of lack of accountability was observed with Participant 18B. During the negotiation stage, he told the other two members:

“Shall we split it and each one makes one part?... I think 20 minutes is enough... 20 is good”.

Based on the written notes during the experiment and his conversation with his teammates, it was realised that he was very influential in producing the final time estimation for Group 18. However, after their estimate went wrong, and they finished later than forecasted, he said:

“I think I trust their opinions because they had experience with LEGO”.

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As can be seen from the above, Participant 18B is lying. In such a situation, when accountability is lacking, individuals are more likely to claim something for which there is not sufficient evidence, such as blaming others or attribution of success (Scholten et al., 2007). This issue is more evident in situations where there are divergences of participants in the task, and it is not easy to recognise who is responsible for the ultimate success or failure of a project. Therefore, if the group fails, it is often hard to place the blame squarely on one or a few actors.

It is noted that lack of accountability leads certain people to deviate from the plan (see e.g. Zwikael, 2009). In such situations, deviation differs from plan changes. Through looking at patterns in transcripts, it was realised that when participants used the term “change”, they meant something positive, while by using the term “deviation”, they referred to something negative. For example, when Participant 8A was asked, “Have you planned this task in detail when I gave you the design and blueprints?”, he used the term “change” to explain the advantage of using an emergent planning approach. He responded:

“To be honest, I think we didn’t plan this task well. But, this gave us greater flexibility to make decisions as we went along and make some changes”.

As can be seen from the above statement, Participant 8A uses “change” when he is referring to the greater flexibility obtained from their emergent plan. In contrast, Participant 3A initially discussed how good he and his teammates were in terms of planning, but when he talks about their group problem, he used the term “deviation”. He stated that:

“I think the most important factor in this task was planning and organising. Initially, we all had this goal to make an accurate estimate and based upon that plan for the task and alongside this plan we know that we have to organise and coordinate things. These all helped us in order to move forward to reach the goal. But, the problem that we had was lack of a leader, a supervisor to monitor the stability of our plan and tell us when he felt we are deviating from it…and guiding us towards the right direction”.

In the above statement, Participant 3A used the term “deviating” to refer to the problems causing the task to not turn out as planned. He also asserted that their group problem was not having a project leader to monitor their activities against the static plan and tell them when they were not going in the right direction. This suggests that having an expert seems to be considered an effective remedy for dealing with deviations to
project progress. Similarly, Häggren and Wilson (2007) propose that organisations should have a back-up team at the corporate office to establish systems that can handle the deviations that occur in projects.

Interest maximisation

According to O’Connor and Carnevale (1997), misrepresentation is more likely to occur when individuals attempt to maximise their own interest rather than enjoy joint gains. In other words, people “deceive more when there is a greater need to serve one’s own interests, or there is more opportunity to do so, or both” (Steinel and De Dreu, 2004, p. 420). In projects, Flyvbjerg et al. (2009) posited that as projects go forward, they create work and make money for all project participants from construction workers to stakeholders. Therefore, stakeholders have a strong self-interest to present projects as favourably as possible at the project approval stage.

In Experiment 1, competitive incentive was used to foster one’s immediate self-interest (Triandis et al., 2001). This led some participants to pretend that they were cooperating, while, in fact, they were pursuing their own interests. After offering them the monetary incentive, they had some interesting conversations among themselves. The following is an example of this type of conversation among participants of Group 12:

Me: *but if you estimate it better than previous group, and achieve that, then you go to the list of draw.*
12C: *half an hour?*
12A: *I reckon possibly back up to 40.*
12B: *we have got to get close to our time to beat them, so…*
12A: *let’s say 35 minutes.*
12B: *yeah.*

In fact, before the decision to compete had been made, the time estimate of Group 12 in Condition 1 was 20 minutes. However, when they discovered that they could win £10 each, they revised their estimate and made it more realistic. Through observation, it was noticed that there is a similar tendency among other incentive groups. To understand the reason, they were asked, “*Did the incentive cause you to change your time estimate or performance? If yes, how?*” In fact, the majority said yes. By coding their responses, three main reasons for this were found.

First, several participants mentioned that incentives motivated them to take the task more seriously. Through this, participants attempted to be more rational and, thus,
construct a justification for their desired conclusion (Kunda, 1990). In order to justify a desired on-time completion, they sought to selectively choose scenarios in which they imagined they would finish on-time and earn the money. For example, Participants 12A and 12B said:

12B: *I think it made us believe more in ourselves, and...*
12A: *(he interrupted 12B)* ...and encouraged us more to do it faster.*

Similarly, Participants 18C explained how incentive motivated her team to go back and look at the task’s details. She noted:

“So after that, we looked again at the drawings and dimensions. We saw there are very small pieces, like this door here. Then we recalculated that...”.

As can be seen from the above response, the interest in obtaining the monetary incentive caused the participants to focus more narrowly and have realistic control over the task.

Second, some of the participants declared that the desirability of winning was the actual stimulus that made them change their estimates. For example, Participant 12C showed his attitude towards winning and competition by stating:

“I feel that winning is very important to me in work, play, football, whatever. It sometimes bothers me when other people do better than I do”.

Third, in this experiment, participants, instead of having self-interest, mainly had a collective interest towards winning. The reason is that the competition was not carried out between group members—everyone knew that if they won they would earn equally. Therefore, participants had cooperative incentives to work with their teammates to increase joint gain and competitive incentives to work against their previous team (see also Schelling, 1960). This is, however, at odds with previous work on strategic misrepresentation which often assumed that decision makers tended to maximise their own profit (see e.g. Boles et al., 2000). Current findings contradict this assumption, at least to some extent, in that they show that “lying and deception are influenced by social value orientation as well as by others’ cooperative or competitive motivation” (Steinel and De Dreu, 2004, p. 432). This points to the importance of examining the role of planners as a group, rather than as individuals (see Chapter 7).

Being opportunistic
One rationale behind strategic misrepresentation is that underestimating project time (or cost) may enable organisations to competitively bid for a project and win, despite the fact that the winning bidder may be the one with the worst possible outcome. This often causes contractors and planners to act opportunistically (Winch, 2001).

In this study, opportunistic behaviours were motivated by incentive and competition. Accordingly, the groups in Category B were informed that if their estimated times more closely matched their achieved times than did those of previous groups, whose members did not know their estimated and achieved times, the group member names would be added to the winners’ list. In order to see the effect of this manipulation, the groups were asked, “How did you feel when I told you that this task was part of a competition?” Interviewees’ responses were interesting, since the sense of opportunism caused them to feel that they were better than their previous group. In this regard, the following responses were noted by interviewees:

“We like to be different from other groups. We don’t want to get the same result like them” (17B);
“Yes, I will do it faster when there is competition” (14C);
“Without competition, definitely a longer time” (16C);
“I think if there was no competition, then we would have said 50, 55 minutes. But, it was a competition and we wanted to smash them” (12B).

The above statements depict the opportunistic behaviour of participants towards changing their choices. Indeed, opportunism and competition often cause people to become more motivated to try and to believe that they could perform just as well. As Tesser (1986) points out, people want to do as well as or better than others to maintain a positive self-evaluation. Additionally, individuals are more opportunistic when they are part of a group than when they are not, because they tend to choose more competitive options (Charness et al., 2007).

The sense of opportunism often led the groups to choose “more myopically for their own direct, short-term earnings and take less account of the future consequences” (Gillet et al., 2009, p. 19). This is consistent with what Flyvbjerg et al. (2009) argue about strategic misrepresentation, that “lack of accountability and the misalignment of time horizons may lead the proposing individual(s) to take more risk” (p. 20) in making their decisions about the future. In this situation, groups often claim that their increased risk taking is necessary to achieve better performance. However, the result of Experiment 1 illustrated that the time estimation performance between the groups under
a competitive situation (where people were supposed to be more opportunistic) and a non-competitive situation exhibited no significant differences (see Section 6.2.2.2).

Asymmetric knowledge and experiences

Previous research has shown that strategic misrepresentation increases when individuals recognise others as having less information than they do (Boles et al., 2000) or having less experience with the task at hand (Murnighan et al., 1999). This issue might lead individuals to engage in a variety of deceitful activities (Steinel and De Dreu, 2004). This is consistent with the results obtained from Experiment 1, which illustrated that strategic misrepresentation tends to occur when the actors have more knowledge about future outcomes. In such situation, the actions of individuals are supposed to be intentional since they have the combination of skill and awareness of their goal (Malle and Knobe, 1997).

Based on observation during Experiment 1, it was noticed that, in most of the groups, the decisions about completion time were mainly made by those who had more knowledge and experience of the LEGO task. For example, when Group 16 was informed about the average time of previous groups, they had the following conversation:

16B: challenge accepted! 30 minutes!
16C: 64 is the average of them!
16A: average! Soooo... we have a bit of experience in LEGO
16B: yeah we are the best group
16C: so what do you say?
16A: 30 minutes?
16B: 30 minutes, bang on!

As can be seen from the above conversation, Participant 16A, who had more experience than the others, was very influential in the decision-making. This difference in level of knowledge and experience of the task caused the other two members to accept what he said without confrontation. Interestingly, after completing the task, they were asked about their initial estimation which they responded as follows:

Me: when I gave you the average time for previous groups, so you had the kind of knowledge about this task. But still you put 20 minutes. So how do you explain this?
16B: too much competitiveness, I can say.
16A: interactively being better than everyone, you know, we were, you agree? ((Pointing at 16C)).
The above conversation shows that both Participants 16A and 16B misrepresented the information. In the negotiation stage, they talked about the experiences and knowledge that they possessed regarding the task, but later they revealed that their estimate was based on their competitiveness and sense of superiority. According to Sniezek (1992), one reason for such behaviour is that group members do not truly share the knowledge and experiences that each individually has during group discussion. For example, Stasser and Titus (1985) distributed pieces of information about job candidates so that some information was given to all group members while other information was distributed only to selected group members. The shared information dominated discussion, with unique pieces frequently being ignored. For Flyvbjerg et al. (2009), this withholding of information is explicitly aimed at strategic misrepresentation (see also Winch, 2001). They point out that this asymmetric information is common in projects because contractors often have superior knowledge and information to the clients. Thus, they downplay the amount of risks involved in the projects to convince the clients and assume strategic advantage over them.

6.4 Merged results from mixed-methods study

As mentioned in Chapter 4, the type of mixed-methods research design selected for this study is the convergent parallel design, where both types of quantitative and qualitative data are equally important for addressing the aim and objectives of research. Creswell and Plano Clark (2011) note that, after analysing the quantitative and qualitative data independently, researchers need to merge the findings through such strategies as comparing and contrasting the results in a table and/or transforming one type of result into the other type of data.

In this research, the titled matrix is used in order to merge the findings of Experiment 1 and the semi-structured interviews with the experiment’s subjects. As can be seen from Figure 6.8, through analysing both quantitative and qualitative data, it was found that in the case of optimism bias, certain issues were considered to have a significant impact on people’s biased estimation of completion time. These errors are mainly caused by unintended actions of people due to:

- Lack of the right background knowledge and experience concerning the expected completion time of the task and future outcomes;
• Not having enough incentives and motivation to produce more efficient work;
• Imagining a “future perfect” and visualising the project as if it were already completed;
• Not considering unexpected surprises, even though they have experienced such surprises previously;
• Being overconfident and more certain about their judgements than is warranted by reality; and
• Being present-oriented by focusing on short-term perspectives.

In contrast, it was found that in strategic misrepresentation, there are other issues leading people to produce biased estimations of completion time (see Figure 6.8). These mistakes in underestimating completion time and overestimating the probability of success are mainly caused by intended actions of people due to the following:

• Having strong incentives to represent outcomes as favourably as possible to obtain more benefits;
• Misrepresenting, concealing, or changing the information when they recognise they have more knowledge and experience that others;
• Lack of accountability for their decisions and bad outcomes;
• Having a tendency to maximise their own interests and secure good personal outcomes;
• Being opportunistic, calculative, and uncooperative in order to seize more opportunities during the course of action; and
• Being future-oriented by considering the image of an ideal future and paying back in the long run.

Based on the literature review (see Chapter 3) and from the discussion articulated in this chapter (see Sections 6.2.3 and 6.3.3), it is argued that the above findings drawn from experimental research can also be extended to real projects. This issue will be discussed more in Chapter 8 of this thesis.
### The influence of planners in producing biased estimate of completion time

![Figure 6.8: Planners' actions and behaviours based on unintended and intended perspectives.](image)

<table>
<thead>
<tr>
<th>Unintended actions</th>
<th>Intended actions</th>
<th>Quantitative data analysis</th>
<th>Qualitative data analysis</th>
<th>Optimism bias</th>
<th>Strategic misrepresentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of background knowledge and information</td>
<td>Having more knowledge and experience than others</td>
<td>Not having incentives for accurate prediction</td>
<td>Lacking accountability</td>
<td>Imagination of future perfect</td>
<td>Pursuing self-interest</td>
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<td></td>
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<td>Less attention to unexpected surprises</td>
<td>Being opportunistic</td>
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<td></td>
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<td></td>
<td>Being overconfident</td>
<td>Being future-oriented</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Being present-oriented</td>
<td></td>
</tr>
</tbody>
</table>

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### Quantitative data analysis

- Lack of background knowledge and information
- Not having incentives for accurate prediction

### Qualitative data analysis

- Imagination of future perfect
- Less attention to unexpected surprises
- Being overconfident
- Being present-oriented
- Lacking accountability
- Pursuing self-interest
- Being opportunistic
- Being future-oriented

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The influence of planners in producing biased estimate of completion time

Figure: 6.8: Planners’ actions and behaviours based on unintended and intended perspectives.
6.5 Conclusion

In this chapter, by using the concept of planning intentionality, the dynamics behind the underestimation of time have been investigated in greater detail to examine the formation of intended or unintended actions of planners. By means of this, the explanations provided for forecasting inaccuracy, optimism bias, and strategic misrepresentation, by Flyvbjerg and his colleagues, have been revisited. The following findings from the contents of this chapter are noteworthy.

As noted, on many occasions, timely delivery of projects is much more important to clients than budget outcomes (e.g. London 2012 Olympic Games). Yet while reviewing the literature on forecasting inaccuracy, it was found that optimism bias and strategic misrepresentation are mainly used to explain how and why ‘cost overruns’ have occurred in construction projects and that schedule delays remain underexplored. In this chapter, however, it was shown that these explanations are also applicable to the problem of time overruns in projects.

The research to date has tended to study optimism bias and strategic misrepresentation separately and not both of them in a single context. The only exception found for this was Flyvbjerg et al.’s (2009) research on megaprojects. Winch and Kreiner (2011) also address this issue and argued that cognitive approaches need to be complemented by consideration of the possibility of purposive managerial action and the motives for action. Notably, in this chapter, the interrelationships between these explanations and how these dynamics play out in planning an activity have been examined in a single context by conducting a pre-test and post-test type of experiment.

Previous research has shown that, where political and organisational pressures are high, the tendency for strategic misrepresentation increases, whereas the opposite holds true for optimism bias (see e.g. Flyvbjerg et al., 2009; Pinto, 2013). In this chapter, however, it was demonstrated that the distinction between optimism bias and strategic misrepresentation goes beyond the influences of organisational and political pressure on the project planners (Flyvbjerg et al., 2009) and lies in the situational contexts in which forecasts are produced. These variables shape the interaction taking place between planners and adjust their behaviour to respond to a certain situation in a particular manner (Fishbach et al., 2003). In this chapter, two of these variables, knowledge and incentives, have been considered and their influences have been investigated.
Reviewing the literature on forecasting inaccuracies and project planning has shown that, although many studies raised the importance of optimism bias and strategic misrepresentation, they did not explain under what conditions planners make their decision optimistically or strategically. This indicates the relative absence of studies on the intentionalities of the planners involved in the planning process, and the main contribution of this chapter lies in addressing this gap. Through analysing the data from a mixed-methods study, it was found that planners unintentionally estimate the completion time of projects optimistically because a) they lack background knowledge at the time of making decisions about future outcomes (see also Kahneman and Tversky, 1979); b) they have not been given any incentives or rewards for their accurate estimation (see also Buehler et al., 1997); c) they think in the future perfect tense as if the future will be like the past (see also Pitsis et al., 2003); d) they do not consider unexpected surprises and things that could go wrong (Byram, 1997); e) due to overconfidence, they do not search for more detailed information (Kerschreiter et al., 2008); and f) they are present-oriented and take more risks by acting impulsively (Zimbardo and Boyd, 1999). In contrast, it was found that planners underestimate the completion times of projects strategically when a) they have strong incentives to increase the likelihood of their project being authorised and funded (see also Flyvbjerg et al., 2009); b) they have more knowledge and experience than others and so can convince them that they are correct (see also Bonaccio and Dalal, 2006); c) they are less accountable for the outcomes of their decisions (see also DePaulo, 1992); d) they want to maximise their own interests or the interests of the contractor with whom they are closely associated (see also Steinel and De Dreu, 2004); e) they act and behave opportunistically in a competitive environment (Winch, 2001); and f) they are future-oriented and tend to focus their attention on paying back in the long run (see also Gavetti et al., 2007).

This chapter in general has provided explanations of intended and unintended outcomes of planners’ actions in order to explain why their estimation of completion times is biased, whether optimistically or strategically. However, similar to much of the literature on project planning, the role of the planner here has been investigated as an individual, rather than as a member of a group. Therefore, to address this shortcoming, the next chapter investigates the role of groups in producing estimations of project completion times in order to better understand how groups can collectively underestimate time.
Chapter 7: Time estimation as a group activity

7.1 Introduction

Groups have important and fundamental roles in society, and membership in a group can modify the behaviour of individuals (Akerlof and Kranton, 2000). However, reviewing the literature on project time and time estimation reveals that the vast majority of studies have examined the process and outcomes of de-contextualised individuals in making time estimates (see e.g. Kruger and Evans, 2004; Thomas et al., 2003) and overlooked the collective outcomes of groups (Buehler et al. 2005). This neglect is surprising, since planning and forecasting project completion times are not tasks performed solely by an individual planner but rather as a collective of those with a stake in the planning (Jacob, 1961; Sanna et al., 2005; Buehler et al., 2005).

Reviewing the literature on group and individual time forecasting revealed that the collective decisions of groups often differ from the decisions of the individuals comprising them (see e.g. Cooper and Kagel, 2005; Cox and Hayne, 2006; Sutter et al., 2009). Put another way, a group might collectively endorse a conclusion with which its member(s) individually disagree. Bazerman et al. (1984), for example, note that if a group makes a decision but the member(s) do not feel “involved” in the group, the group dynamics may change and the quality of the decision may be reduced. Similarly, Kerr and Tindale (2011) found that group discussion exacerbates the tendency towards unrealistic estimations.

Therefore, the overall aim of this chapter is to extend the existing scholarship by focusing on the role of groups in estimating project completion times and examining how group members move from a diverse set of individual preferences to agreement on a consensual estimate for the group (the formation of collective intentionality). In particular, this chapter investigates two methods of aggregating group members’ estimates to generate their forecasts collectively so as to shed light on which of these produces more or less accurate group forecasts and why. These two methods are face-to-face and the statistical aggregation method (which involves no interaction between members).

To perform this investigation, the sequential explanatory mixed-methods design is used. As a first step, an experiment was designed and carried out to compare the accuracy of time estimates produced by face-to-face meetings with those produced through the
statistical aggregation method. Second, the collectivity involved in estimating project completion times at the group level was investigated. Following this experiment were semi-structured interviews with the experimental groups. These interviews were transcribed verbatim using conversation analysis conventions to facilitate their interpretation and a better understanding of group interaction. The aim of interviews was to identify the challenges and difficulties group members experienced in arriving at the single group estimate. Analysing the resulting qualitative data led to some interesting findings which could prove useful to project managers in resolving preference disagreements among the planners’ team members and enhancing the collectivism within their team, thus allowing planners to achieve more reliable and accurate forecasts.

The structure of explanatory mixed-methods design and the research process is outlined below in Figure 7.1.

Figure 7.1: Outline of the research process described in Chapter 7.
7.2 Experiment 2

In recent years, the number of studies exploring the differences between individuals and groups using the experimental approach has increased; interactive games, in particular have been employed in such research (see e.g. Kocher and Sutter, 2005; Cox and Hayne, 2006). For example, in the management science area, Maciejovsky et al. (2013), through two experiments, found that exposure to teams enhances the quality of teamwork and makes members smarter.

The reasons for the popularity of experiments in studying the individual vs. group decision-making are that it allows researchers a) to study group processes in a controlled environment; b) to isolate group-related issues and study their effect on decision making, which cannot easily be controlled in real groups outside the laboratory; c) to increase the level of control over extraneous influences such as any discrepancy or history between group members of a project; d) to analyse the group decision-making process in detail; and e) to avoid the major methodological problems of field studies (Gillet et al., 2009; Van Dijk et al., 2012). Although experiments produce results related to social issues within teams that can be inferred to reality, some aspects of experiments (i.e. rationality, beliefs, expectations, and preferences) are often hard to disentangle (Balafoutas et al., 2014), and, therefore, care should be taken not to over-interpret the results of experimental studies. Thus, in the present study, qualitative data is collected and awarded the same care and attention as quantitative data.

The aim of Experiment 2 was to investigate how a group of individuals aggregate their views in order to reach a consensual ‘group’ decision. Since the present study concerns project time and the process through which time-related estimates are produced, Experiment 2 focused on forecasts of completion times made by a group of individuals. In particular, Experiment 2 was designed to answer the following questions emerging from the literature review described in Chapter 3 of this study:

- Does mechanical aggregation of individual opinions increase accuracy of group forecasts?
- Does participation in face-to-face meetings help a team reduce bias in time estimation?
- To what extent does each individual take part in generating the ‘collective’ project estimations made by teams?
7.2.1 Identifying the issue of interest

Much research on forecasting inaccuracies has hitherto focused on the role individuals play in generating predictions of project completion times (see e.g. Kruger and Evans, 2004; Peetz et al., 2010). However, it remains unclear how a ‘group’ of planners err in their estimates ‘collectively’, since their decisions have consequences for others in a social-interactive context. Widespread evidence suggests that groups act and behave differently than individuals in many circumstances (Cooper and Kagel, 2005; Sutter et al., 2009). Kugler et al. (2012), for instance, note that “groups differ from individuals not only in the information they accumulated and processed, but also in their aggregated preferences” (p. 477).

As a matter of fact, a fundamental part of the task of planners’ groups is to estimate unknown quantities. Therefore, they must participate in a collaborative effort to form a group judgement so as to arrive at a consensus about such project outcomes as completion time or amount of available resources under uncertainty (Credé and Sniezek, 2003). Of course, the challenge in this type of consensus seeking lies in aggregating individuals’ preferences into a joint team decision. Amplifying this difficulty is the unitary structure of planners’ teams, which have no hierarchical structure and view all team members as equal ex ante (Balafoutas et al., 2014). The planning process is a highly divergent one, and planners often come up with a large number of different options from among which one should be selected for discussion and adoption.

Conventionally, planners and organisational teams of other types employ face-to-face group meetings to aggregate the judgements of individual members to produce an estimate concerning project deliverables. However, as discussed in Chapter 3, the effectiveness of these meetings as a method of eliciting project time estimates has been questioned recently (see e.g. Graefe and Armstrong, 2011), and the problems and challenges with which planners have to deal in making joint decisions through face-to-face meetings are highlighted (see e.g. Kerr and Tindale, 2011). Examples of such problems and challenges include the following: Some planners may express more greed and less altruism towards others; more dominant planners may exert their influence on the less confident ones; discrepancies or history between planners may exist; and so on and so forth (Kugler et al., 2012; Van Dijk et al., 2012). As opposed to face-to-face meetings, Kerr and Tindale (2011), for example, suggested that such methods as statistical aggregation, which involves no interaction among group members, could
generate more accurate forecasts than group meetings. Therefore, the first hypothesis of Experiment 2 is as follows:

**H1-1:** *Group discussion in face-to-face meetings results in a more inaccurate time estimation than using the statistical aggregation method.*

One other reason that the above hypothesis is proposed is that in many group meetings, there might be situations where group members privately disagree with the outcome of group decision-making and do not feel responsible for those decisions. This, in fact, reduces the collectivity of the decisions made by groups, and, thus, a decision resulting from this process cannot be termed a ‘collective choice’ (Sugden, 2000). A non-summative approach to collective intentionality is one in which each member’s individual action-intention would not necessarily lead towards the collective purpose (intentionality) of the group (Tollefsen, 2004). As individuals interact within a team, their intentions, goals, preferences, expectations, and interests are not always complementary and may, in fact, be in conflict; i.e. “one man’s goals may be another man’s constraints” (Felin and Foss 2009, p. 165). Therefore, the second hypothesis is the following:

**H1-2:** *The collectivity involved in time estimation at the group level is low due to divergent preferences of individuals.*

### 7.2.2 Conducting Experiment 2

Experiment 2’s goal, similar to Experiment 1’s, was to estimate the time to finish building a two-storey house using LEGO bricks (see Figure 6.2). The participants were given the project brief, design, and a 3D image of the completed house (see Appendix F) prior to them making their time predictions. After they had made their predictions, they were asked to build the LEGO house and the time they took to complete this task was recorded by the researcher.

Experiment 2 was carried out over six weeks in February and March 2013. To perform this experiment, 93 university students aged 19 to 25 were recruited to participate on a voluntary basis. They were assigned to 31 groups of three persons each. Out of 93 students, 72 of them were undergraduate and postgraduate students doing business-related studies at Leeds Metropolitan University, and 21 were postgraduate students doing project management at the University of Manchester. All participants were fluent in English and experienced no communication problems with their teammates.
The participants’ selection method was based on true experimental design (Creswell, 2009), explained in Section 4.7.7. In order to carry out the randomisation, the participants were asked to select a schedule using Doodle poll (available at http://www.doodle.com). Thirty-one available schedules were defined on the poll so that participants could choose the one that was most appropriate for them. The participants’ names were anonymised on this website so that classmates or friends could not know details relating to attendance.

After the participants had completed the Doodle poll, an email was sent to each participant expressing the appreciation for their willingness to participate as well as reminding them of the experiment’s date. Furthermore, the informed consent form was attached to the email (see Appendix G). The participants were requested to read the form and, if willing to participate, sign it either electronically or after printing it out to be brought on the day of the experiment. This form contained an option to choose whether the participant was willing to be video-recorded during the experiment. Only 8 of the 31 groups consented to being video-recorded, and the rest agreed to be audio-recorded. The purpose of the video recording will be discussed later in this chapter.

7.2.3 Experimental procedure

On the day of the experiment, each group of three appeared at their selected sessions. Out of 93 participants, three did not turn up on the day. Therefore, three of the 31 groups only had two members rather than three. Each day, two to three sessions were set up, each took between one and two hours. The sessions were held in quiet classrooms or conference rooms with a maximum booking of three hours allowed. All participants were informed that sound recording was to take place in the room. For those eight groups who agreed to be video-recorded, the reasons behind doing so were explained and they were assured that their recordings would not be shared with anyone else.

Next, the informed consent forms were collected from the participants, and those who forgot to bring their forms were given a copy to complete before the start. Later, participants were asked to complete an individual pre-task questionnaire (see Appendix I) and provide such details as names, addresses, fields of study, ages, and email addresses. After participants had completed the questionnaire, they were requested to remove their watches and they were also instructed not to use any other form of time-monitoring device during the experiment. They were informed that the reason for this
was that the experiment concerned time estimation, so monitoring of time could clearly affect the results.

Furthermore, before starting the experiment, it was explained to the research participants that, in this task, they were required to imagine that they were real project planners who should predict completion time as accurately as possible for a given task. They were also informed that, in order to make their estimates, they would be provided with the project brief, design, and a 3D image of the completed LEGO house. Although they were asked to play the role of planner, they were given no guidance as to what that role involved, apart from making an accurate time estimation.

The participants then were told what the current time is and were asked to write it on their forms. After that, participants were asked to estimate the time to carry out the task for two different cases: a) if they were to do the task individually and b) if they were to do the task in their group of three persons. They were given five minutes to consider their estimates, after which they should write those for both cases on the provided questionnaire. They were also reminded that they were not allowed to talk and negotiate with other group members during these five minutes.

When they had given their individual estimates, they were informed that they now had five minutes to negotiate with their group mates to arrive at a single group estimate through consensus. They were also told that the group decision was not valid unless all group members had agreed. It should be noted that all the conversations they had in making their group decision were recorded. After five minutes, they were asked to enter the group estimate that they reached through consensus on their forms. The forms were then collected from participants, and they were instructed to begin building the LEGO house. After they had done the task, their achieved time was recorded. They were interviewed at the end of session, and were appreciated for their participation.

### 7.2.4 Data analysis and findings

In the following discussion of Experiment 2, ‘individual stage’ refers to the experimental stage where each individual generated predictions without negotiating with other group members and ‘consensus stage’ to that where the group arrived at a single estimation through negotiation and agreement.

At the individual stage, each individual produced two estimates: the time taken to do the task individually (IndInd) and the time taken do the task as a group (IndGroup). These
estimates and the actual completion time for each group were converted into minutes (see Appendix J), and the means and standard deviations were calculated for both IndInd and IndGroup situations for all 90 participants. As can be seen in these data results, presented in Table 7.1, the average estimated time to complete the task for IndInd was 37.9 minutes, while the average estimated time to complete the task for IndGroup was 27 minutes. This means that the participants expected that working as a team would improve their performance to achieve a better completion time by 33.5% over doing the task individually. This reflects the good intentions of individuals towards teamwork and partnership in practice (see also Hayes, 2002).

Comparing the mean actual times for all 31 groups ($M = 58.1$ minutes) with the two mean forecasts made by individuals show that the time participants estimated to carry out the task individually was more realistic than the time they had estimated in the group. Individuals’ over-reliance on the efficiency of teamwork or undervaluing their own abilities could account for these results (see e.g. Delarue et al., 2008).

<table>
<thead>
<tr>
<th>Table 7.1: Comparison of individual and group completion times and corresponding individual estimates.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated time (IndInd) (min)</td>
</tr>
<tr>
<td>$M$</td>
</tr>
<tr>
<td>$SD$</td>
</tr>
</tbody>
</table>

The next step is to test the first hypothesis (H1-1), that group discussion produces less accurate estimates of project time than the statistical aggregation method. After initially listing the estimates that the groups arrived at through negotiation and agreement (GroupGroup), the statistical aggregation method was employed. This method is based on the arithmetic mean of quantitative forecasts of individuals having no interaction with other individuals and is computed by finding the mean for each group by summing up the IndGroup values and then dividing each of these sums by the number of participants in that group (GroupSTA). For example, if in a group the IndGroup of members are 20, 50, and 38 minutes (a total of 108 minutes), then their GroupSTA is 36 minutes (108 minutes divided by 3). Afterwards, the estimates generated by the statistical aggregation method (GroupSTA) were compared with the estimates produced through consensus (GroupGroup).

Based on the calculations, the average of the arithmetic means for all 31 groups was 27 minutes, whereas the mean estimate at the consensus stage was 23.4 minutes (see Table
7.2). Thus, the statistical aggregation produced more reliable forecasts. Furthermore, a paired-sample $t$-test was carried out to determine whether the differences between estimates produced by GroupSTA and GroupGroup were significant. The $t$-test confirmed a significant difference between the two groups ($p = 0.01 < 0.05$), meaning that groups made better estimates when they had no interaction between members. Thus, the first hypothesis that group discussion in face-to-face meetings results in time estimates that are less accurate than those produced by the statistical aggregation method.

Table 7.2: Compared accuracy of estimation through the statistical aggregation method and group discussion.

<table>
<thead>
<tr>
<th></th>
<th>Estimated time for GroupSTA (min)</th>
<th>Estimated time for GroupGroup (min)</th>
<th>Actual time to perform the task in a group (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M$</td>
<td>27</td>
<td>23.4</td>
<td>58.1</td>
</tr>
<tr>
<td>$SD$</td>
<td>11</td>
<td>11.4</td>
<td>12.3</td>
</tr>
</tbody>
</table>

A scatter diagram better displays the differences between these two methods of eliciting forecasts. As can be seen from Figure 7.2, out of 31 groups, in 19 groups statistical aggregation resulted in more reliable forecasts; in 3 groups, it produced the same result as the face-to-face meeting; and in 9 groups it led to poorer estimates than group meetings.

![Figure 7.2: Difference between estimates generated through statistical aggregation method and face-to-face meeting.](image-url)
As mentioned in Chapter 3, different aggregation methods employed in group forecasting may result in different degrees of accuracy, depending on such factors as the nature of the forecasting task, size of the group, distribution of group members’ preferences, and number of decision alternatives. These factors may account for the conflicting and inconclusive results produced by previous studies. For example, Hinsz et al. (2008) showed that group discussion caused groups to forecast less accurately than their average group member (see also Graefe and Armstrong, 2011), whereas Cooper and Sutter (2011) found that discussion within groups made group decisions better than individual decisions (see also Casari et al., 2011).

The present study revealed, in general, that using the statistical aggregation method to aggregate group member time estimates resulted in slightly more accurate forecasts than those resulting from face-to-face meetings. Thus, it lends support to a growing body of studies which problematises the effectiveness of face-to-face meetings as a method to elicit project forecasts (see e.g. Graefe and Armstrong, 2011) and argues that group discussions attenuate forecasting accuracy (Buehler et al., 2005). This conclusion may seem odd, since in face-to-face meetings members can share distinctive knowledge, skills, and abilities as well as point out each other’s errors (Laughlin, 1999). Therefore, understanding the reasons for these findings (i.e. group discussion and face-to-face meetings appears to decrease accuracy where no interaction appears to improve it) is important, and these reasons are discussed in more detail later in this chapter.

The next step was to test the second hypothesis (H1-2), that the collectivity involved in time estimation at the group level is low due to divergent preferences of individuals. To evaluate this hypothesis, individual estimation bias (IEB) was calculated, which measures the difference between each individual’s estimate (IndGroup) and his/her group’s agreed estimated time at the consensus stage (GroupGroup) and which allows us to understand the degree of divergence in each participant’s initial estimate, provided at the individual stage in their respective group’s estimates. If, for example, the IEB of one person were zero minutes, then the estimated time of the group at the consensus stage would equal his/her estimate. By contrast, if it were 100 minutes, there would be a 100-minute difference between his/her estimate and that agreed upon by the group. Calculating each individual’s IEB resulted in 90 IEBs (one for each participant) (see Appendix K).
The scatter diagram showing the distribution of IEBs for each participant in each group (see Figure 7.3) reveals that 24 out of 31 groups have at least one member with an IEB of 0. This could mean, for example, that one member in 77.5% of those participating in Experiment 2 had attempted to convince the other members of his/her group that his/her estimate would be the most accurate one. This assertive member would be better at promoting his/her preferences even when other team members have divergent individual preferences. This would confirm the second hypothesis, that the collectivity involved in a group time estimation is low when preferences of individuals are highly divergent. This could be due to such reasons as power-standing within the networked interactions with other members, confidence and certainty, individual team member’s attitudes and personality, self-interest, and so on (Kerr and Tindale, 2011). However, in Experiment 2, even though there were no incentives or a structure of hierarchical authority involved in the process to influence group members to diverge from their actual beliefs for strategic reasons or interest maximisation, the finding shows that group members preferred their personal interests over the collective interests of the group, thus supporting the non-summative approach of collective intentionality, i.e. there may be several group-members that do not have the corresponding we-intentions (Tuomela, 2005). In order to better understand the reasons for the low collectivity involved in the joint decisions made by the group, the qualitative data obtained from interviews with all 31 experimental groups were analysed. The findings are discussed in the next section.
7.3 Interview

After completing Experiment 2, each group was interviewed separately. The interviews were semi-structured and qualitative in nature, allowing to identify the experience of participants and the meaning they made of that experience (Seidman, 1991) and to understand the reasons for their behaviour and preferences (Saunders et al., 2009). Before beginning the interviews, the purpose of the interview was explained to all groups and they were informed that the session would be tape recorded and that all quotations used for publication would be anonymised to protect their identities. The interviews lasted from 9 to 25 minutes, the average being 17 minutes. The reason for the brevity of the interviews was the participants’ frustration with respect to the experiment. Also, it was not possible to arrange a time to do the interviews at a later stage.

7.3.1 Interview procedure

This section provides an overview of the data coding process and demonstrates the development of categories and patterns.

The framework of the interview procedure was similar to that described in Chapter 6 on the pilot study (see Figure 5.3). Initially, interviewees were asked some opening
questions about their courses and student life to set them at ease and start them talking and participating in the discussion. In the next step, some general questions were asked about the role of time in their personal lives and about the way they plan their activities and allocate time to those activities (see Table 6.3). Next, the interviewees were asked some specific questions about the experiment and the process participants went through to estimate the time (see Table 7.3). However, since the interviews were semi-structured in nature, the sequence of the questions varied and new questions evolved during the interviews (Bryman, 2012). Furthermore, the researcher made sure that each participant is addressed equally and, therefore, allowed the less confident ones to express their opinions and be involved. In addition, the researcher tried to stimulate discussions among participants and encouraged them to talk to each other at some point. For example, they were asked, “Do you think X encouraged you more to change your estimate?” This question often prompted a heated discussion among participants for a few minutes. Later, each semi-structured group interview was transcribed fully, using conversation analysis transcription conventions (Jefferson, 2004), for reasons discussed in the following section. Finally, the transcripts were checked twice in order to minimise typing errors. All transcripts and the details of each group were dated and assigned a unique identifying number so as to facilitate their systematic filing.

Table 7.3: Detailed interview questions concerning Experiment 2.

<table>
<thead>
<tr>
<th>Question</th>
<th>Aim of question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  How did you make your initial estimation for your group?</td>
<td>This question is designed to understand how individuals make a decision for the group. Are their estimates for their group more accurate than those they made within their group?</td>
</tr>
<tr>
<td>2  How did you make your estimation within your group?</td>
<td>This question aims to gain an understanding of the process of decision making through group discussion. This helps to uncover the challenges and difficulties participants went through during their discussion.</td>
</tr>
<tr>
<td>3  How do group discussions affect your decision to change/stick to your estimation? Why?</td>
<td>This question attempts to find out how and why people change their minds and what the structure of power relations within the group is. It also reveals whether the joint decision was based on consensus or on persuasion.</td>
</tr>
</tbody>
</table>

Source: Field work

7.3.2 Data analysis and findings

The process of data analysis is the same as that discussed in Chapter 6 (see Section 6.3.2) and is based on the general steps defined by Creswell (2009) and Miles and Huberman (1994) (see Figure 6.6). This section explains these steps so as to outline the data analysis plan and presents findings.
7.3.2.1 Organising and preparing the data

Data preparation started during data collection and involved writing memos about the nature of the interactions that occurred during group discussion and noting any issues arising within the interviews. This was carried out through observation and the notes taken during interview sessions. These notes contain information regarding interactions among group members and the level of their participation in making joint decisions concerning task completion time. NVivo software was later used to record these notes and observations as memos for each group. The remainder of the interview data were mainly generated through audio and video recording of groups.

Both video and audio transcripts follow Conversation Analysis (CA) conventions (see Jefferson’s transcription system 1978; 2004). In fact, transcribing 31 group interviews based on the CA transcription system using the above signs and symbols was a very challenging and time-consuming task which took around three months to complete. However, the researcher found this choice appealing because it not only provided a deeper and richer understanding of the interactions between individuals and meaning-making, but also it led to find better answers for questions such as ‘what is behind the participants’ decisions regarding to completion time?’; ‘how did they estimate the time as a group?’; ‘how did they identify what something means to them?’; and, in particular, ‘what is going on here?’ (Goffman, 1974).

Furthermore, to increase the legitimacy of the observational interpretations, video recordings were taken of eight of the 31 groups of participants. In fact, these eight groups were the only ones who consented to being video-recorded, while the rest were audio-recorded. The purpose of video-recording was to investigate decontextualised sequencing of minute behaviours and to capture participants’ facial expressions and conversations. Video recording in qualitative research is typically used for systematic collection and examination of change in behaviours and interactions as they occur in a social setting (Marshall and Rossman, 1995). In addition, as Paterson et al. (2003) noted, it is often assumed that data elicited from video recordings carry more credibility and precision than data that is simply observed by a human researcher. ELAN video analysis software was used to specify fragments and add transcripts in video files (see Figure 7.4) and NVivo 9 was used to transcribe the audio files.
7.3.2.2 Reading through data

After transcribing all group interviews in NVivo and ELAN, they were all dated and each was assigned a unique identification number (based on their group number) in order to file them systematically. Next, all transcripts were double checked with their audio/video recording files in order to minimise any possible errors and obtain a better sense of the data. Here once again video recording was employed, as it allowed re-experiencing the group interviews. During revision, annotation and memo tools of NVivo and ELAN were used in order to highlight important sentences, create initial jottings, and document the observations, and the patterns observed during the experimental sessions. Emerson et al. (1995) suggest that researchers re-examine and experience all their data while simultaneously trying to pick out key themes, similarities, and nuances within their transcripts. Accordingly, during reading through the transcripts, the researcher’s own reflections, impressions of the content, and thoughts about the topic were noted in a separate sheet.

In addition, in order to achieve better reflexivity in the analysis, the researcher engaged in periodic conversations with his supervisors and also colleagues with whom he discussed his original analyses thus enabling them to gain an understanding of his analyses. This process allowed the researcher to return to the data to re-examine the analyses if they thought this warranted (see e.g. Glesne, 2006).
7.3.2.3 Data coding

Unlike what it was described in Chapter 6, only inductive coding is employed in this chapter allowing the codes to emerge from the transcripts during analysis according to the coding schemes of Strauss (1987) and Miles and Huberman (1994). Therefore, the researcher’s own expectations and judgements were set aside to inductively analyse the data in order to gain insights about key recurring themes with an open mind. Thereby, the observation notes, memos, and interview transcriptions were read several times and the researcher immersed himself in the data. At this stage, the researcher paid heed to the language used in the data, made use of straightforward labels, and tried to hold off making any interpretations at this point, regardless of the number of similarities arising. Additionally, as suggested by Tesch (1990), while reading through the transcripts, a variety of questions was repeatedly asked to discover “what is going on here?” Some of these questions were as follows:

- Who is the more/less dominant person in the group?
- Why has an individual changed/held on to his/her mind?
- What are the sources of agreements/disagreements?
- Was the group decision made individually or collectively?
- How was the contribution of each individual towards the joint decision of the group?

The above questions allowed the researcher to attribute initial codes that reflected or conveyed the essence of this study using NVivo 9 software. Through this, thirty-eight codes were identified and included in the observation notes and interview transcripts. In addition, NVivo’s various functions were used to test the codes and further refine and manage them, thus enabling me to carry out the secondary coding so as to eliminate redundant codes (Miles and Huberman, 1994) or rearrange them to higher-order codes describing broader themes in the data. After numerous coding iterations, all appropriate codes were identified and finalised in order to be developed further. As a result, the total number of codes was reduced to 26 (see Figure 7.5).
7.3.2.4 Developing categories

After the codes had been attributed, insights regarding key categories gained a greater level of clarity and structure and seemed to explain the challenges and difficulties individuals experienced to reach collective outcomes; and why group discussion to reach consensus, which should improve the quality of decisions, led instead to more inaccurate estimates. These categories are shown below in Table 7.5 and are explained separately in the findings section.

Table 7.4: Integrating codes into categories.

<table>
<thead>
<tr>
<th>Codes</th>
<th>Categories</th>
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<tbody>
<tr>
<td>Sense of superiority</td>
<td>Power relations</td>
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<tr>
<td>Self-focused</td>
<td></td>
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<tr>
<td>Less dominant</td>
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<tr>
<td>Assertive</td>
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<tr>
<td>Motivation</td>
<td>Commitment</td>
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<tr>
<td>Sense of attachment</td>
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<tr>
<td>Willingness to cooperate</td>
<td>Confidence level</td>
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<td>Being realistic</td>
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<td>Underconfidence</td>
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<td>Overconfidence</td>
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<td>Having more skills</td>
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<td>Having more knowledge</td>
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<td>Individual’s preferences</td>
<td>Cultural diversity</td>
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<td>Collaborative tendency</td>
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<td>Team’s preferences</td>
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7.3.3 Interpretation of findings

In this section, all six categories mentioned above are discussed by way of coding, observation notes, and memos in order to provide insight into this process and to illustrate how the researcher has arrived at that point starting from the interview transcripts. Each sub-section, therefore, contains transcription excerpts to illustrate the observations and further analysis drawn from attempts in the relevant literature to explain participant behaviours.

7.3.3.1 Power relations

In any group activity, some individuals most likely perceive themselves as being superior to others in terms of being more capable than these others; they assume that other group members are less able and trustworthy. This sense of superiority can be due to their having more skills or experience (Mead, 1934) or to personality traits (Kipnis, 1976), race, gender, socioeconomic class, and so on (Lincoln et al., 2011). As a result, those who have this subjective sense of “power” may feel that they can exert influence over the outcomes and experiences of others (Van Kleef et al., 2008). The term “power” here refers to the relative degree of control one person can exert over the outcomes, experiences, and behaviours of others (Keltner, et al., 2003).

Recent research indicates that, when people experience power, they are more likely to act independently of others (Galinsky et al., 2008) and less likely to be influenced by others’ opinions and viewpoints (Brinol et al., 2007), which can negatively affect the accuracy of their judgements (Weick and Guinote, 2010). This is in fact what was observed in some of the experimental groups. For example, Group 15 had the following conversation at the negotiation stage:
As can be seen from the above conversation, Participant 15B was dominant and influential in making the group decision concerning task completion time (see lines 3, 5, 8, and 23). Even Participant 15A tried to change his mind twice; initially, in line 10, Participant 15A asked Participant 15C about her estimate to show that they both think that the task takes longer. Then, in lines 16 and 17, Participant 15A talked about the difficulty of the task to make Participant 15B aware of the problems ahead and cause him to change his mind. However, these attempts were futile since 15B had confidence in his own ability and insisted on sticking to his initial estimate.

This type of behaviour could be explained by the “situated focus theory of power” (Guinote, 2007), which implies that powerful people direct more attention to themselves and their personal preferences. Similarly, Pitesa and Thau (2013) argue that power makes people more self-focused and less dependent on others for their contributions. In fact, the above conversation among members of Group 15 shows that Participant 15B holds this self-focused approach; when he noticed that the other two members were threatening his knowledge or ability, he expressed his feeling of aggression towards
them by saying “I say 7 minutes” (line 23). This reaction fostered feelings of competitiveness among the group members. As a result, the other two members (15A and 15C) resisted when they found that 15B was exhibiting an individualistic approach and undermining their abilities. Eventually, in lines 25 and 26, both Participants 15A and 15C succeed in making him adopt a “slight” change in his prediction. However, he accepted this change reluctantly, showing that power holders do not hand over their power easily (Tost et al., 2012).

As Tost et al. (2012) point out, the experience of power may not only cause individuals to be less open to advice from others but can also lead them to discount advice even from individuals having high levels of expertise. This was in fact the case with Participant 15B, who intended to establish his superiority over others by justifying his position. For him, the group discussion to obtain a consensus was more like a competition to show “who is right”. As a result, he undervalued the advice from the other two members and overvalued his own point of view (see e.g. Bonaccio and Dalal, 2006).

Previous research has shown that this sense of competition within a group can enhance optimism biases in decisions (Ku et al., 2005) due to greater feelings of confidence. Indeed, the findings from Group 15 confirm this; the group estimated 10 minutes to complete the task but actually finished in 45 minutes. To understand the reasons for this, Participant 15B was asked about his inaccurate estimate, and he stated that:

1 15B: =I was saying that, and I thought, (.) >>>when I am saying that I
2    thought<, they are big pieces, rather than loads of these (tiny) ones (.)
3  Me: yeah ((go on))
4 15B: and then ↑look at the blueprints, (.I thought they look as they are in
5    the blueprints.
6  Me: =em but I think 15A said something initially about the size of the
7    [pieces]
8 15B: [yeah] but we hadn’t any previous experience with that (3). It was
9    difficult.

Initially, he attributed their incorrect estimation to technical problems and task difficulty (lines 1-2 and 4-5). When he was reminded that they discussed this issue during the negotiation stage (line 6), he identified still another reason, lack of experience (line 8). The interesting point is that while 15B used “I” many times during the negotiation stage, he used “we” when discussing the failure. In fact, he created this “we-ness” to attribute insufficient competence and lack of skills and expertise to the group. However, as Kent (2006, p. 54) argues, “it is difficult for people to feel we-ness when they are
separated from others” by various forms of personality and interpersonal interaction; this sense would be felt amongst group members when they have the sense that “we are all in this together, we need each other, we have to work together to succeed”. The following conversation occurred after task completion and demonstrates that Participant 15A is exhibiting this “we-ness” approach.

Me: ok:: Was he more dominant in decision making in your group? Because he said (.) 5 minutes and you were like 20. And then you changed your mind ((pointing at 15A)), I think he influenced you [and]
15A: =[yeah] that’s why he said emm you know he said he would do this in 5,6 minutes. ↑ He might be doing it well. [But]
15B: =.tk [I] thought I didn’t think when you build in walls they could be bigger pieces like (1)
Me: [are you always]
15B: [didn’t] get the rules and £stuff£
15A: hehheh
Me: but, what about other group tasks? For example when your lecturer gives you an assignment?
15B: yeah:: ((he means go on))
Me: then, are you again the same, the dominant person in the group?
15B: =wee, where [actually the group]
15A: [he is] £doing well basically£ he is quite good.
15B: =yeah, I am fine (.)

The above conversation shows that Participant 15B is not only assertive but also defensive. For example, in line 5, when Participant 15A mentioned 15B’s low estimated time, he interrupted him and did not allow him to explain what he thought. He also did the same with the researcher when he asked him about his dominancy in other group activities (line 9). However, it was observed that he was less confident when he realised that his time estimation was very far from reality and his voice was even shaky. This shows power is relative; it can change when aspects of the social situation change (Bacharach and Lawler, 1980).

In addition, Participant 15B, despite being confident about his time estimate during the negotiation stage, confessed that he did not understand the rules and regulations at the beginning (see line 9 in above conversation). This lends support to previous research that “powerful individuals are less likely to consider multiple alternatives in their future plans, and therefore are less prone to recognise potential setbacks and interfering events” (Weick and Guinote, 2010, p. 596). This issue was not only the case with Group 15; other groups had participants who apparently thought they were better than others, and this led to more optimistic estimates of task completion time. For example, when
Participant 28A was asked, “Why did you change your mind from 25 minutes to what Participant 28B said?”, he noted:

28A: (. ) well he started very low. <he was 5>. Mine was not really there. He said he knew it very well. [so]
28B: [You £trusted] me£.
28A: no::
28B: =of course coz £I am so smart you know£.
Me: hehheh

The above conversation demonstrates that Participant 28B saw himself as a step above the others. In fact, this behaviour may create intolerable conditions for less powerful people and make them less likely to cooperate or to share information with each other. Another issue is that those who feel dominant or superior want to show their level of expertise and skills to other group members in order to convince them that they are “right” (Bazerman and Moore, 2012). This is, in fact, what Participant 28B did in Group 28. As a result, the group trusted him because they thought he was an expert; and the decision of an expert is likely to be in higher demand than the decision of a novice (Tost et al., 2012). Therefore, they decided on 15 minutes for their estimate, but they actually finished the task in 45 minutes.

Another interesting point discovered through observation was that powerful individuals often tend to allocate attention more selectively to individuals who share similar opinions in order to support their points of view. For example, Participant 19A displays this approach in the following conversation at the negotiation stage:

1 Me: =And tell me how long does it take for your group to make this LEGO.
2 19A: (1) ↓5-10 minutes. What do you think? ((Pointing at 19B))
3 19B: I am rubbish at LEGO. >so it would [take me a lot]<
4 19A: [what do you think]? ((Asking from 19C))
5 19C: =about 15 minutes.
6 19B: =:[haha]
7 19A: [I said so, 5,10?((Asking from 19C))
8 19C: =so as long as used to confident (.) you can say that.
9 19A: (2) 10 minutes [then?]
10 19A: yeah::

As can be seen from the conversation above, initially Participant 19A proposed his time estimate (line 2) and then turned to Participant 19B and asked her estimate. Interestingly, when he realised that her estimate might be different from his (line 3), he interrupted her and asked Participant 19C (line 4). After realising that 19C had an idea similar to his, he again asked her to choose between 5 minutes and 10 minutes (line 7).
Here, they both ignored Participant 19B and did not even ask her for her estimate. However, after the experiment, the questionnaire forms were checked and it was discovered that her estimate was more realistic than those of the other two; her estimated time was 40 minutes (20 minutes below their group’s actual time) (60 minutes). The above conversation gives credence to previous research showing that powerful individuals are more strategic in their interactions, giving more attention to those individuals they see as fundamental to the achievement of their goals while ignoring those they think of as less useful (see e.g. Gruenfeld et al., 2008).

It should be noted that in many real situations, especially when money and/or possessions are involved, however, people might not react like Participant 19B above and instead might tend to be confrontational. They do not allow other powerful people to force them to do as they are told. For example, in Group 16 when Participant 16A was asked, “Why didn’t you agree with her initially?”, she noted:

16A: .tk you would respect others opinion, but you give your own view too (1).
Me: =yeah, that’s correct. But how much you are going to put your own view?
16A: >it wouldn’t be that much< but, you wouldn’t like all the POWER could be everyone else’s power, and also ↑you wouldn’t like they might try to have the final word.

The above statement reveals that Participant 16A did not like to give away all her power to one person and obey. In fact, she confronted the superior person since she apparently perceived her status, power, or influence being threatened. This line of reasoning is consistent with research indicating that, under certain circumstances, power increases competitive behaviour during the negotiation stage (Magee et al., 2007).

Unlike previous research, which concentrated on the positive effect of power and emphasises its beneficial effects (see e.g. Keltner et al., 2003; Brinol et al., 2007), in the present study it was found that the tendency to seize power can be detrimental; it not only reduces the group-level cohesion construct to an individual-level construct (Casey-Campbell and Martens, 2009) but may also lead to greater errors in time estimates (see e.g. Weick and Guinote, 2010; Tost et al., 2012). Therefore, to prevent and control subjective feelings of power, project managers and leaders are advised a) to learn to avoid (or manage) the tendency to seize power within their team effectively and appropriately; b) to decentralise decision-making and give everyone an equal chance to be impactful across teams; c) to allow less powerful people to cooperate in decision-making and reassure them as to their value to the team so that their interactions with
experts are less daunting; and d) to create a culture in which group members are encouraged to share information (Tjosvold, 1997; Tost et al., 2012).

### 7.3.3.2 Commitment

Much research has been published on the importance of “commitment” within organisational studies. It has all confirmed the existence of multiple constituencies of commitments and investigated them with respect to multiple foci such as organisation, team, management, union, (see e.g. Porter et al., 1974; Becker, 1992; Bishop et al., 2000). However, in the present study, the focus was only on team commitment, which is the commitment that one has for his/her teammates, rather than the commitment to one’s organisation or employer. In this sense, team commitment is the psychological attachment that members feel towards the team and teamwork (Pearce and Herik, 2004). It will also reflect the degree to which the individual tends to be involved and participate in a group activity and the decision-making process (O'Reilly and Chatman, 1986).

Empirical evidence suggests that the success of a team is highly dependent on individual level of commitment to his or her team (Mathieu and Zajac, 1990; Bishop et al., 2000). Bishop et al. (2000), for example, based on data collected from 380 manufacturing plant employees, found that team commitment could positively enhance performance. This positive relationship was also observed among some of the experimental groups of this research. For example, members of Group 17, which exhibited the best performance among the 31 groups in terms of finishing the task on time, completed the task in 37 minutes, while the average time for the other groups was 58.1 minutes. When this group’s members were asked about their teamwork, they responded as follows:

17B: =I think: having a team that is adaptable and committed and focused is very important, as well (. ) So you need to adapt your plan, you need people, who would put in 100% of their work in the thing.  

Me: (2). Ok: do you think you had this in your [group?] ((asking from 17C))

17C: =yeah: everyone had a kind of accountability to what they commit to. Yeah, I think that surly we had it. It £was a good team building exercises£.

The above responses demonstrate the role of team commitment and how it influences individuals to develop their goals and values within the team. It also shows that the members of this team perceived the value of teamwork and cared about each other. Bishop et al. (2000) call this type of teamwork *perceived team support* (PTS), which refers both to how much support team members feel they are given by their team and
also how committed the team members are to their team. In fact, PTS relates to self-directed work team environments whereby the team members need to have a sense of responsibility in making their decisions based on operational problems and uncertainties (Campion et al., 1993). In order to operate efficiently under such circumstances, interactions between team members must be both positive and supportive (Hackman, 1986). The following statement from Participant 23B shows how he perceived the support and sense of responsibility within his team:

Me: what do you think was important in this task (. ) 23B?
23B: (1) emm I guess multitasking and planning skills are massively important and being able to kind of enforcing the task progressing and making sure your teammates are doing what they are meant to be doing and the kind of also pretty good communication skills at kind of, (.) you know, just keep on top of things and just to <encourage rest of the team to communicate>. I kind of see those as pretty key things.

Participant 23B was clearly very concerned about the other members of his team as shown by the statements “making sure your teammates are doing what they are meant to be doing” or “just to encourage rest of the team to communicate”. In fact, Participant 23B has a high level of commitment based on Bishop and Scott’s (1997, p. 108) classification; because he not only had a “willingness to help team members” but also tried to “improve team performance” by encouraging team members. Another example of high-level commitment was demonstrated by Participant 22A, who noted:

Me: =what was the challenge for you in your [teamwork]?
22A: = [we participated] as a team, you know. It could be different people and different mind and different, you know, (.) you get together exchange your IDEAS. (1) Therefore, you should set the relationship between the people effectively, because while you are doing a group work, you have <to deal with different people with different tasks and all of them have different opinions> and should finish their tasks in an appropriate time,(.) if you cannot deal with these people and cannot set the relationship between them, it will affect the quality of the work.

The above statement implies that, should each team member conduct his/her part effectively, the team would be able to complete their common task on time and with good quality. For Participant 22A, the process of achieving desired goals is engaging in consistent lines of activity and exhibiting cooperative behaviour towards the common goals.

However, there are situations where group members are less likely to accept the team goals and be determined to reach them (Locke and Latham, 1990). They may
consequently exhibit lower degrees of effort to implement the task and produce output required to meet the team’s objectives (Klein et al., 2001). This issue was observed in most of the groups, which often resulted in intersender conflict, dissatisfaction, impaired communication, and a tendency towards individualism among group members (see also Bishop and Scott, 2000). An example of this could be the following conversation among members of group 31:

```
1 31A:  (1) I think we need at least half an hour as our team.
2 31B:  (1) I said 1 hour and 20 minutes ↓. Because if you look at the
3 construction my personal view is [like]
4 31A:  .tk[it is not] is not actually that hard.
5 31B:  =you think so?
6 31A:  =[yeah]:
7 31C:  [you] haven’t made LEGO? Are you crazy?<It’s easy>.
8 31A:  =yes, we have everything we [need to]
9 31C:  [yeah::]
10 31A:  [just] follow the recipe and done done[done]
11 31B:  [=I don’t] know guys. I don’t like LEGO. If I don’t like the thing↑, I
12    have to give it more time, you know what I mean ((he is not happy)).
```

As can be seen from the conversation, Participant 31B initially tried to be engaged in the activity (lines 2 and 3). However, while he was explaining his reason for his higher time prediction, Participants 31A and 31C did not let him speak (lines 4 and 7). Consequently, he expressed his dissatisfaction by saying that he was not interested in this task (line 11 and 12). Furthermore, one of the written notes during the experiment for Group 31 was:

“*Participant 31A sometimes just looks at the other two teammates and does nothing unless they ask him to do something. It seems that he doesn’t care about the group*.”

The above observational note and the interpretation of Participant 31A’s responses after the experiment reveal his lack of team commitment and of intention to cooperate with his teammates. In fact, in these situations, the unhappy members may have the “intention to quit” or wait until the task is terminated and the team is dissolved (Bishop et al., 2000). West et al. (2005) call this type of commitment poor commitment and believe that it reveals itself in teamwork as a “malaise or illness that begins to grow evident in team processes and performance” (p. 110).

The above findings indicate that team commitment is an important issue to be considered within a planners’ team, not because of its direct influence on members’ performance but because it affects the characteristics of their interaction and their
attitudes and behaviours. As a result, planners need to jointly demonstrate their commitment to working together in such a way that reliability within the team can be maintained and trust can be built so that quality of time estimation can increase.

It should be noted that in practice, understanding the level of commitment of members to their team is not straightforward and can, in fact, be difficult since managers often realise lack of commitment when they receive negative feedback about any decision for which team members were responsible or committed (Bazerman et al., 1984). However, managers can adopt certain strategies to enhance the level of commitment and effective team functioning within their teams such as a) encouraging feelings of warmth and acceptance among team members (Piper et al., 1983); b) focusing on various characteristics of the workplace environment that encourage employees (Paillé, 2009); c) enhancing the feeling of groupness and loyalty to the team (Bazerman et al., 1984); d) increasing the attractiveness of team tasks (Zaccaro and Dobbins, 1989); and e) building trust among team members (Kirkman and Rosen, 1999).

7.3.3.3 Confidence level
Confidence refers to the stated probability that one’s judgement or choice is correct (Paese and Sniezek, 1991). Comparison of individual vs. group confidence is important in the decision-making literature because the degree of confidence in a judgement determines the actions individuals or groups take (Tsai et al., 2008). The literature on confidence assessment reveals that groups tend to be more confident about their judgements and predictions than individuals (see e.g. Sniezek and Henry, 1989). The reason for this is that groups have more resources and information at their disposal, and these can be shared through face-to-face discussion in order to produce decisions that are higher in quality than those of individuals. Furthermore, group decisions have a higher likelihood of acceptance for the simple reason that all members were involved in the decision-making process (Cooper and Wood, 1974).

While having confidence in ability is necessary to progress in life, inappropriate confidence can be a barrier to effective decision-making and implementation (Bazerman and Moore, 2012). Sniezek (1992) criticises organisational theorists and practitioners for placing “great value on high group confidence but show[ing] no concern for appropriate group confidence” (p. 131). Highly confident groups have been found to be less likely to accept or process new or contradictory information; rather, they put too
many eggs in one basket, so to speak, which increases the likelihood of them engaging in dysfunctional decision-making heuristics (Credé and Sniezek, 2003).

One important issue discussed extensively in the confidence literature is the relationship between confidence and accuracy of judgements (see e.g. Lichtenstein and Fischhoff, 1977; Yates, 1990). These studies often report that confidence exceeds accuracy. For example, when subjects express 90% confidence, they may be correct only about 75% of the time (Kahneman and Tversky, 1996). However, Sniezek (1989) argues that confidence does not always correspond to accuracy. She believes that people could be either overconfident or underconfident due to miscommunicating their confidence through individual differences or motivational factors (see also Thomas and McFadyen, 1995). Accordingly, Sniezek and Buckley (1995) note that overconfident people may prevail in terms of having their ideas chosen more often than those people who exhibit lack of confidence. The reason for this is that in many real life situations where group members wish to make a decision concerning future outcomes, they may not have a demonstrably correct answer at the time of interaction, if at all. Thus, when they do not know an answer, they frequently rely on inferences about the confidence of others.

In the present study, since team structures were not hierarchical and everyone had the same authority in decision making, it was possible to examine the confidence level of group members through their interactions at various points such as before starting the task and after finishing the task. This enabled the researcher to specify the under- and overconfident members of each group through not only words and conversations but through tone of voice, facial expression, and interactions with each other. For example, terms that confident participants often used during the negotiation stage were:

- “I am sure that…”
- “I am a LEGO Champ”
- “We know how to build a LEGO, don’t we?”
- “Believe me, we can finish it very soon”
- “You will find your kid doing this in 5 minutes”
- “It is easy, just count them and put it there”
- “I said 10 minutes because I think that the process to build is very easy”
- “Put the materials together and it is very easy”

In contrast to the above expressions, terms that less confident participants often used were as follows:
• “I have no idea, you decide”
• “I am not good in planning”
• “To be honest, I am not an on-time person”
• “It takes ages to make that on my own”
• “You decide it, I haven’t any clue”.

After identifying the under- and overconfident members through following the patterns in transcripts, it was noticed that those who seemed to be more confident were much more influential in producing the group time estimate than were less confident participants. This is, in fact, in line with previous research, which found that group members tend to select their most confident member to the position of group decision-maker (Hinsz, 1990), and thus the confident member will exert more influence than less confident group members (Zarnoth and Sniezek, 1997). As an example, the following conversation among members of Group 9 shows Participant 9C’s influence in producing the group’s time estimate and how his overconfidence influenced other team members to go along with his decision:

As can be seen from the conversation above, Participant 9C used his high confidence to dominate the discussion and justify his prediction. The statement that he made in line 8, “shake hands!”, was very convincing for his teammates and caused them to reach a consensus in a very short period of time. This is in line with Kerschreiter et al.’s (2008) findings that when actual confidence exceeds the realistic confidence, group members will be unlikely to engage in fruitful discussion. However, lack of discussion, due in this case to Participant 9C’s overconfidence, delayed the group’s task completion by 45 minutes. To understand why, the other two members were asked why they changed their minds before and after the discussion. They replied:
Me: (2) ok, what about you? Because you changed your mind a lot.
((asking from 9A))
9A: (.).his was very low. I though mine was 15, 20 minutes. He insisted on
5. Mine was not really [there]
9C: tk[↓you should not have gone]
9A: =we said we go with what he [said]
9C: =[you] should know not £to listen to me£
Me: =yeah, why did you?
9A: it sounds like a conflict↓. He said that he can do it in [5 minutes].
9B: [stubborn]! That is the word! (.5)Being stubborn!

The above conversation indicates that both Participants 9A and 9B trusted in their
teammate because of his overconfidence; but, Participant 9C laughingly told them that
they should not listen to him (lines 5 and 7), thus making them unhappy and frustrated
because they thought that his apparently sincerity during the negotiation stage had
caused them to trust him. This situation resulted in a conflict (Participant 9A, line 9), in
which Participant 9B called him “stubborn” (line 10), and to a time overrun of
approximately four times their estimated time due to the Participant 9C’s inappropriate
level of overconfidence in urging the group to underestimate the time. His high
confidence level also interfered with communication between team members, and,
consequently, led to a failure to search for information about the details of the task (see
also Kerschreiter et al., 2008).

Another interesting issue which Group 9’s conversations reveal was the persistence of
participants’ confidence levels during the task. In fact, “data on changes in confidence
over time or situations have been relatively rare in empirical studies” (Sniezek, 1992, p.
139). Though we cannot judge level of overconfidence as it affects someone’s decision
at the time of interaction, we may still evaluate the quality of his or her decision over
time or following task completion and whether or not he or she is prone to
overconfidence bias. For example, the conversation between the members of Group 9 is
accompanied by a dramatic increase in confidence at the point of consensus, since
Participants 9A and 9B were not aware of Participant 9C’s inappropriate level of
confidence but only came to this realisation after task completion. In addition, based on
the observation notes, after finishing the task, Participant 9C appeared not to be as
confident as during the negotiation stage. The words and phrases that he used during the
interviews lends credence to this observation. For example, he noted:

“I am not sure if I got it right in the first place”;
“Maybe I probably was too bold and just rushed into something”;
“It seems that it’s more difficult than what I thought”
The underlined texts from Participant 9C’s responses reveal a substantial decrease in his confidence and certainty level. This supports a finding of Sniezek and Henry (1990, p. 70)—when confronted with differing judgements and arguments during discussion, group members may exhibit more uncertainty regarding their own judgements, even in cases where they do not revise their judgements due to their loss of confidence.

While overconfident participants generally claimed that the task would be easy and that they would be very capable of doing it, underconfident people noted the opposite—that the task would be difficult and that they would be unable to do it. Sniezek (1992) argues that less confident people are often less likely to make future group decisions, and, if they do, others would be likely to challenge them. For example, in Group 31, Participant 31B was less confident than his teammates during the negotiation stage:

31B: =I don’t] know guys. I don’t like LEGO. If I don’t like the thing↑, I have to give it more time, you know what I mean.

His estimate at the individual stage was one hour. However, his teammates did not trust him because of his lack of confidence and, thus, decided on 35 minutes at the consensus stage. However, the group completed the task in 60 minutes, which was 25 minutes over time. To understand what Participant 31B experienced, he was asked the following questions:

1 Me: You said 1 hour and 20 minutes...and then you changed it to (.) 30 minutes in the first stage. Tell me why did you do that?
2 31B: (.) to be honest, I have never had any specific relationship with LEGO.
3 <So when I saw the picture> I was like aaa ↑ it gonna take some times.
4 But as 31A said when you are in group you should cooperate, right? (.) and therefore I changed when they were, when I saw, they were confident with LEGO thing. So I said it might take, might take less than what [I thought].
5 6 Me: [so] you get convinced?
6 31B: =yeah:
7 Me: =what] about other activities? Are you easily get convinced when others provide reasons for you?
8 31B: =to be honest, emm at first I think about myself like what can I do, what is my like, goals and objectives, (.) and then in group work when you see people’s confidence, people’s interest then you might change your opinion. ((With hesitation))

As can be seen from the above conversation, Participant 31B cited his other two teammates’ confidence levels (lines 6-7) as motivation for changing his estimate. However, the collected data showed that his time estimate was closer to the group’s actual time than the other two group members to whose judgement he deferred. This
observation was not, however, restricted to Group 31; the same issue was observed in such groups as 6, 14, and 26, where those who were less confident during the negotiation stage also produced more accurate estimates.

However, whether high or low confidence levels could provide an indicator of increased or decreased accuracy in both experimental studies (Zarnoth and Sniezek, 1997) and real life situations (Mann et al., 2004) is unclear. In the present study, it was found that, in general, less confident participants tended to make better time estimations than did overconfident participants. This finding is similar to what Paese and Kinnaly (1993) found in their study. A possible explanation is that less confident people search for more detailed information on which to base their judgements (Kerschreiter et al., 2008); they are not as defensive as confident people (Zarnoth and Sniezek, 1997); and they consider more of the issues that could lead to negative consequences (Sniezek, 1992).

In addition, it was found that the estimates produced by less confident participants were often ignored by participants having greater confidence levels (e.g. Group 31) or were sometimes apparently not even heard by them (e.g. Group 14). This finding confirms the results of our experiment, i.e. that face-to-face meetings could be detrimental in terms of eliciting project forecasts since less confident people are less likely to express their ideas (see also Graefe and Armstrong, 2011). Indeed, it is the managers’ responsibility to ensure that less confident team members have an equal chance to speak and air their opinions, especially when there are more experienced people in the team. Otherwise, less confident people may fail to raise critical perspectives during face-to-face meetings.

7.3.3.4 Cultural diversity

Culture is best defined with reference to shared value systems within a unit which can shape and direct human behaviours (Hofstede, 1980). It could be evaluated at different levels, such as team, organisational, national, and regional ones and either in different, predominantly individualistic contexts or collectivistic ones (Chatman and Barsade, 1995). In this section, however, the collaborative culture within 31 experimental groups will be examined from individualistic and collectivist points of view in order to explore how this culture affected the outcomes of group discussion and the accuracy of the time estimates produced by the groups.

As a matter of fact, increased diversity in the workplace and economic globalisation has led a variety of people from differing cultural backgrounds to come together and work
as teams. In particular, nowadays China and India have become two of the world's largest developing and increasingly influential economies and are now looking to establish partnerships with other nations in an attempt to be better connected to the world (Leung et al., 2005). Consequently, the operations of many companies span the East and West in response to this global economic change (Chang et al., 2001), and so work teams may be composed of individuals from multiple cultures (Fitzsimmons et al., 2011).

A major challenge for these cross-cultural teams is that members from different cultures may have different understandings regarding interaction processes and different value systems, which can shape and direct behaviour in different ways (Hofstede, 1980). Thus, cultural diversity tends to increase divergent processes within teams, which can have positive consequences (i.e. bringing to the team different, previously unknown ideas and values) or negative ones (i.e. decreasing the group’s performance and creating conflicts) (Stahl et al., 2010). This makes necessary a holistic view of East–West collaboration to achieve better progress in building effective teams across different cultures. Therefore, an understanding of the ways in which different cultures affect behaviour in team settings and of the ways the multi-culture nature of a team can help or hinder performance is necessary.

However, the existing literature reports inconsistent results on the influence of cultural diversity on team outcomes (Stahl et al., 2010). While some researchers contend that cultural diversity enhances performance by leading to more creative and higher quality decisions (see e.g. Thomas, 1999; Van Knippenberg et al., 2004), others argue the opposite, that it results in more conflicts, higher intergroup anxiety, and loss of effectiveness (see e.g. Stephan and Stephan, 2000; Jehn and Bezrukova, 2004).

In this study, out of 31 groups, 12 groups consisted of participants from different cultures, and the rest were all British. The focus, therefore, in terms of cultural diversity was on those 12 groups, which represented 10 different nationalities. 10 nationalities were classified into three cultural clusters: Chinese (13 participants); other Asians (Arabian, Iranian, Afghan, Indian, Turkish) (11 participants); and Europeans (English, Norwegian, Swedish, Bulgarian) (12 participants). To understand an individual’s orientation towards collectivism, the transcripts and the observation notes were examined. Notably, it was fortunate that out of the 12 groups, eight groups’ conversations had been video-recorded. So, it was possible to watch their conversations
several times and note participants’ facial expressions and body movements during discussions in an attempt to determine why some people cooperate with their teammates and others do not. At some points, where the significance of body movements or facial expressions were not understandable, the researcher had to ask his Chinese and Turkish friends for help in interpreting these. The resulting analyses led to several findings, which are discussed below.

Observing the conversations among two all-Chinese groups (Groups 1 and 2), I noticed that their decision-making process began with collection of all team members’ time estimates. During the negotiation stage, members of the Chinese groups shared the responsibility for all aspects of the task under consideration and planned how they could best implement the task “as a group”. For example, in the following discussion, the Chinese members of Group 1 used “we” several times while negotiating to produce a time prediction:

1 1B: emm (.) actually I think: we need to find the correct position that is similar to design. (.) and to find this four points on this plate. ((the other two nodding their heads))
2 1A: (1) so you count each of them?
3 1B: =yeah, (2) it takes time. To do it [first].
4 1C: =[then] we can make this part.
5 1A: (.1) if we have this first, like this, it would be easy for us to put others.
6 1B: =yes.
7 1C: (1) we also should check these dimensions. Do we have [ruler?]  
8 Me: [yes].
9 1B: (3) Can we finish it in 30 minutes? ((with hesitation))
10 1A: (1) yes, 30, 35. What do you think? ((ask 1C))
11 1C: emm (1) 30 minutes.
12 1B: (.2) ok.

Reading the above conversation reveals its collectivistic tone. The participants used “we” seven times during the one-minute conversation. Within a collectivist-dominated team, in fact, each participant becomes an “insider” of a network, and cooperation proceeds smoothly (Leung et al., 2005). In contrast, the other 10 groups, specifically those with European participants, e.g. Group 4, were more interested in dividing the task into three different parts (e.g. ground floor, first floor, roof) and then assigning each individual responsible for delivering his/her specific part. This strategy was adopted in Groups 4, 5, 6, and 9. For example, in Group 5—which contained one Bulgarian (5C) and two Chinese (5A and 5B)—Participant 5C suggested:

5C: =ok, we have three persons here. We can divide these to at least three parts maybe, four parts, yeah? First part we can build each of us can build each
floor. OK(.) it will take mm maybe 14,15 minutes. I guess that for each of us to do this if we have separate box of construction blocks. To build this floor if we had for example separate mmm parts construction blocks. Yeah. But as long as we have one box and we will compete each other for each block, I think it will take us maybe we need to add additional 5 minutes. Thus, it will take us maybe 20, 25 minutes.

However, Participant 5B disagreed with his suggestion; he saw no benefit in dividing the task into different parts. After a few minutes of discussion with Participant 5C, he told him:

5B: I think (.). aaa we can divided into two parts, there are two person, aaa there are two people building the lower level. And there are, there is one person who supply the things which they need.

5C: =uhum↓.

5B: =just one people to select things from the box and to give it to both of the people, to both of the constructor.

5C: =uhum

5B: =and then they construct it. It will save the time, the time to find it.

In the aforementioned conversation, the Chinese participant recommended his collectivist approach to Participant 5C. In this approach, rather than each working separately on a different task, team members would have coordinated their work so as to work as a team. This line of thinking, giving priority to the team’s achievement rather than to individuals’ preferences, reveals the Chinese collectivist culture, which Hofstede (1980) and numerous empirical findings (see e.g. Triandis et al., 1990; Boisot and Child, 1996) support.

People from collectivist cultures are more likely to subordinate their personal interests to the accomplishment of group goals, whereas, in individualistic cultures such as those in Western countries, people tend to live in a loosely knit social network and give more prevailing emphasis to the self and immediate families over others (Hofstede, 1980; Chang et al., 2001). Chatman and Barsade (1995) argue that Westerners often fail to behave more cooperatively in response to a collectivistic organisational culture because they find it difficult to appreciate the differences between opponents’ self-interested and cooperative behaviour. Furthermore, Frank et al. (1993) demonstrated that, even when Westerners understand the advantages of cooperation and mutual benefits and the disadvantages of self-interest, they often choose to behave individualistically. Indeed, Hofstede’s (1980) individualism scores confirm this; while individualism scores of the USA and the UK were 91 and 89 (out of 100, with 100 being high and 0 low), respectively, they were 18 and 25 for South Korea and Hong Kong.
In the study, the differences between individualism and collectivism were observed not only in the negotiation stage but also during implementation. For instance, in Group 2 (with all Chinese members), when Participant 2B made a big mistake in measuring the dimensions of the first floor, the other team members treated the issue as if it were their own problem and so displayed cooperative behaviour. Not only did they not place Participant 2B under stress or pressure, but they also encouraged her to continue the task by smiling and adopting a positive attitude. They stated:

2C: don’t worry. We have time.
2A: =yes, we need to put only one row here.

However, the reactions in other groups, specifically those with all British participants, were quite different. For example, when two members of Group 21 had finished their parts, Participant 21C was still struggling to make the roof. Instead of helping him finish the roof, the other two members busied themselves checking their parts (even replacing white blocks with colourful blocks) and waited for him to finish his part. They exhibited no willingness to cooperate or resolve their teammates’ problems and were mainly concerned with their personal achievements. This issue was observed in other groups with British participants; the majority acted competitively within their team, seeing one another as competitors, even though they were all on the same team. In such a team culture, if a problem occurs, individual team members would be more inclined to solve it by themselves rather than asking others for help. This interpretation is in line with Luthans et al. (1997), who found that while in the UK and the US people rely on their own experience and prior training to solve problems, in China and Japan the most frequently adopted method of problem solving involves soliciting advice from a more experienced person.

Within the study, another difference between groups from different cultures involved communication. Communication efficiency is instrumental to the success of teamwork, and cultural differences can cause considerable challenges to successfully accomplishing group activities (Leung et al., 2005). It is argued that a high-context communication style characterises Asian cultures; here, there is less need for specificity, and meanings are inherent in mutual experience and assumptions, and such indicators as tone of voice and gesture help convey meaning. In contrast, in the West, the norm is low-context communication, where people require more details and a large amount of explicit information in order to describe meaning (Hall, 1976; Korac-Kakabadse et al., 2001).
Based on the observation, the Chinese people involved in the study often used eye contact and specific gestures as a means of information exchange while making time predictions. The meaning of these was well understood within their culture, but Europeans and other Asians were not able to interpret them. For example, silence during discussion apparently does not signal passivity for them (Brake et al., 1995); however, Westerners often misinterpret this as lack of respect, and other Asians interpret it as indicating consent (Graham and Sano, 1984). In contrast to the Asians involved in the study, the Westerners primarily adopted a direct style of interaction and were much clearer about their points. This, style, however, may be perceived by Asians as highly threatening and fear evoking (Levine, 1985).

By following the patterns in transcripts, it was found that, in the four groups (Groups 5, 6, 7, and 16) containing at least one Chinese and one European, the first estimate for all groups was proposed by the European member. Furthermore, in producing the group time estimate during the negotiation stage, the European member or other Asians (e.g. Indians and Turkish) were more influential and the Chinese less so. Another interesting point revealed by the observations of the group video recordings was that the Chinese participants did not try to convince their teammates to adopt their estimates, due possibly to cultural norms regarding modesty (Heine and Lehman, 1995), to lack of confidence (West et al., 2005), or to language barriers (Leung et al., 2005). For example, when one of the Chinese members of Group 16 was asked why she did not intervene in making a group estimate, she stated:

16C: I don’t know (.) aaa People might listen to someone’s advice first time. But, we were not convenient with people↓. So we try to listen to people.

The above response shows that Participant 16C was not happy with the outcome, but she did not want to oppose what she perceived as the prevailing "team" culture by attempting to impose her individualistic preferences on the group (Chatman and Barsade, 1995). It was noticed from her response and her behaviour that she would prefer working with people sharing her beliefs, values, and attitudes (see Stahl et al., 2010). However, the response below, which was received from one of the European members of Group 5, had a completely different tone:

1 Me: ok, now the question I have for your group is how did you change your mind and accept others’ decision? I like to know how did you come to this agreement within your group?
2 5C: =ok, I just, ok (.) , the majority of all thought that we will need less time that I thought. But I have to agree with the majority. So, I gave
up, but it took even more time than my estimate. Despite, I just agreed with the majority.

Me: so, you just follow what they said?
5C: yeah, because I am one person, and there are two persons which agree with each other. Also, I think there is cultural differences too, the way they think about the things is different than me.

Me: what is the difference?
5C: =how to say, emm I think Chinese people interested more on group activities. They always work as groups. But for me it doesn’t work. I work better by myself.

The above conversation indicates that, although Participant 5C claimed that he respected the decision of the majority and ignored his own opinion (line 5), he had his own individualistic view, as evidenced by his mentioning that he works better individually than in a group (line 13-15). This would suggest that, while trying to encourage cooperative behaviour, managers must be aware that persuading certain people to do so may be difficult, and, in fact, may never be possible.

Another interesting point concerning the four groups discussed above was that the averages of the estimates made by the Chinese members at the individual stage across the four groups was more accurate (estimation bias= 53%) than the average of estimates made by their groups at the consensus stage (estimation bias= 66%). It should be noted that, within this study, the Asians tended to be more accurate in terms of time estimation than did the Europeans and British; however, this observation is only based on data from four groups, and so this cannot be treated as a finding. However, previous studies found that East Asians tend to make less optimistic predictions than do Westerners (Heine and Lehman, 1995; Chang et al., 2001). Fitzsimmons et al. (2011), for example, argue that one of the fundamental reasons behind building teams from different cultures is to benefit from experience, skills, and innovative ideas drawn from different cultural perspectives. However, the most common drawback is that “multicultural teams take longer to perform tasks, because of conflict, misunderstandings or differences in values” (p. 200).

Based on the observation and analysis of the interviews, it was found that Chinese and other Asian participants brought a more collectivist-cooperative orientation to the task than did the European individuals; the former prioritised collective goals and cooperative action and made joint contributions to achieve team accomplishments. In addition, it was found that, at the group level, homogeneous groups of Chinese (Groups 1 and 2) acted more cooperatively than did homogeneous groups of British participants (e.g. Group 20), and showed greater commitment and responsibility in finishing the task.
on time according to the design. The responses from individuals in all-British groups exhibited their competitiveness within their teams and their tendency to show their superiority and excellence (see also Cox et al., 1991).

Interestingly, it was found that some of the European and British participants predicted that they would complete the task sooner if they did it individually rather than in a group of three. This tendency towards self-enhancement (Heine and Lehman, 1995) may be due to their individualistic culture, which supports and encourages individualism (Hofstede, 1980). Moreover, it was noticed that in the culturally heterogeneous groups, participants had more difficulties with communication and understanding of teamwork and cooperation, especially in those groups containing both European and Chinese members. One reason for low productivity and problems within a heterogeneous group, as one of the Chinese members of Group 6 mentioned, could be the lack of a leader to assume responsibility for guiding the team.

It should be noted that, since the above findings are based on experimental settings, they cannot provide a clear picture of the impact of within-group cultural differences and their dynamics on group processes in reality. As Korac-Kakabadse et al. (2001, p. 19) noted, “Cross-cultural interaction is sensitive to contextual elements, and a full understanding of the dynamics involved cannot be achieved by general knowledge about cultures alone”. In addition, there was not an equivalent number of individuals from each culture to make the comparison, thus further limiting the researcher’s ability to fully appreciate the complexity that exists in the interface between different cultures. Therefore, research in multicultural work groups would provide a more detailed and precise mapping of the elements that constitute cultural differences in field settings.

7.3.3.5 Conflicts
Conflict is an inevitable part of teamwork (Deutsch, 2005). The reason for its inevitability is the fact that team members will in all likelihood have opposing interests, beliefs, characters, opinions, and thinking styles, which in turn influence their behaviours, goals, values, and preferences. When people are faced with contradictions in any given situation that matters, they tend to express their own beliefs, which might be incompatible with those of others. Depending on the context and nature of the decision, the real or perceived differences concerning issues that matter “produce psychological states, including feelings and motivational goals, that in turn drive
behaviours intended to intensify, reduce, or solve the tension” (De Dreu and Weingart, 2003).

Early scholars’ views on conflict were one-sided; conflict is a bad thing and has many negative influences on team effectiveness and productivity. It can increase anxiety, tension, and distractions among team members and, consequently, reduce team performance and satisfaction (see e.g. Pondy, 1967). However, in the past 20 years, there has been a growing tendency in the literature to focus on the constructive aspects of conflict. For example, Tjosvold (1997) notes that conflict helps team members to confront issues that they might not have noticed before.

Drawing on Follett’s (1940) work, Jehn (1997) suggests an alternative approach to distinguish between good and bad conflict based on task and relationship conflict. The former refers to perception of disagreements and opposing viewpoints among team members towards the task, including ideas, viewpoints, and thoughts, whereas the latter refers to interpersonal incompatibilities and typically includes tension, animosity, and annoyance among group members.

The distinction between task and relationship conflict has attracted much research attention over the years (see e.g. De Dreu and Weingart, 2003; Deutsch, 2005). The major argument put forward is that task conflict can be beneficial to task performance in non-routine tasks. For example, it can stimulate team members to examine issues related to the task more carefully so that members can achieve a better understanding of task-relevant information and available options (Tjosvold, 1997); it can provide a setting for members to make an impact on the company by expressing their opinions and/or resolving decisions (Hackett et al., 1994); and it can be a remedy to groupthink, where feelings of solidarity and loyalty to a decision-making group may face no realistic evaluation of possible options (Simons and Peterson, 2000).

In contrast, relationship conflict is dysfunctional with respect to team performance. It decreases satisfaction and hurts team effectiveness (Jehn, 1997); it limits the information processing ability of the group so that the group members spend most of their time and energy focusing on each other rather than on the group’s task-related problems (Simons and Peterson, 2000); it impairs cooperation and productivity among team members (Hackman and Morris, 1975); and it provides a stressful and disruptive work environment for team members with negative responses such as anxiety and hatred resulting (Huang, 2010).
Based on the interview transcripts and observation notes collected during Experiment 2, the conflict was very evident in the descriptive language and phrases used in some groups or across participants’ responses to the questions. For example, a conflict among members of Group 26 was initiated by Participant 26A during the following exchange:

```
1 26A: =<<that would be difficult for me, that would be difficult for me>>!
2 26B: I think that (.) is difficult to make [guys].
3 26B: [what time]?
4 26A: (2) I am not, i am not a big LEGO fan
5 26B: (.5) I think it does not take as long as half an hour.
6 26A: =I just put what I [thought]
7 26B: ↑ [what is] that?
8 26A: what did you put 26C?
```

As can be seen, Participant 26A described the task negatively to other teammates (lines 1 and 2). However, Participant 26B was not interested in hearing these negative thoughts and interrupted him (line 3). This issue sparked the conflict and made Participant 26A angry, causing him to say that he is not a “LEGO fan” (line 4). Furthermore, when Participant 26B tried to calm him and have a proper discussion (line 6), he reluctantly said, “I just put what I thought”. In fact, the heated part of the discussion was the point where Participant 26B asked 26A’s opinion about the completion time (line 7), to which he did not respond (line 8). This upset Participant 26B, and he became silent. His negative emotional reaction to perceived disagreement was obvious and caused me to note during the experiment:

“Participant 26B is frustrated; he is not happy to work with 26A!”

This disagreement was mainly due to the aggressive personality of Participant 26A, who apparently wished to increase his own authority and autonomy. As Tjosvold (1997) asserts, those people who aim to create conflict are those who are usually engaged in conflict. This certainly describes Participant 26A’s approach towards teamwork. In fact, during task implementation, there were few opportunities for him to resolve initial conflicts, but not only did he exhibit negative attitudes towards and suspicion of other members’ intentions, he also exhibited a competitive approach towards his teammates rather than a cooperative orientation (Deutsch, 2005).

Based on the observation notes, the initial conflict between Participant 26A and Participant 26B was still evident in the interview session subsequent to task completion and even intensified, possibly due to Participant 26A’s realising that his time estimate at the individual stage was more accurate than the others. During the negotiation stage, the
other two members had not listened to him and had, in fact, ignored his point of view. The following conversation shows the intensity of this conflict:

Me: ok, I see. How could you convince him to put 30 minutes ((asking from 26C))

26C: (1) he he, I honestly did not truly believe it would take an hour and half to build this.

(4) you agreed that we could make it quicker than< [that]. ((He is asking the question to 26A))

26A: .tk I said because of him ((pointing at 26B)).

= he was in this group. <<He knows what is in here and would [make it]>>.

Me: ((participant 26B is so frustrated))

26A: I thought when we struggle, HE IS the one, the one that kept it all together.

=He knew what he was doing and could tell you anything. He knew what he was doing.

=I didn’t know what I was doing. (. ) I was like pick [pieces up and where does it go]

26C: [hehheh] chill out.

26A: [so] I was just being like without him we will [struggle]

Me: [and]

26A: <<probably take an hour and a half>>

As can be seen from the above conversation, Participant 26A continued the relationship conflict with his teammate. He attributed the reason for their inaccurate group time estimate to the overconfidence of Participant 26B (lines 7-9). Even, when Participant 26C tried to calm him down (line 17), he continued to complain (lines 18-20). In fact, Participant 26A sought to enhance his own power and reduce the power of others by telling them that he was right and they were wrong. As mentioned earlier, fuelling this conflict was, in addition to Participant 26A’s aggressive personality, the fact that the other two members did not listen to Participant 26A’s point of view during the negotiation stage. As Olson et al. (2007) assert, for an effective decision-making process to emerge, it is imperative that members of diverse teams are permitted to air their differing opinions and ideas with respect to the decision. To do otherwise “encourages antagonistic or sinister attributions for other group members’ behaviour, which can create a self-fulfilling prophecy of mutual hostility and conflict escalation” (Simons and Peterson, 2000, p. 103).

The quantitative data from the experiment revealed that Group 26 was one of the worst performing groups within the experiment. It finished the task in 72 minutes while the average actual time over all 31 groups was 58.1 minutes. Consistent with this, research has shown that, as conflict intensifies, team performance suffers badly (see e.g. Jehn,
This type of dysfunctional conflict produces “tension and antagonism which distracts team members from performing the task” (De Dreu and Weingart, 2003, p. 741).

In contrast to relationship conflict, task conflict is often assumed to increase team members’ effectiveness and innovativeness by increasing learning and fostering development of creative ideas (De Dreu and Beersma, 2005). Task conflict arises during interaction between team members aimed at assessing differences in judgement concerning the decision or creation of alternatives. The following conversation among members of Group 29 is an example of such a conflict:

As can be seen from the above conversation, Participant 29B mentioned that he could do the task faster individually than in a group (line 1), thus triggering a disagreement between him and the other two members that caused Participant 29C to interrupt him (line 2). Also disagreeing with 29B’s statement, Participant 29A informed 29B that he was not a “team player” (line 6). Participant 29B then attempted to explain why he thought he could do it faster alone (lines 7 and 8). The other two members then began to provide logical reasons and highlighting the benefits of teamwork (lines 9, 10, 14, and 15) in an attempt to convince him he was incorrect.

According to Sniezek and Henry (1990), when people are faced with conflicting arguments during discussion, they are presented with a wider range of alternatives and could conceivably come to doubt their previously held judgements and so could revise them. Consistent with this, the last sentence in the above conversation shows that Participant 29B became less confident as he found himself being convinced by the
explanations provided by his teammates. This caused him to more deeply analyse his own position as well as comprehend others’ opinions (line 16). This is similar to what Olson et al. (2007) argued, i.e. as team members engage in task conflict, their understanding and knowledge of the task at hand can increase in terms of complexity, importance, and immediacy due to the exchange of ideas relating to the strategic decision.

Another interesting issue noticed during analysis of the qualitative data was the relationship between cultural diversity and conflict. As indicated in the previous section, cultural diversity may be an obstacle for effective communication and can complicate interactions among team members. The problem is that when team members come from different cultural backgrounds, they need to be taught “how each of their respective cultures may differ and how they can overcome these differences and use them to the team’s advantage” (Townsend et al., 1998, p. 24). Otherwise, the cultural differences may cause members of a group to misinterpret one anothers’ behaviour as being disrespectful or driven by ill-intent and perceive the conflict concerning the task’s content as a personal slight, thus increasing relationship conflict within groups (Taylor, 2001).

Based on the observation and video recordings, it was found that, while Chinese team members were more inclined towards conflict avoidance, European and British participants more readily adopted a competitive and conflictive style (see also Morris et al., 1998). Leung et al. (2005, p. 290) note that “Asians are more in favour of mediation and compromises, whereas Westerners are more in favour of win-lose settlements”. They found that while the former use harmony-inducing strategies to avoid conflicts, the latter prefer confrontational approaches to conflict management. Notably, any confrontational approach among the Asian participants could not be identified, while there were many such instances among the teams containing British participants. The following conversation between two British members of Group 28 provides an example of this confrontational approach:

1 Me: Ok, You put 30 minutes individually and 15 minutes as a group. [and]
2 28C: [I was] realistic. <↑I said> individually I could finish it in 30
3 [minutes].
4 28A: .tk [no], you couldn’t
5 28C: .tk[yes], ↑I could!
6 28A: =you couldn’t even do the roof.
7 28C: =the dimensions for the roof were misleading.
8 28A: £yeah::, you would say that£.
As can be seen from the above conversation, Participant 28A initiated the win-lose strategy to let his teammate down (lines 4 and 6), thus upsetting Participant 28C, who raised his voice in anger (line 5). The competitive negotiation between these two participants supports the contention that they view conflict resolution as occurring only when one side is imposed upon by the other. According to Liu et al. (2008), when team members adopt this competitive strategy, they overemphasise their own view in order to achieve one-win-the-other-obey. The apparent assumption of superiority by individualistic cultures will result in interpersonal disputes and diminish group functioning. In contrast, collectivistic cultures are more prone to employ collaborative strategies to manage conflicts effectively. Consequently, team members from collectivist cultures often consider conflicts as opportunities to find creative solutions and express ideas and opinions to arrive at mutual understanding within their teams, rather than as win-lose situations (West et al., 2005).

Therefore, based on the findings, in case of disagreements, those teams which exhibited more collaborative communication and interaction experienced fewer negative effects of conflict. De Dreu and Weingart (2003) stress that “when task conflicts emerge, team performance may benefit but only when the conflict is managed constructively and teams have high levels of openness, psychological safety, and within-team trust” (p. 748). However, in the present study, teams often had no defined conflict management strategies to mitigate and eliminate the negative effects of conflicts, especially since there were no hierarchical power structures and no members had control over others, thus preventing these strategies from arising.

Furthermore, team members often had undefined roles and responsibilities with opposing or overlapping objectives. Therefore, in conflicts between team members, they often blamed each other, thus providing the basis for relationship conflict, which, in turn, led team members to make poor time estimations, have non-productive communications, and become incapable of experiencing good collaboration and performance (see e.g. Simons and Peterson, 2000; De Dreu and Beersma, 2005).

### 7.3.3.6 Groupthink

Groupthink is defined as a “a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members’ strivings for unanimity override their motivation to realistically appraise alternative courses of action” (Janis, 1972, p. 9). It is a process in which maintaining a shared positive identity as a group
and/or achieving consensus is more important for group members than seeking or evaluating alternative options realistically (Lunenburg, 2010). Hälgren (2010) explains that the reasons group members may not share their true points of view in meetings might be because they retain their status quo, minimise conflicts, or seek to avoid feelings of embarrassment by standing out from the crowd. Because members are reluctant to openly identify and discuss problems or consider and analyse all relevant information, groups often make poor decisions.

The groupthink model was first proposed by Janis (1972) to account for poor political and military decisions. However, the potential for groupthink to explain the issues contributing to deterioration of decision-making ability within the group and so to cause poor outcomes attracted a great deal of attention from a variety of disciplines, including psychology, social and organisational studies, political science, and others (see e.g. Turner et al., 1992; Esser, 1998; Baron, 2005). Groupthink, as conceptualised by Janis (1972), has five steps: antecedents of groupthink (e.g. high cohesion, appraisal procedures, and low self-esteem); concurrence seeking (exaggerated desire to support the perceived group preference); symptoms of groupthink (e.g. pressure on dissenters, illusions of invulnerability, illusions of unanimity, self-censorship); decision-making defects (e.g. incomplete search for alternatives, selective bias in processing, failure to consider risk); and poor decision outcomes (e.g. wrong estimates, fiascos). Indeed, examining groupthink theory in detail is very complicated (Esser, 1998) and is not within the scope of this thesis. Therefore, only those portions of the theory identified as being relevant to the codes and discussion of this research were investigated.

According to Janis (1972), certain features support a tendency to seek consensus among group members. The most important of these that contribute to groupthink is the desire to maintain team cohesion (through unanimity). An undesirable degree of cohesiveness could damage group decision quality by leading group members to neglect divergent viewpoints and reduce the number of ideas being considered (Henningsen et al., 2006). The effect of high group cohesion was noticed in some of the experimental groups. For example, Group 20’s members arrived at their decision in less than a minute, during which the following conversation occurred:

1 20C: =Alright, alright.
2 20B: Can we get it in a group and then each of you guys make a different bit of it.
3 20B: (3) :Yeahh, someone can get the roof, THAT, THAT, AND [THAT].
4 20A: [:yeahh]
As the above conversation shows, the group members displayed no sign of disagreement or disapproval in their interactions. Participant 20C was influential in the group’s decision making and, also, was the one who initially revealed his time estimate (lines 6 and 7). In this, he was followed by Participant 20B, who agreed with him and confirmed his time prediction (line 8). Finally, Participant 20A revealed her time estimate, which was the same as those of the other two members (line 10). However, interestingly, when their pre-task questionnaire was checked after the experiment, it was discovered that Participants 20A and 20B had different time estimates than that which they noted during the negotiation stage: 25 and 5 minutes, respectively. Thus, they were lying to Participant 20C and did not share their true opinions with him, possibly because of low self-esteem due to previous failures in estimating the time of activities or due to the charismatic personality and leadership style of Participant 20C, which influenced them and caused them not to challenge his decision (see also Rovio et al., 2009).

In such a situation, there is “no competition from other ideas, so the process goes through, just as before, without considering potentially high quality alternatives” (Bagshaw, 2004, p. 155). Additionally, the attempt to preserve team unanimity by Participants 20A and 20B caused Participant 20C (who was influential in producing the group’s time estimate) to be unaware of his flawed or risky decision, especially when he was told that the others shared his opinion. This situation illustrates what Stasser and Titus (1985) term “hidden profile”, in which some information is not shared during the decision-making process.

According to Janis (1972), antecedent conditions such as high group cohesion lead to “concurrence-seeking”, which he defines as a tendency towards convergence and mutual agreement among team members that emerges before the decision has been sufficiently discussed or assessed. Choi and Kim (1999) claim that the concurrence-seeking tendency often impedes good decision making. Under these circumstances, the group tends to choose the option that is favoured by the majority of group members.
rather than the best option (Henningsen et al., 2006). For example, it was noticed that in Group 18, Participants 18A and 18C were in agreement with each other during the negotiation stage and, thus, ignored Participant 18B’s point of view. They had the following conversation:

1 18A: (1) I put 8
2 18B: =I put 7
3 18C: (.) ↓ I am not sure.
4 18B: ↑(1) is this for individually?
5 Me: no no, for the group
6 18B: ok.
7 18C: (2) so 10?
8 18B: =↓yeah ((not confident))
9 18A: (.)£let’s do it£!
10 Me: (2) OK, put 10 minutes over there.

As can be seen from the above conversation, Participants 18A and 18C had quite similar opinions (line 1 and 2). In fact, when Participant 18C said she was not sure, the other two understood that she definitely had a different opinion (line 3). However, they did not ask her for her opinion, nor did she reveal it, indicating that she went along with the perceived majority position and acted to support it. However, after the experiment, when her time estimate written on the questionnaire was checked, it was found to be 25 minutes, which was far more accurate than what the other two members had predicted. In fact, Participant 18C manifested symptoms of “group polarisation”, defined as a shift towards the opinion of the majority in the process of decision making in groups (Deaux et al., 1993). In this situation, people’s tendency to critically assess the situation decreases, while their tendency to conform and maintain harmony increases (Rovio et al., 2009).

Janis (1972) notes that, after concurrence-seeking by decision-making groups, the symptoms of groupthink emerge. He suggests eight symptoms of groupthink, which, in turn, create a situation whereby group members feel obliged to support the favoured group position. As Park (1990) points out, most of the symptoms of groupthink cannot be evaluated easily by an observer because of the inherently private nature of the behaviour, feelings, and beliefs of group members. The most suitable method by which to gauge these symptoms is thus to ask group members directly (see also Esser, 1998). In so doing, based on the conversations between group members and the questions that they have answered, three clear symptoms of groupthink were identified: namely pressure on dissenters, self-censorship, and the illusion of invulnerability.
Pressure on dissenters is the strong compliance pressure exerted on a person who may disagree with the group’s idea(s) or may question the group’s decision. It refers to the power of the group to alter the attitudes and judgements of individual members and get them to agree with the dominant view (Hällgren, 2010). For example, in Group 31, Participant 31B had to change his mind due to pressure from his teammates. Note that this conversation was mentioned in Section 7.3.3.2. However, to ease readability, it will be displayed again here.

1 31A: (1) I think we need at least half an hour as our team.
2 31B: (1) I said 1 hour and 20 minutes ↓. Because if you look at the
3 31A: construction my personal view is [like]
4 31B: .tk[it is not] is not actually that hard.
5 31B: =you think so?
6 31A: =[yeah]:
7 31C: [you] haven’t made LEGO? Are you crazy?<It’s easy>.
8 31A: =yes, we have everything we [need to]
9 31C: [yeah::]
10 31A: [just] follow the recipe and done done[done]

As can be seen from the above conversation, Participant 31B made an estimate which was different from his teammates. However, while he was explaining his reasons for his higher time prediction, Participants 31A and 31C did not let him speak (line 4 and 7). Instead, they exerted pressure on him to conform to their opinions (line 7-10). Finally, Participant 31B agreed with their proposed time estimate, which was 35 minutes. However, the group completed the task in 60 minutes, which was 25 minutes over time.

It could be argued that if Participants 31A and 31B had listened to their teammate during the negotiation stage instead of pressuring him to change his mind, they would have produced a more accurate time prediction for their group. Such pressures towards uniformity “inhibit members from sharing dissenting information, challenging others, and considering alternative courses of action, thereby eliminating or reducing the benefits of cognitive diversity in groups” (Straus et al., 2011, p. 134).

Another observed symptom of groupthink was self-censorship, which is an inclination to hide one’s doubt and uncertainties concerning the actions of his/her group (Lunenburg, 2010). In fact, when members of a group censor their opinions, the final decision of the group may appear to be unanimous, while many of the members might disagree with the decision privately. For example, Participant 14B apparently self-censored her view during the following conversation with her teammates at the negotiation stage:
The aforementioned conversation shows that Participant 14B was not confident enough to reveal her time estimate (line 2). More importantly, when she noticed that the other two members agreed with each other and had reached a consensus (line 8-9), she avoided giving a view that differed from theirs (line 12). To understand the reasons for that, she was asked the reason of her action:

As can be seen from the above conversation, Participant 14B self-censored her view and kept her objections and concerns to herself for two reasons. First, believing in teamwork, she accepted the view that a group has superior collective problem-solving ability (line 5-6). Second, she apparently lacked confidence in her ability (line 8) and so complied with the group preference (see also Henningsen et al., 2006).

Another symptom of groupthink shared by many members of the experimental groups was the illusion of invulnerability, which causes group members to ignore obvious threats and become over-optimistic and be willing to take extraordinary risks (Turner et al., 1992). This is similar to “overconfidence bias” (Kahneman and Tversky, 1979), which has previously been discussed. As a result of this, overconfident member(s) reassure other team members and encourage them to take extreme risks. For instance, in the following group discussion among members of Group 12, notice Participant 12B’s illusion of invulnerability:
As can be seen from the above conversation, Participant 12A employed managerial skills, or supervisory potential, to lead the team. He initially asked the other two members about their time estimate (line 1 and 3) and, when he noticed a large difference between the two estimates, he asked them to compromise (line 10). He also predicted unforeseen problems such as miscommunication among group members which could cause delays (line 23). His responses indicate that he is a team player and believes in the collective decision-making process. In contrast to 12A, Participant 12B appeared very individualistic and overconfident. His estimate for the group was 6 minutes, which was considerably different from those of the other two members (lines 2 and 15). Notably, when he realised that Participant 12C estimated the completion time for the task as 25 minutes, he was surprised and made fun of him by saying “25 minutes to build this?” (line 7). This caused Participant 12C to provide logical reasons for a forecast of 25 minutes and to explain the challenges ahead (lines 8, 9, 19, 21, and 24). However, Participant 12B was not convinced and again said “15 minutes? That is really 10 minutes” (line 25). 12B’s behaviour is consistent with what Janis (1972) argues, that the individual who ignores or makes light of possible ramifications will be seriously inadequate in making informed decisions. Eventually, Participant 12B’s illusion of
invulnerability caused the other two members to surrender and comply with him. This extreme risk taking led to inaccurate estimates off by 80%.

Janis (1972) argues that the symptoms of groupthink (mentioned above) produce defective decision making and listed seven defects: inadequate survey of alternatives, incomplete survey of objectives, biased assessment of risk associated with the preferred choice, poor evaluation of available information, selective bias in processing information, failure to analyse the decisions' alternatives and choices, and inadequate contingency plans for the future (for review, see Henningsen et al., 2006).

In planning and estimating project times in the context of the projects, the above defects of groupthink led planners to make premature group decisions by reducing careful evaluation of available information and analysis of available decision alternatives and choices. To overcome these defects, it is suggested that managers a) limit their own expression of solution preferences (Janis, 1972); b) allow people to freely express their ideas in an open discussion (Hällgren, 2010); c) use structured group judgmental techniques such as nominal group technique and brainstorming (Chapman, 2006); d) hold second-chance meetings to re-assess decisions (Turner et al., 1992); and e) allow the group to produce multiple alternative solutions so that no single solution is readily assumed as being the best option (Esser, 1998).

7.4 Merged results from mixed-methods study

As mentioned in Chapter 4, the type of mixed-methods research design selected for this study was the sequential explanatory design, in which qualitative data are used to explain or expand on quantitative results. It should be noted that, unlike many sequential explanatory studies, in the present research, qualitative data is given the same care and attention as quantitative data.

In this study, the quantitative data were collected by conducting Experiment 2 with 31 groups of three persons each. Three of those groups were subsequently reduced to two persons each. Next, qualitative data was gathered from group interviews with all 31 experimental groups. According to the explanatory design, quantitative data have to be first analysed and interpreted. The experimental data therefore were analysed and it was found that groups produced better forecasts of completion time when there was no interaction among group members, rather than when they made their decision through group discussion and face-to-face meetings. This result may seem odd initially as group discussion is assumed to enhance the quality of decisions (Maciejovsky et al., 2013) and
result in more productive and creative outcomes (Cooper and Sutter, 2011). However, reviewing the literature on group forecasting has shown that other studies have reported similar results and thus question the effectiveness of face-to-face meetings as a method of eliciting project forecasts (see e.g. Graefe and Armstrong, 2011; Kerr and Tindale, 2011) and argue that group discussions attenuate forecasting accuracy (Buehler et al., 2005). In addition, by measuring the degree of divergence of each participant’s initial estimate at the individual stage from their group’s estimated time, it was realised that one member in 77.5% of those participating in Experiment 2 had attempted to convince the other members of his/her group that his/her estimate would be the most accurate one. This, to a certain extent, suggests the assertiveness of that member, meaning that he/she is better at implementing his/her preference even when other team members have divergent individual preferences.

In fact, the above findings from the analysis of experimental data imply that the collectivity involved in the estimation of project completion time at group level was weak and, thus, the final decision of this process cannot be called a ‘collective choice’ (Sugden, 2000). This result, however, is surprising as, unlike real-life situations, there were no incentives and hierarchical authority structure involved in the process to influence group members to diverge from their actual beliefs for strategic reasons or interest maximisation. Therefore, qualitative data obtained from interviews were analysed in order to better understand the reasons for the low collectivity exhibited in the joint decision-making of the group. The findings are discussed in Section 7.3.3 of this chapter and are summarised below in Table 7.6.

Table 7.5: Findings from analysing qualitative data.

<table>
<thead>
<tr>
<th>Influential factors</th>
<th>Participant Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense of power</td>
<td>Direct more attention to themselves and their personal preferences</td>
</tr>
<tr>
<td>Commitment</td>
<td>Are less inclined to accept the team goals and commit themselves to them</td>
</tr>
<tr>
<td>Confidence level</td>
<td>Are overconfident and often ignore less confident members of the group</td>
</tr>
<tr>
<td>Cultural diversity</td>
<td>Are from individualistic cultures and are more inclined to have a competitive orientation within their team</td>
</tr>
<tr>
<td>Conflicts</td>
<td>May exhibit relationship conflicts and non-productive communications with other members</td>
</tr>
<tr>
<td>Groupthink</td>
<td>Tend to reach quick agreement instead of assessing the situation and considering alternatives</td>
</tr>
</tbody>
</table>

Source: Field work

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7.5 Conclusion

In reality, decisions concerning project outcomes such as completion times are primarily made by groups such as committees or work groups. Yet, reviewing the literature on project planning, it seems that scholars have failed to consider the significant role of the planner function embodied in a group (see Buehler’s et al., 2005 concern). More importantly, groups are perceived as acting and behaving differently than individuals in many circumstances (see e.g. Cooper and Kagel, 2005; Sutter et al., 2009; Kugler et al., 2012). Therefore, as reported in this chapter, the process that a ‘group’ goes through to produce a joint estimation of a completion time was investigated by means of the sequential explanatory mixed-methods design.

The result of the experimental study showed, first, that individuals expected working as a team to improve their performance and so result in a better (i.e. more accurate) completion time by 32.4% over doing the task individually. This finding reflects the positive approach of individuals towards teamwork and partnership in practice (see also Hayes 2002; Delarue et al., 2008). Second, as reported in Chapter 6, groups underestimated the time to finish the task remarkably in both no-interaction (GroupSTA) and group discussion (GroupGroup) situations. The averages of estimation bias for all 31 groups in both situations were 53.5% and 59.7%, respectively. Third, it was also found that group discussion and face-to-face meetings not only do not enhance the accuracy of time estimations made by a group but also result in poor estimation in comparison with the situation in which group members had no interaction with each other. This result was obtained by comparing the estimates generated by the statistical aggregation method (GroupSTA) with the estimates produced through consensus (GroupGroup). Similar findings to this have been reported by a few recent studies (see e.g. Kerr and Tindale, 2011; Graefe and Armstrong, 2011), which raised questions about the effectiveness of face-to-face meetings as a method of combining individual members’ judgements in order to arrive at group decisions. Fourth, the analysis of the quantitative data shows that 24 out of 31 groups had at least one person who tried to convince the other two members of his/her group that his/her estimate was the most accurate, thus reducing the collectivity involved in the joint decision made by those groups and ignoring the divergent preferences of individuals. This non-summative approach of collective intentionality, whereby if the collective intentionality of Group G is X, it does not follow that each member’s individual action-intention would tend towards X, was discussed in Chapter 3 (Tuomela, 2005). To put this differently, if a
group arrives at a conclusion, it does not mean that each member of that group individually agrees with the outcome (Sugden, 2000).

In this chapter, it was argued that the low collectivity involved in the joint decision made by groups was the main reason that groups produced more inaccurate estimates through the face-to-face meeting rather than the no-interaction situation. To understand why the sense of we-ness has been reduced during group discussion, the qualitative data were analysed through conversation analysis, thus leading to the following issues, which were discussed in great detail in Section 7.3.3:

- Sense of power: group members have a subjective sense of power and feel that they can exert influence over the outcomes and experiences of others (Van Kleef et al., 2008). They are more self-focused and less dependent on others for their contributions (Pitesa and Thau, 2013);

- Commitment: group members exhibit a lack of team commitment and intention to cooperate with others. They do not believe strongly in the team’s goals and values and are less determined to reach them (see also Locke and Latham, 1990);

- Confidence level: group members feel that they are capable of doing things better than others. As a result, they are less likely to accept or process new or contradictory information (see also Credé and Sniezek, 2003);

- Cultural diversity: group members from individualistic cultures tend to show competitive orientation within their teams and attempt to demonstrate their superiority and excellence (see also Chatman and Barsade, 1995);

- Conflicts: group members have relationship conflicts and so create a stressful and disruptive work environment which impairs cooperation and productivity among team members (see also De Dreu and Weingart, 2003);

- Groupthink: group members disagree with the group decision privately but in the interests of reaching a quick agreement and maintaining a shared positive identity as a group, they do not challenge that decision (Janis, 1972).

As can be seen from the above, analysing qualitative data led to some interesting findings which can be used by project managers to resolve preference disagreement among the planners’ team and enhance collectivism within it. As a consequence of these
findings, planners should be better prepared to achieve more reliable and accurate forecasts. In order to add value and credibility to these findings, in the next chapter a few interviews will be conducted with project planners, and the results will be compared and contrasted with those mentioned earlier in the current chapter.
Chapter 8: Interviews with practitioners

8.1 Introduction

The purpose of this chapter is to extend the findings of the experimental studies concerning the role of planning intentionality in explaining the presence of delays in practice. By closely scrutinising the process through which planned project time is determined, the present research can explore the role that project planners play and identify the issues that help or hinder their ability to deal with unforeseen events (unintended) as well as predictable contingencies (intended).

With a discussion of its general objectives and methodological direction as well as the specific approach taken in its application to this research, this chapter introduces content analysis as the method of data analysis used herein. Next, this chapter analyses the qualitative data collected through seven structured interviews with project planners working in the construction industry. Finally, it presents the findings according to the five topics which were developed in previous chapters of this study from a content analysis perspective.

8.2 Data interpretation in qualitative content analysis

Beaugrande and Dressler (1981, cited in White and Marsh, 2006) argue that seven criteria should be used to define a text as the main form of data used in qualitative content analysis: cohesion, coherence, intentionality, acceptability, informativity, situationality, and intertextuality.

Viewed as data that is coherent, cohesive, intentional, and informational, text is presupposed, therefore, to follow a logical and argumentative structure which gives it its meaning. The text’s meaning is often established through identification of recurrent relationships that may not appear linguistically evident and require further interpretation by the researcher; the researcher therefore must adduce the underlying coherence within the text as a necessary ingredient for interpretation. By the same token, the researcher is presumed to build the text with the aim of conveying meaning, that is, the text is presumed to carry a certain and definable intentionality (White and Marsh, 2006).

The text is, in addition, presumed to be context specific, that is, to be acceptable under certain conditions, and to be situational and inter-textual inasmuch as it relates to other context-specific texts (i.e. a paper on macroeconomics can be read in light of previous...
texts in the same field and on the same subject). In addition, the texts used in content analysis can, in fact, come from a variety of sources: reviews, interviews, questionnaires, problem statements, articles, posted messages, and even job advertisements. It is, to a degree, up to the researcher to select and justify the use of particular texts, in particular when discussing articles. Texts derived from interviews (transcriptions in most cases) are characterised by open-ended questions and probing (e.g. the researcher uses expressions such as ‘go on’, or ‘tell me more about that’ in order to encourage interviewees to expand on certain questions or topics) (Hsieh and Shannon, 2005).

8.3 Interview procedure

The number of interviews used here for content analysis is seven. This number of interviews may be too small for generalisation, but it is still valid for the qualitative interests that guide this research (Talja, 1999). The small number of interviews does not mean that the data to analyse is equally small. On the contrary, this small number allowed this research to provide rich data and in-depth arguments on a series of ideas, topics, and issues related to project planning as such, to the role of project planners and managers, and to the most relevant issues with respect to project delays and time estimation.

All interviewees chosen for this part of the research are males with ages ranging from 30 and 40 years and with an average age of 33.7 years. All interviewees work in the construction industry and occupy a planner role (although one worked previously as a site manager and another as a quantity surveyor). The participant selection method was based on both convenience sampling and snowball sampling. In fact, three of them were the researcher’s classmates in a construction management course during master’s studies in 2008-2009 and had started their jobs in construction after obtaining their MSc degree. After interviewing them (convenience sampling), the researcher asked them to introduce him to any colleague who was a project planner and could be a good knowledge contributor to the notion of his research. Through this, four other research informants were recognised and interviewed (snowball sampling).

It should be noted that these two types of sampling method are often criticised for their selection bias and lack of randomisation (see e.g. Saunders et al., 2009). However, in the present research, familiarity and trust with the interviewees enabled the researcher to
collect more genuine and reliable data from them, as they would be more likely to submit honest opinions due to their trust in the researcher.

Interviewees’ work experience ranged between three and ten years (with an average of 5.6 years). Five out of the seven interviewees are working in the UK construction industry, and another two are working in Lebanon and Iran (but both had experience working in the UK). In total, five face-to-face interviews and two interviews using Skype were carried out. The interviews took a maximum of 60 minutes to complete and a minimum of 40 minutes.

All interviewees were fluent in English, and there was no communication problem during interviews. However, as only one of the interviewees was a native English speaker, their responses may contain minor grammatical errors. Table 8.1 below presents the basic profile of all participants.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Age</th>
<th>Industry</th>
<th>Position</th>
<th>Work Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewee 1</td>
<td>30</td>
<td>Construction (Iran)</td>
<td>Project planner (Site manager)</td>
<td>3 years</td>
</tr>
<tr>
<td>Interviewee 2</td>
<td>34</td>
<td>Construction/Oil &amp; Gas (UK)</td>
<td>Project designer</td>
<td>5 years</td>
</tr>
<tr>
<td>Interviewee 3</td>
<td>30</td>
<td>Construction (UK)</td>
<td>Quantity surveyor and project planner</td>
<td>4 years</td>
</tr>
<tr>
<td>Interviewee 4</td>
<td>35</td>
<td>Construction (UK)</td>
<td>Project planner</td>
<td>4 years</td>
</tr>
<tr>
<td>Interviewee 5</td>
<td>34</td>
<td>Construction (Lebanon)</td>
<td>Project planner and designer</td>
<td>7 years</td>
</tr>
<tr>
<td>Interviewee 6</td>
<td>40</td>
<td>Construction (UK)</td>
<td>Project planner</td>
<td>10 years</td>
</tr>
<tr>
<td>Interviewee 7</td>
<td>33</td>
<td>Construction (UK)</td>
<td>Senior planning engineer</td>
<td>6 years</td>
</tr>
</tbody>
</table>

Source: Field work

Before starting an interview, the purpose of the interview was explained to interviewees and they were informed that our conversation would be tape recorded and that all quotations used for publication would be anonymised to protect their identity. Next, similar to previous interviews conducted as part of the pilot study and Experiments 1 and 2, some opening questions were posed about their lives, the cities in which they live, their experiences in the UK, and so on, to make them feel comfortable enough to start talking and participating in the discussion.
In the next step, the interviewees were asked some general questions about their jobs, their previous work experiences, their positions in the current company, and their responsibilities. After that, some specific questions were asked regarding to this research. These questions, developed from the literature review and two mixed-methods studies conducted as part of the present research, were categorised into five topics, which, along with the interview questions, are displayed in Table 8.2.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Number</th>
<th>Interview Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The role of planners</td>
<td>1</td>
<td>What are the main responsibilities of project planners?</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>How do planners approach project completion time?</td>
</tr>
<tr>
<td>Changes in project planned time</td>
<td>3</td>
<td>What are the main reasons for changing a project plan? and how those changes could affect project completion time?</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>To what extent do you believe that time overrun (delays) is the consequence of 1) Flawed expectations or a biased optimism in their time predictions (unintended changes) and 2) strategic changes that affect the predictions to obtain the project and funding (intended changes)?</td>
</tr>
<tr>
<td>Knowledge, experience and incentives</td>
<td>5</td>
<td>To what extent does having more knowledge and information and having more skills and experience regarding the outcomes of the project help planners to make more accurate time estimates?</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>To what extent do incentives (or being in a competition for bidding) affect the ability of planners to improve their time estimates?</td>
</tr>
<tr>
<td>The dynamics of interaction and teamwork</td>
<td>7</td>
<td>What is the role of teamwork from a planners’ point of view?</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>To what extent do face-to-face meetings affect the quality of decisions made by planners?</td>
</tr>
<tr>
<td>Issues affecting collective-decision making in meetings</td>
<td>9</td>
<td>What are the reasons for not arriving at a full agreement among the planners’ team?</td>
</tr>
</tbody>
</table>

Source: Field work

8.4 Data analysis

After finishing each interview, the researcher immediately transcribed it fully. The researcher also asked his wife (who is a PhD student) to check the transcripts one more time in order to minimise any error in understanding or typing. The full transcription of all interviews resulted in 155 single-spaced pages of transcripts. Similar to previous interviews as reported in Chapters 6 and 7, NVivo 9 was used in order to organise and manage these interview transcripts.

Deductive content analysis was used to analyse interview data collected from practitioners. This type of analysis is suitable when researchers want to “retest existing
data in a new context” through testing categories, concepts, hypotheses, or models (Elo and Kyngäs, 2008, p. 111). Hsieh and Shannon (2005) call this strategy the *directed approach* to content analysis and note that this strategy enables researchers to determine the relationship between different variables and to add value to their prior research which might be incomplete or would benefit from further description.

The first step in carrying out directed content analysis was to develop initial coding categories with the predetermined codes. Therefore, the data were coded according to the five categories of analysis listed in Table 8.2 and so started to develop a categorisation matrix. The categories are a product of the literature review, and the aim of the analysis is to understand the way project planning is defined as well as to understand the intended and unintended role that project planners play in generating time estimates. The next step was identifying the relationships between codes. In doing so, the answers of each question were categorised in Table 8.2 and then compared each interviewee’s responses so as to identify 1) shared used of terms and definitions, 2) shared or similar ideas, and 3) differences in the responses given (see Appendix L for details). For example, initially the usage of shared terminology and the appearance of similar ideas with respect to project changes, delays, and estimations, as well as specialised skills and knowledge were investigated. Then, the responses from different interviewees were compared and contrasted in order to discover recurrent relationships so as to establish the text’s meaning. Finally, the interpretation was made as part of the analysis. The resulting interpretations for each of the five categories are discussed in the following section.

8.5 Findings

In this section, interviewee responses are analysed from a content analysis perspective according to five topics: 1) the role of planners, 2) changes in project planned time, 3) knowledge, experience and information, 4) the dynamics of interaction and teamwork, and 5) issues affecting collective decision making in meetings.

8.5.1 The role of planners

In general, interviewees mentioned that planners have to take into account every single detail of their projects based on pre-determined project milestones so as to be able to identify how the work needs to be done and how long it will take and to establish the sequence of activities. Interviewees 3 and 6 noted that, before planners start to plan
projects and conduct their surveys and all investigations, they have to know the clients’ demands and requirements. Interviewee 6, for example, articulated:

“A lot of project sponsors do have a specific time requirement, and regardless of their insight of the technical matters, it is important for them that their project finishes at the right time, so then you would need, as a professional, to go back to them and ask them about the specific timely requirements that they have”.

In addition, Interviewee 6 also declared that it is important to know about the ‘availability of financial resources’ of the project sponsors before the start of the planning process.

Interviewees 3 and 4 both suggested that planners must be ‘persuasive’ in a sense to convince clients to sign the contract with them. Interviewee 3, for example, stated:

“I was a part of the team that was doing the bid on the contract. So we had to show to the clients that we were able to do the job, not only on paper but the sequence of work. That’s how I see planning: sequence of work, and the way we did the sequence of work, we basically prove to them we are able to do that based on their requirements”.

The above statement shows the importance of planners’ actions before starting a project and how influential their role is in being awarded the contract and winning the tender. Even after starting the project, planners can still have a significant impact on project success or failure. However, Interviewee 7 argued that their role as project planners is often neglected during the construction phase. Specifically, he mentioned:

“Planners are not taken seriously in most of the companies. It is just project managers and lead engineers. But, I think like our company, the planning department should be the most important department, that kind of status”.

In his point of view, lack of attention to planners is problematic and will result in project overruns and loss of profit. Interviewees 2 and 5 also referred to this perception.

In addition, interviewees repeatedly used the terms ‘budgeting and cost control’ and ‘time estimating’ as the main responsibilities of the project planner. Although in the literature of project planning, the emphasis is placed more on the former, Interviewee 3 stated the opposite:

“Time is always gonna match the cost, and usually time is more important than cost, in most occasions. As a quantity surveyor, I shouldn’t be saying this, but this is the truth and reality. The client would say, especially the client that’s focused on time, he would say, just get on with it, and let’s get the job done on time”.
As can be seen from the above statement, Interviewee 3 apparently believes that ensuring timely delivery of projects is an important requirement of many clients of the construction industry (see also Othman et al., 2006). He also gave an example illustrating the importance of ‘time’ in construction projects:

“I’m not sure if you heard about the train tracks in the south of the UK. There are train tracks on the coast, and there was a flood a few months ago. And the flood destroyed the train tracks, and that was a huge problem. So the trains can’t go from one side to another side of the country because of the train tracks problem, so they employed people at the highest price. They left them with open cheques and said, “Get this done in one week and you will have this amount. You’ll have this amount if you get it done in two weeks”. It would definitely cost less under normal conditions, but they wanted it to be on time”.

The above example is reminiscent of the statement made by Blount and Janicik (2001), that “time is costlier now than ever” (p. 566). To avoid consequences of delay, and timely failure, organisations sometimes have to pay a price for it that is even higher than their profit, e.g. the 2012 Olympic Games in London with a 100 percent cost overrun (Flyvbjerg and Stewart, 2012). In addition, the above responses from Interviewee 3 increase the credibility of the present research because, unlike previous research, which was mainly motivated to deal with the problem of cost overruns, the focus of this study is exclusively on project delays.

8.5.2 Changes in project planned time

Although there was no shared agreement among interviewees about the reasons for delays, they raised the importance of both unintended and intended actions of actors and how these issues are influential in shaping project delays.

Unintended changes

The raison d’être for unintended delays was mainly related to client-initiated changes and inexperienced staff. Clients were either charged with being unreasonable or of exerting pressure on construction companies to change their schedules. For example, Interviewee 6 noted:

“A client changes their mind in terms of the products, in terms of the quantities. The sponsor changes their mind because of, again, a lot of things: market situations, financial problems or financial benefits. They change the scope quite dramatically. To be honest, when the scope is changed, everything automatically changes”. 
As can be seen from the above response, Interviewee 6 believes that changes in the project plan are mainly due to faults of the client and sponsor during implementation. Similarly, other interviewees seemed to agree on blaming clients for their change requirements. Moreover, interviewees stated again that inexperienced planners were likely to fail in the accuracy of their plans, leading in turn to delays. For instance, Interviewee 1 referred to this issue as follows:

“I’m not going to say that the planners are not doing it wrong because you are human and we can do it wrong, but the whole idea is if you’re experienced enough and you’ve done the work before you’re expected to do something right, and have the right approximation under a time, and how you’re going to deliver the assignment”.

Interviewee 1’s quotation above implies that, although he believes that planners are imperfect and can make mistakes, experienced planners are less likely to fail in the accuracy of their plans and estimations, leading in turn to delays. This belief is in line with what has been described as unintended errors of planners in producing time estimates. To avoid such problems, all interviewees (except the most junior) stated that, depending on the type of project, they take margin of error into account. For example, Interviewee 2 mentioned:

“Definitely all projects have changes and it is very important that you can monitor those changes and you can charge a client for those changes and again a lot of unknown is coming, so a good project planner should have a very good idea about the contingency of the project”.

As can be seen from the above statement, Interviewee 2 believes that it is important to take contingency into account prior to planning. This belief refers to the shared agreement among interviewees that ‘changes are inevitable’. Contingencies, despite being accepted as part of the job by all interviewees, are reduced either to being changes originating from the client or to being predictable and, thus, fully accountable events. This apparent overconfidence on the accuracy of project plans is akin to the findings from Experiment 1.

Furthermore, interviewees all agreed that ‘under normal conditions mistakes should not take place’. This finding seems to confirm the fact that project plans are seen as fundamentally accurate plans, whose measures of success are the ways they manage costs, time, and resources efficiently. In other words, time estimations are seen as the result of accurate plans, and delays are not perceived as the result of contingencies. This perception is consistent with the findings of the literature review presented in Chapter 2;
prevailing studies assume the project plan is always ‘right’ at the early stages of the project and delays are therefore a consequence of flawed execution. This also illustrates the future-perfect thinking of planners whereby they tend to visualise future actions in the present and neglect that their understanding about the future is incomplete in relation to the full range of consequences. Thus, they may face unexpected surprises during task implementation; even though they have experienced such surprises in the past (see Chapter 6).

**Intended changes**

In contrast to unintended changes, interviewees also mentioned the effect of intended changes. The raison d’être of intended changes is primarily to make more money and obtain higher turnover. Five of the seven interviewees admitted that they had made such changes in project plans due to pressure from their company or project manager. This confession/admission by the planners was made possible only, as discussed, because of the choice of convenience sampling and the consequent familiarity and trust between the interviewer and interviewees. For example, interviewee 3 noted:

“First of all, we would not be able to win the bid if there was a big difference in time, because you always hear about people saying, ‘Cost and quality’. When you talk about going into a bid, and you want to win a bid, you have to make sure that you show the clients that you’re comfortable in reaching the time and the amounts that they specify for these projects, also with the best quality that you’re able to. These are the three things that you’ll do”.

As can be seen from the above response, Interviewee 3 believes that, to win the bid, planners need to show that ‘everything is perfect’. This recalls Flyvbjerg’s (2009) statement about strategic misrepresentation, “A project that looks highly beneficial on paper is more likely to get funded than one that does not” (p. 352). Similarly, Participant 7 stated:

“But technical, emm I wouldn’t say it’s a main reason, because you’re talking about people who have been doing the thing for 25, 30, 40 years. So I wouldn’t say it’s always a technical problem. I agree with the third, that it’s the politics. Not the politics of the contractors pushing, but the politics as a whole idea. The client sets up the time, and the client does not usually have experience with time frames, and stuff like that, and the contractor, they need to make some money somehow. They want to live, so they want to bid on a contract, and they would probably seem like they’re pushing on the planners, too, squeeze it together to make a plan for the clients. I can lean onto this reason more than the other two”.
The above quote is interesting since Interviewee 7 clearly admits that planners (and contractors) intentionally attempt to convince clients to choose them for the project by squeezing the plan so as to represent the ideal time-frame (along with budget and quality) for clients. He also notes that technical problems are not the raison d’être for delays (which is similar to the discussion made in Chapter 2). This finding extends Flyvbjerg’s conception of strategic misrepresentation since his (and his colleagues) focus was mainly on megaprojects, which are typically subject to a great deal of political pressure, and yet the present research illustrates that even in smaller scale projects such an issue is observable and indeed relevant.

In Chapter 6, four reasons were found for strategic misrepresentation through analysing the qualitative data, namely: lack of accountability, interest maximisation, opportunism, and asymmetric knowledge and experience among project actors. In this chapter, the analysis of the data collected from practitioners confirmed the influence of the last three on strategic changes. For example, Interviewee 6 noted:

“People may follow their own personal interests. It might be that they are loyal, it might be because of their own personal interest, and also it goes back to people’s personality, I think”.

After his response, I asked him, “What do you mean by interest,” and he replied:

“It can be anything, to be honest. It can be financial, it can be political, inside the company. It can be a conversation between different companies. It can be benefits of the old companies, or benefits of their own personal, as a person, benefit for themselves, just to prove to themselves that they are worthy—it can be a lot of things, to be honest”.

The above responses from Interviewee 6 demonstrate that planners tend to act more strategically when they attempt to maximise their own interest (and even their companies’ interest). The rationale here is that, as a project goes forward, it creates work and makes money for all project participants, from planners to construction workers (see Flyvbjerg et al., 2009). This is also related to the competitive environment in which organisations want to bid for a project and win, especially when they know that the ‘lowest bid wins’ system is favoured by the owners (Assaf and Al-Hejji, 2006). In Chapter 6, it was argued that such situation often raise the possibility of opportunism among contractors and planners (see also Winch, 2001). For instance, Interviewee 3 mentioned:
“As soon as a client puts a project outside, you have to come and say, by coming to agree to bid, you agree that you are happy with the time frame that they’re putting on, and the cost”.  

As can be seen from the statement above, Interviewee 3 believes that organisations need to bid competitively for a project to win, even if they know that their estimates are immature and far from reality. This action is thus an ‘intentional action’ based on the arguments made in Chapter 3. Another reason mentioned by interviewees for these types of intentional actions was clients’ lack of knowledge (or experience) about the projects. Similar to the findings of Chapter 6, planners noted that the asymmetric knowledge between them and the client’s team led them to make strategic changes in estimates. This issue will be discussed in more detail in the next section.

8.5.3 Knowledge, experience and incentives

Knowledge

Five out of seven participants agreed that ‘knowledge about the concrete conditions of a project is crucial for its success’. One may still question whether this knowledge is a product of experience, information, or education. In fact, the analysis showed that participants did not share a clear view on this, with terms like contingency management, communication skills, and execution strategy appearing often in their responses, although without a clear trend. For example, the most junior participant stated that ‘specialised knowledge about the type of project is needed for proper planning’. There was, moreover, no clear mention of education except by Interviewee 4 (one of the senior participants), who stated:

“I will give you an example. I know a few people who are designers but working as planners for a construction project. They may be very good at the software they are using, okay? But the company is not happy because they don’t understand how a building behaves in terms of construction. So, it’s always important, I would say because my qualification, I am a civil engineer, so when I am working for a construction project as a planner, I do understand the engineering side of the building, how much time it would take to cure RCC construction and what’s a steel column and what’s a concrete column, how much time it takes to have scaffolding on the construction. Those would be ordinary civil engineering aspects of the project which I would understand better than a person who doesn’t have a qualification or knowledge about the construction project”.

As can be seen from the above statement, Interviewee 4 raises the importance of having an educational background besides having specialised software skills. He believes that, in general, the industry undervalues the role of education. This is in line with previous
research by Winch and Kelsey (2005), which found that planners need to have a good understanding of site processes and details of construction works (see also Laufer et al., 1994).

**Experience**

The consensus view among interviewees seems to favour experience as the main source of knowledge and accurate project plans. Four interviewees mentioned that knowledge and experience go hand in hand. For example, Interviewee 1 noted:

> “Planners would have higher knowledge when they have more experience. I would put knowledge and experience at the same level”.

The above viewpoint is mainly shared among other interviewees (except Interviewee 2). They all agree in stating that ‘a plan’s accuracy increases with experience and knowledge’. Statements such as this were accompanied by explanations such as “Experience and knowledge are essential to problem identification and resolution” (Interviewee 4) and “Experience provides better judgement in general” (Interviewee 6). Additionally, Interviewee 4 was asked, “Why do you think experience is really important?”, he replied:

> “Because inexperienced people cannot follow the right way, see it’s very important to, when you make a plan, if you are inexperienced, you make a plan which is not realistic. We always should make sure that we sit with the experienced people to crosscheck what we are doing is correct or not”.

The above response from Interviewee 4 highlights the importance of experience in project planning and how it can lead to more accurate estimates. In addition, there is a positive relationship between experience and skill with intentionality (see folk concept of intentionality in Chapter 3). When planners have the right skill set and experiences, they are expected to intentionally propose the right course of action while less experienced planners might unintentionally fail since they lack the necessary experience and skill. In line with this argument, Interviewee 1 mentioned:

> “The whole idea is that if you’re experienced enough and you’ve done the work before then you’re expected to do something right, and have a right approximation under a time, and how you’re going to deliver the project”.

As can be seen from the above statement, Interviewee 1 seems to justify the importance of experience, as one would expect that rules of thumb would be better understood and implemented by planners with greater experience. Thus, seniority is perceived as
fundamental to proper planning, making senior planners much more valuable than juniors.

**Incentives**

There was no shared agreement about the role of incentives in better prediction of time. The analysis shows that the two most senior participants agreed in saying that ‘monetary incentives cannot determine a person’s commitment to a project’. One of them stated:

“It depends on employers but what I would say is if you are making a good plan you are doing your own job. If you’re not making a good plan, then you are not in the correct field. So I wouldn’t exactly say that if your plan is working, then you should be given some credit”.

The above statement from Interviewee 4 shows that he dismissed monetary incentives as something positive, affirming that a planner’s job was to make accurate plans and that he should not be rewarded for doing his job properly. With the exception of Interviewee 1, all other interviewees did not link monetary incentives with improvements in productivity or any other aspect. Interviewee 1 stated:

“As you know for some of the contracts if contractors could deliver earlier than they approximate the work, they are going to get some additional cash back...like incentives. I think in this sense they would be more conservative, than taking much risk”.

As the above statement implies, Interviewee 1, who was the most junior research informant, believes that incentives awarded to increase accuracy make contractors (and even planners) have better judgements about the outcome of the project and also contribute to better performance. This perception is, in fact, in line with the findings of Experiment 1 of the present research, which showed that awarding accuracy incentives results in more reliable estimations.

**8.5.4 The dynamics of interaction and teamwork**

**Importance of teamwork**

There was a shared agreement among all interviewees that teamwork is a necessity in construction projects because practitioners have different skills, experiences, and knowledge which, when shared, improve performance and quality of decisions. For example, Interviewee 1 noted:
“You are not going to be able to work on your own. You need to talk to the ones with different perspectives of the work from different areas with higher levels of experience”.

The above statement from Interviewee 1 shows the significance of interaction with other people in the context of projects. After his response, he was asked the following question that, “How does a team determine a project plan?”, to which he replied:

“If the plan is not discussed with other people, then it is not going to be a good plan. We need to make clear that whoever the stakeholders are, it could be from a technician who is working on the site, or could be the project director, or the company director who is the top level, they should be involved. I mean they should be explained about the plan, and their opinions should be asked. Because it is a team effort and everyone should have their inputs. If people do not get involved in the team effort and making the plan, then that plan is not going to work”.

The above statement from Interviewee 1 highlights the importance of teamwork in producing a project plan. Other interviewees raised the same point to some extent that ‘if people do not get involved/agree with the plan, they are not going to follow it (Interviewee 7) or take it seriously (Interviewee 5)”.

**Face-to-face meetings**

Moving on to the set of questions related to teamwork and the role that meetings play in project plans, the analysis revealed two shared responses: ‘Decisions are made based on the knowledge and information you can get’, and ‘people with the higher experience will make the best decisions’. Given what participants failed to say about the role of education in producing such knowledge, it seems again that participants explicitly (intentionally) and implicitly (unintentionally) favour senior experience over any other factors in determining a project’s success. For example, Interviewee 1 mentioned:

“The experienced person in the team knows many things already and has experience in terms of how he is going to just deal with different things, so I’m going to trust him. Also, if he is experienced enough he is going to collaborate because he knows that he can finish the work sooner in this way”.

As can be seen from the above response, Interviewee 1 believes that those in the planning team who are more experienced are more trustworthy and reliable. His point of view was similar to that of Interviewee 2, who was bold enough to directly state that ‘decisions should be made primarily by those in higher echelons of power’. Unintentionally, however, seniority seems to provide planners with the ability to coordinate efforts in a top-down manner. This naturally raises the question about the
importance of power relations, which was discussed in Chapter 7. In such a situation, it seems that meetings are not perceived as events where discussion and different points of view are shared in construction projects. Collective intentionality seems to come as a result of hierarchical responsibilities, rather than anything else. For example, Interviewee 3 noted:

“...where that person saying to you that this has to be done this way, then sometimes you do not even have time to think about it and you’re just gonna have to agree or disagree to it. If you disagree, you’re out of the project!”

The aforementioned statement from Interviewee 3 indicates that opinions arising from the personal interest of a senior person can change the outcome of teamwork, whereas a less experienced/confident person would presume not to express such opinions but would follow the lead of the senior member of the meeting. For this reason, three interviewees noted that ‘the right attitude is important for teamwork to be productive’. They noted that if people share “good faith”, then meetings will achieve their genuine purpose of improving coordination between those involved in the work or project at hand. In general, interviewees admitted that having face-to-face meetings is better than having no interaction in terms of producing time estimates. For example, Interviewee 3 stated:

“You are talking about millions of pounds difference, not just hundreds or thousands, it’s millions. And if they get that wrong, it’s disaster. That’s why they have to meet as a group, as a team, and work together, et cetera. I believe in such a situation, practitioners would have to have a face-to-face, and have proper discussions”.

According to Interviewee 3, having a face-to-face meeting is far better than having no discussion. This, however, contradicts the findings of Experiment 2 of the present research, i.e. that using methods such as statistical aggregation (which is based on using certain central tendency statistics) leads to slightly better forecasts than group discussion. Indeed, all interviewees disagreed with this finding and noted that ‘it is impossible to specify project outcomes without having any discussions and face-to-face meetings’.

8.5.5 The reasons for low collectivity in joint decisions

Participants were asked about distinct idiosyncrasies and factors concerning project planning and their collective decision-making, and the analysis of their responses revealed a clear bias towards thinking that seniority is ‘key’ in terms of better planning and decision-making. In fact, interviewees not only agreed on this statement, but also
added others such as ‘experienced people collaborate more than inexperienced’. For example, Interviewee 7 stated:

“They were experienced enough in that project to say how long it would take for them to deliver some set amount of work so, we could just carry on with what they were saying. When experienced people are in the team, you are more confident”.

As can be seen from the above statement, Interviewee 7 assumes that, when there is an experienced member in the planning team, he can rely on what that person says. This assumption was quite common among interviewees of the present research. Planners appear to believe that they have to ‘trust’ and ‘respect’ senior people in the team. This is a type of bias that discourages less senior planners from expressing either opinions or criticisms. When the most junior interviewee was asked, “What do you think managers should do to avoid such a problem in group meetings?”, he stated:

“I would say they should give equal chance to other team members to share their ideas. In this way if you have someone who is so dominant and wants to just say that, “My plan is working”, the role of the manager is to hold that guy or person down, and let the others share their ideas. In this case, after collecting others members’ ideas, the manager can say, “Okay, your whole idea is good, but we have a better idea”.

As the above statement illustrates, Interviewee 1 suggests that managers’ duty is to balance the power among team members and allow less dominant members to express their ideas. However, there are situations where power relations appear to determine the way teams coordinate efforts towards a single goal and hinder collectivism. For instance, Interviewee 3 stated:

“One of my friends, he was telling me how his project manager wants him, the whole project manager, not the construction manager, he wants him to put a higher budget for something, and he didn’t want to agree to it, because he had thought about it. He was not very sure, so he took his time, and calculated it two or three times, and he said, “No way”. He lost his job in that project. Obviously it was taken back to the office, and worked with someone else. But it was the decision that he made, that he didn’t feel comfortable with someone dominating him”.

The above statement from Interviewee 3 is tragic in a sense, in that it shows how power makes people more self-focused and less dependent on others for their contributions. In such a situation, the point of meetings is not to reach a consensus; rather, it is a method that superior members use to say ‘who is right’ (see e.g. Bonaccio and Dalal, 2006). The above story is not unusual; similar stories have been mentioned by previous studies in the literature of project planning (see e.g. Wachs, 1989).
8.6 Summary of findings

This chapter outlined the procedure used in conducting seven interviews with project planners working for different construction companies and reported the associated data analysis, results, and findings in order to strengthen and enhance the scope of the findings of the two mixed-methods studies presented in Chapters 6 and 7 of this thesis.

The directed content analysis led to three main findings. First, the research informants pointed to the importance of both unintended and intended actions of actors in shaping project plans and how these result in project delays. With respect to unintended delays, planners were found to not only blame clients for their change requirements but also contend that a plan fails due mostly to inexperienced and unqualified planners and staff (see also Heesom and Mahdjoubi, 2004). On the contrary, for intended delays, planners confirmed that, in order to win a bid, be awarded the contract, and obtain a higher turnover for their companies, they have to ‘squeeze’ the plan in such a way as to represent ‘everything is perfect’, even if they know that their estimates are immature and far from reality (see Flyvbjerg’s 2009 conception of strategic misrepresentation). They noted that the reason for this is pressure from their company or project manager as well as knowledge that the ‘lowest bid wins’ system is favoured by the owners (see Assaf and Al-Hejji, 2006).

Second, it was noted that interviewees had different understandings of ‘knowledge’; they defined it as the combination of experience, skill, information, and education. Yet there was a shared agreement among interviewees that having more knowledge and experience would result in more accurate plans and fewer project overruns. In addition, no relationship was found between monetary incentives with improvements in productivity or any other aspect of the planner’s job. Only one of the interviewees noted that incentives for the purpose of increased accuracy would cause contractors (and even planners) to have better judgements about the outcome of the project, but he himself had never received such an incentive and his statement was thus based on his personal speculation about how accuracy incentives might work.

Third, the importance of teamwork in project planning in order to improve the quality of decisions and to obtain/share different skills, experiences, and knowledge was noted by almost all interviewees. The assumption shared by them was that senior experienced members are expected to make better plans and better decisions overall as well as to take the lead in all team efforts and meetings. It was also found that a senior person can
change the outcome of teamwork by not allowing a less experienced person to express his/her opinions, and this less experienced person will instead simply follow the lead of the senior member of the meeting (see also Tost et al., 2012). In such a situation, collective intentionality seems to be taken for granted as a result of seniority (or hierarchical responsibilities), rather than anything else. There is thus no negotiation or argumentation involved in project planning but rather discipline and commitment, which one must conclude are followed by junior team members who agree to the rules of the game.

This chapter provided the research findings of interviews with project planners in order to enrich and extend our understanding of the reality of project planning, relate these findings to those obtained from experimental studies mentioned in previous chapters, and thus overcome the deficiencies found in those previous studies with regard to generalisability of findings.

The next chapter further discusses the research findings and provides a review and conclusions of the research project as well as the study’s theoretical and practical contributions, limitations, and recommendations for further research.
Chapter 9: Discussion, conclusions and recommendations

9.1 Introduction

The preceding three chapters presented the research findings from two mixed-methods studies and interviews with practitioners. This final chapter summarises, discusses, and evaluates these findings with respect to each other and to the existing literature provided in Chapters 2 and 3. By doing so, it contributes to the current understanding of planning in construction projects while increasing the strength and overall quality of this study’s research. Reflecting on the overall research project, it draws conclusions, identifies its theoretical and practical contributions, describes the study’s limitations, and recommendations areas of further research.

9.2 Summary and discussion of findings

The aim of this study was examine the role of planning intentionality in establishing project planned time. In so doing, the research seeks to explore how the intentional and unintentional actions of planners can influence the accuracy of the project schedule. To achieve this aim, five objectives were defined (see Table 9.1). Accordingly, five research questions were presented in Chapter 1 to provide direction and focus to the study. These are as follows:

1. Why has there been such reluctance to learn from previous poor performance and consequently no improvement in timely completion of construction projects over time? (discussed in Chapters 2 and 3)

2. How could intended and unintended actions of planners lead to the creation of delays? (discussed in Chapters 3, 6, and 8)

3. What are the key situational variables differentiating intended and unintended actions of planners and how do they influence the quality of time estimation? (discussed in Chapters 6 and 8)

4. How and to what extent does each individual planner take part in generating the ‘collective’ estimates made by teams? (discussed in Chapters 7 and 8)

5. Does participation in face-to-face meetings aid teams in reducing bias in their time estimation? (discussed in Chapters 7 and 8)
In order to achieve the purpose of this study and answer these research questions, two mixed-methods studies and seven interviews with practitioners were carried out and the results discussed in this thesis. The following subsections summarise the results for the research questions indicated and interpret them with respect to the pertinent literature: Subsection 9.2.1, Question 1; Subsection 9.2.2, Questions 2 and 3; and Subsection 9.2.3, Questions 4 and 5. In addition, Table 9.1

**Table 9.1: Accomplishment of the research objectives**

<table>
<thead>
<tr>
<th>Research objectives</th>
<th>The reviewed literature</th>
<th>Used research methods</th>
<th>Main findings</th>
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<tr>
<td>To critically review the current literature of project delays in construction</td>
<td>A review of the literature on project time overrun and cause-and-effect studies</td>
<td>Using Critical Management Studies (CMS) approach</td>
<td>-dominant stream of research is cause-and-effect studies in this area -Having the technocratic assumption that plan is right and deviations are therefore the results of poor performance</td>
</tr>
<tr>
<td>To identify the key situational variables differentiating intended and unintended actions of planners</td>
<td>-A review of the project planner literature -A review of the recent research on optimism bias and strategic misrepresentation</td>
<td>- Convergent parallel mixed-methods research (see page 171) -Pre-test post-test type of experiment (60 participants)</td>
<td>Knowledge and incentive were found to be key influential variables impacting project time estimation</td>
</tr>
<tr>
<td>To explore how intentional and unintentional actions of planners result in biased estimations of project time</td>
<td>-A review of the concept of intentionality in philosophy -A review of previous research on time estimation</td>
<td>-Semi-structured interviews with all experimental subjects -Merging the findings of quantitative and qualitative studies with the titled matrix -Structured interviews with project planners (N=7)</td>
<td>-Six reasons were found for the unintentional failure of planners (see Table 9.2) -Six reasons were found for the intentional failure of planners (see Table 9.2)</td>
</tr>
<tr>
<td>To examine the effect of group discussion on quality of time estimation</td>
<td>A review of the literature on group vs. individual time forecasting</td>
<td>- Sequential explanatory mixed-methods research (see page 217) -Pre-test post-test type of experiment (90 participants in 30 groups)</td>
<td>Group discussion resulted in poor estimation in comparison with no interaction among group members</td>
</tr>
<tr>
<td>To discover how individual intentions of planners are aggregated to the collective level</td>
<td>-A review of different methods of aggregating individuals’ preferences into a joint decision -A review of the literature concerning collective intentionality</td>
<td>-Semi-structured group interviews with 30 groups of experimental subjects-Structured interviews with project planners (N=7)</td>
<td>Six factors causing weak collective intentionality were found (see page 270)</td>
</tr>
</tbody>
</table>
9.2.1 Poor improvement in timely completion of construction projects over time

Previous research has shown that the problem of project overruns persists, indicating that no learning seems to have taken place in spite of the wealth of research undertaken on this topic (see e.g. Morris and Hugh, 1987; Odeyinka and Yusif, 1997; Assaf and Al-Hejji, 2006; Flyvbjerg, 2009; Glenigan Report, 2012). For example, Flyvbjerg (2009) shows that nine out of ten of his sample of 258 projects across 20 nations and 5 continents suffered overruns during a 70-year period (see Table 2.1 for more figures of schedule overruns). In order to understand why no improvement was observed in timely completion of construction projects over time, based on the first objective of this thesis, the current literature of delays in construction was reviewed by means of the CMS approach to reassess the ontological and epistemological assumptions that underpin this literature (see Chapter 2). This engagement with critical studies provided several benefits for the present research:

- To think beyond the lines of reasoning and practice dedicated to a narrowly rationalist perspective—based primarily on cross-sectional studies—and so open new avenues within the research agenda of construction delays;

- To re-examine and problematise the underlying ontological and epistemological assumptions of the existing dominant research underpinning prevailing studies on delays in construction projects (particularly related to factor research strategy);

- To consider the problem of project time overruns not only from the research’s point of view but also from the planners’ own perspective, i.e. their own perception of themselves, and gauge their influence in carrying out a project plan.

Through this process of critical evaluation, it was discussed how both construction management researchers and project planners play an important role in reducing the likelihood that planners’ learn from previous failures to accurately plan and so fail to make progress in learning. Each of these is addressed individually in forthcoming subsections.
Role of researchers

For a long time, many researchers in the field of construction management have tried to investigate the causes and effects of construction delays (see Appendix A). These studies have tended to focus attention on explaining the causes, which in turn would help guide practitioners identify possible measures for mitigating against (or even eliminating) such delays (see e.g. Assaf and Al-Hejji, 2006; Fallahnejad, 2013). This dominant techno-rational approach assumes that the problem of project delays is merely one of proper management and can be easily addressed by taking heed of the causal factors that the body of research has repeatedly identified. However, as mentioned in Chapter 2, this linear approach to delays in construction projects is somewhat acontextual, since knowing why delays occur does not guarantee error avoidance and the successful eradication of delays. This contention is in agreement with the findings of those scholars who take more critical perspectives and criticised project management for its rational and engineering approach, which viewed projects as ‘machines’ that should behave in a predictable manner. According to this perspective, a project’s failure to perform as expected should be fixable through application of the proper technology (see e.g. Morris, 1994; Green, 1998; Bredillet, 2008).

Moreover, the literature’s prevalent assumption of a positivist methodology, with researchers adopting quantitative methods (typically self-perception questionnaire surveys) to identify the factors causing construction delays, is striking. This type of survey suffers from a multitude of limitations. First, participants must choose a particular response among three or so possibilities, which may say little of what a particular participant really feels or thinks (Alvesson, 1996). At times, participants are forced to subordinate themselves to the subjectivity of the researcher who designed the questionnaire (Alvesson and Deetz, 2000). Smyth and Morris (2007) describe this type of conventional method as “atomising” research and disregarding the context in which practitioners operate and enact reality.

The review of the project delay literature revealed another conventional type of research in this area that focuses on improving accuracy of time estimation through such methods such as critical path (CP), PERT (Program Evaluation Review Technique), and Monte Carlo simulation (Bertelsen, 2004) or on building empirical models to predict construction duration as accurately as possible (see e.g. Khosrowshahi and Kaka, 1996). The BTC model, for example, was one of the first models to employ regression analysis
to estimate project duration when cost (as the main variable), client type, and the year of construction were known. Since then, countless studies have been conducted to evaluate and improve the BTC model or to introduce new models (see e.g. Chan and Kumaraswamy, 2002; Stoy et al., 2007). The similarity between these studies is that they initially identify, through use of questionnaire studies or literature review, a set of influential factors and variables that can affect construction time. Then, at the quantification step, they build and/or develop their construction duration models based on analyses and dependencies between those factors and variables (see e.g. Hoffman et al., 2007).

Although no one can deny that the tools and techniques mentioned above have aided planners, allowing them to understand problems more clearly and to reduce risk, very little was found in the literature on the significance of planners’ use of judgement concerning the future outcomes of the project and the social and political complexities associated with their job (see Chapter 5). This contention seems to be consistent with Jørgensen (2007), who notes that, in projects, planners not only use extensive estimation models and tools but also their expert judgement to generate completion time estimates. Others similarly argue that failure to consider human judgement causes construction duration models to often fail to estimate project completion time accurately (see e.g. Blattberg and Hoch, 1990; Goodwin, 2000).

Based on the critical evaluations presented above, it is argued that the linear and rational approach often taken for granted by researchers of construction delays needs to be viewed with scepticism. In line with what CMS scholars contend, the researcher believes that the conventional approach towards construction delays limits our understanding of the reality of the project delay, ignores the power of human agency in making and enacting decisions, and also lessens the possibility of stimulating further research and transferring knowledge to the practitioners in the construction industry.

To the best of the author’s knowledge, there has been no work raising the questions above about prevailing ontological and epistemological assumptions over the nature of delays in the construction management literature. However, in a broader perspective, project management researchers, in particular CMS scholars, have addressed the consequences of adopting a conventional techno-rational approach in PM. So, for example, Cicmil and Hodgson (2006) argue that scholarship that sought simply to apply standardised and rationalist ways of thinking about project management problems offers
only a limited perspective (see also Clegg and Courpasson, 2004; Van de Ven and Johnson, 2006; Winter et al., 2006; Pollack, 2007; Bredillet, 2008; Alvesson et al., 2009).

**Role of planners**

Previous studies on construction delays rarely considered the role of planners in explaining project delays. Winch and Kelsey (2005), for example, call for research attention to be directed towards construction management so as to emphasise the importance of investigating what construction project planners actually do. As a result, recent attempts in project management have been initiated by contemporary scholars to highlight the weaknesses of conventional scientific and naturalistic approaches in social science in capturing the complex world of planning; understanding its practice and processes; and explaining planners’ actions (see Flyvbjerg et al., 2009; Williams et al., 2009; Winch, 2013; Pinto, 2013). They have begun problematising the accuracy of project planning and the role of planners in erroneous estimations of project cost. By means of this, recent scholars distinguish between strategic bias and/or optimism bias in their estimates. A review of the literature revealed that planners play the former role when construction companies force/ask them to act opportunistically through use of strategic misrepresentation and provide the lowest bid in order to win the tender in the bidding phase. In fact, companies are aware that most project owners award contract to execute their projects to the contractor with the lowest bid. However, in reality the winning bidder will most likely be “the bidder who most underestimates” the actual cost and time of the project (Flyvbjerg et al., 2009, p. 23). In such a situation, planners intentionally do not want to learn from past failures and are more interested in focusing on paying back in the long run. This issue is in agreement with Pinto (2013), who stated that planners “are motivated to provide misleading data knowing full well that being honest about project challenges, real schedules, and quality expectations will lead to an unwillingness by top management to fund the project” (p. 651) (see also Winch, 2013; Flyvbjerg, 2014).

Unlike the situation described above, in still another case, the underlying motives of planners are not based on bad intentions. Rather, they fail to estimate completion time correctly due to optimism bias and so fail to rationally weigh gains, losses, and probabilities. For the most part unintended, this failure is due to planners’ cognitive mechanism and their desired end state. Seeing themselves as superior to others in
intelligence, judgement, etc., they view themselves as less likely to experience negative outcomes (see e.g. Kutsch et al., 2011; Buehler et al., 2012).

Optimism bias causes poor learning because the primary input into planners’ decision-making is information and details about the specific project (singular information) under scrutiny. Knowledge about the experiences and failures of similar events that took place in the past (distributional information) are ignored and so do not enter into the decision-making process. Thus, learning from past experiences and failures is curtailed, leading them to repeat their mistakes again and again. The positive effect of over-optimism on inaccurate estimates has been studied extensively in psychological and cognitive science (see e.g. Connolly and Dean, 1997; Kruger and Evans, 2004; Buehler et al., 2012), and also in project management (see e.g. Lovallo and Kahneman, 2003; Flyvbjerg et al., 2009; Kutsch et al., 2011).

Building upon the above explanations for forecasting inaccuracies, the current study has made the following contributions to the pertinent literature:

- Focusing exclusively on explaining ‘project delays’ using optimism bias and strategic misrepresentation explanations;
- Investigating the relationship and dynamics between optimism bias and strategic misrepresentation in a single context;
- Examining the applicability of optimism bias and strategic misrepresentation to other types and sizes of project (not only ‘megaprojects’);
- Studying the intentionalities of the planners involved in the planning process and differentiating between intended/unintended actions of planners;
- Focusing on the role of ‘groups’ in producing estimations of project completion time.

9.2.2 Planning intentionality and the influence of situational factors on project planned time

The second objective of the present research was to explore how intentional and unintentional actions of planners play out in producing biased estimations of project time. Therefore, the notion of *planning intentionality* is introduced to explore the intended and unintended roles of project planners in producing ‘inaccurate’ predictions of completion times and thereby a delays in projects. To the best of the author’s
knowledge, no work has been done so far that incorporates the notion of intentionality in the study of project time (and cost) overruns. Therefore, to fulfil the fourth objective of this research, the formation of unintended and intended actions of planners and the way these affect their actions were discussed and elaborated in Chapters 3 and 6 of this thesis in order to provide a better understanding of planners’ actions in producing biased estimates of completion times. The findings are summarised in the next two subsections.

9.2.2.1 Project delays and unintended consequences

From the unintended perspective, it has been argued that planners may make estimation errors with respect to project time due to natural limitations and delusional optimism (see e.g. Buehler et al., 2012). In an act of decision-making, planners formalise their intentions in the form of a project schedule at one point in time—the project’s inception. However, stability and controllability of the project with respect to the project schedule (i.e. the planner’s earlier intentions) is not guaranteed due to any number of causes (e.g. inclement weather, strikes, equipment breakdown, etc.). Bratman (1992) called such plans “future-directed intentions” and postulates that humans are epistemically-limited creatures; information is scarce and costly to obtain, and the survival and integrity of future-directed intentions to their eventual achievement at the time of action is not guaranteed.

The present research’s convergent mixed-methods study, described in Chapter 6, and interviews with planners, described in Chapter 8, revealed some causes as to why the future-directed intentions of planners might not be achieved (see Table 9.2 for summary):

- Planners’ thinking is in the future perfect (Pitsis et al., 2003), meaning that they retrospectively imagine the project as already accomplished and mentally reconstruct the essential steps needed to bridge the present situation and the future they visualise (Clegg et al., 2006). However, whether this vision of the future proves to be accurate or inaccurate, it will be “incomplete” in relation to the full range of possible materialisations of their vision (Winch and Kreiner, 2011). This research included Experiment 1, discussed in Chapter 6, in order to, in part, explore the role that previous knowledge (or its lack) play in time estimation. During Experiment 1 and in interviews with project planners, it was repeatedly noticed that people believe that, since they had performed a similar
task previously, future repetitions of the task would be the same as these previous ones and so would neglect to consider that their understanding of the future, in which novel events may occur to disrupt the task in unforeseeable ways, is limited. To counter this tendency towards the future perfect and project time overruns due to it, it has been suggested that, rather than engaging in still more detailed project planning (Stinchcombe, 1985), project promoters create a shared culture and research everyday organisational life (Pitsis et al., 2003). They can also use the multiple scenarios technique (Newby-Clark et al., 2000) to draw alternative images of the future by defining different scenarios (e.g. optimistic, best guess, pessimistic) based on different information that might be otherwise ignored.

- Planners do not think about the *unexpected surprises* that could occur during the construction stage, despite the fact that they have experienced such surprises in past projects (Hinds, 1999). This is consistent with what Winch (2006) argues, that planning future outcomes of projects could be accompanied “with many surprises along the way” (p. 167). The current study queried planners to discover the types of occurrences (i.e. surprises) to which they attribute project delays. The analysis of these interviews showed that the main causes for such surprises were related to client-initiated changes. Therefore, to reduce the number of such surprises, planners are recommended to list all “possible pitfalls” that could occur during project implementation prior to making their final prediction of completion time (Byram, 1997) or incorporate a margin of error (contingency) into the estimate (See Chapter 8).

- Planners are *overconfident* in producing their time estimation, a tendency stemming from an imagined illusory power or mastery over any technical issues and problems that could arise later in projects (Pollack, 2007). Accordingly, they tacitly assume that they are “experts” in what they do and, consequently, are more certain about their judgements than is warranted. This finding matches those of Hinds (1999) in cognitive psychology and Gervais and Goldstein (2007) in organisational studies. Hinds (1999), for example, found that, “although it may be expected that experts’ superior knowledge and experience should lead them to be better predictors of novice task completion times compared with those with less expertise, the findings in this study suggest otherwise” (p. 217). To reduce overconfidence, planners can, at the
time they decide on future plans, recall their past prediction failures so as to
direct their attention to previous failure (see also Buehler et al., 1994). They are
also advised to “focus on the acquisition of project related knowledge and
information, especially during the early stages of project management”
(Fabricius and Büttgen, 2013, p. 8).

- Planners are more present-oriented and less past/future-oriented. As a result,
  they view future outcomes more positively and fail to take into account long-
term consequences of their actions (Zimbardo and Boyd, 1999). Thus, present-
oriented planners take more risks in acting impulsively and make plans with
shorter time frames. This orientation towards the present is not deliberate;
rather it is due to cognitive temporal bias. This finding is supported by
Mohammed and Nadkarni (2011) in management studies, who noted that
present-oriented individuals “are likely to act rather than to deliberate” (p.
494). It is recommended that planners consider the cosmological notions of
timing (kairos), i.e. the ability to act intelligently and wisely on an appropriate
occasion, instead of merely considering the clock-time (chronos) (see e.g.
Rämö, 2002; Chan, 2012). This will aid them in not only acting productively
(doing things right) but also effectively (doing the right things) (Rämö, 2002).

- Planners do not have the right background knowledge of the design process or
have insufficient information and details about the specific task or case under
consideration to make an informed decision. This finding is in line with Huber
and Power (1985), who argue that, when decision makers exhibit lack of
information or knowledge, “second-hand information and imagination may fill
in information gaps and lead to unintentional inaccuracies” (p. 173). To
overcome this, it is recommended that organisations enable collaborative
planning and use more experienced project planners in the planning team. In
addition, as suggested by Kahneman and Tversky (1979), planners should use
the reference class forecasting method to gain information from a class of
similar projects, rather than having an “inside view” based only on the project
and details thereof.

- Planners often do not have enough incentive to provide concrete services for
which they can be held accountable. In Chapter 6, it was shown that incentives
cause planners to be more responsible and accountable for their actions and/or
decisions and enhance the level of cooperation among planners. This echoes
the suggestion of Hamman et al. (2007), that organisations can benefit from monetary incentives to resolve a history of coordination failure in their teams. However, this is not to say that planners should be provided with incentives on winning the tender or pleasing the contractors (Flyvbjerg et al., 2009). Rather, based on the findings of this research project, planners should be incentivised on producing more accurate estimates and should receive the incentive after timely completion of the project. In addition, incentives should be of the all-or-none type, meaning that the whole group would benefit from accurate estimates and the whole group would suffer if they performed poorly.

9.2.2.2 Project delays and deliberate planning

In contrast, Chapters 3 and 6 discuss strategic misrepresentation which occurs whenever planners manipulate, conceal, or misrepresent information in order to influence others (e.g. pleasing the contractors or obtaining approval from project sponsors) (Flyvbjerg et al., 2009; Winch, 2013). In such situation, planners intentionally lie with numbers when they estimate the outcomes of projects (Wachs, 1989). Discrepancies between intentional misrepresentations of project outcomes by planners and actual outcomes have been the subject of much planning history (see e.g. Hall, 1980; Wachs, 1989; Flyvbjerg et al., 2002). Based on planning intentionality, such actions of planners constitute a failure with respect to their ethical obligations. Chapter 6 discussed possible motives and enabling factors for this ethical lapse, and these are as follows (see Table 9.2 for summary):

- Planners have lack of accountability for their decisions and bad outcomes. In fact, if a project fails, assigning blame to planners is difficult since there are divergent agents working on the project (e.g. from manager’s team to construction workers) and each could be responsible for its ultimate success or failure. Due to this lack of accountability and their own failure to accept responsibility for their decisions, planners may assume more risks than project sponsors or owners would like. In addressing this issue in the context of megaprojects, Flyvbjerg et al. (2009) note that “diffuse accountability” can lead to strategic deception and project failure (see also Bovens, 2007). Therefore, it is suggested that organisations encourage transparency and accountability. Mechanisms through which to do so are peer reviewing forecasts by independent experts and revealing the results of benchmarking to the public with all relevant documentation (Flyvbjerg et al., 2005). In addition,
organisations can include a neutral observer in the planning team in order to enhance the controllability of the decision-making process. Buehler et al. (2012) state that a neutral person is more inclined to consider potential impediments and drawbacks and less inclined to produce optimistic plans.

- Planners tend to maximise their *self-interest* rather than joint gains and therefore misrepresent their preferences to secure good personal outcomes such as bonuses, rewards from being awarded a contract, or bribery (see also Flyvbjerg et al., 2009). This, in fact, results from the inherent characteristics of forecasting, associated as it is with clearly articulated interests and involving many boundaries. As a result, planners are able to pretend that they are cooperating while they are pursuing their own self-interests, without anyone detecting their construct of interests. For example, one of the interviewees of the current study mentioned that sometimes they squeeze the plan in a way to represent the ideal time-frame so that clients award them the project, although they knew that their estimates are immature and far from reality. In line with this, other studies have shown how self-interested behaviours of project team members could adversely affect project delivery (see e.g. Hall, 1980; Wachs, 1989; Boles et al., 2000; Steinel and De Dreu, 2004; Pinto, 2013; Flyvbjerg, 2014). To control self-interested planners, it is suggested that organisations design incentive structures to reward them for increased estimation accuracy.

- Planners tend to change their choices and be more *opportunistic* when working in a competitive environment. As a result, they revise their estimates in such a way that it allows their companies to competitively bid for a project and win. Interestingly, in the current study, planners admitted that, in some situations, they make strategic changes in project plans to show that ‘everything is perfect’ so that their companies can win the bid and get the project. As they noted during interviews and as was also articulated in the literature, this lying and deception is mostly due to pressure from the organisations or powerful stakeholders, who exploit, manipulate, or coerce planners to act as if the organisation is willing the action to be so. Pinto (2013), for example, claims that sometimes project planners “by padding project estimates” try to protect themselves from aggressive bosses (p. 652). As a real example, Wachs (1990) quotes one of his interviewees as saying that the client asked her to revise the estimates that she had made earlier; when she refused to do that, the client told
her supervisor to “remove her from the project and to get someone else to revise her estimates” (p. 144) (similar story was mentioned by one of the interviewees of this research and is presented in Chapter 8).

- Planners tend to be future-oriented, rarely considering past experiences and performances. Rather, they tend to focus on the image of an ideal future and paying back in the long run. In this case, it is often assumed that planners are rational purposive actors who learn from the past to act in the present to achieve a desired future (Winch and Kreiner, 2011). For example, one interviewee of this research on the question of why these strategic changes occur responded ‘to make more money and obtain higher turnover’. In such situations, planners’ forecasts are biased to “serve strategic purposes that dominate the commitment to accuracy and truth” and “are deliberate” (Flyvbjerg, 2008, p. 19). It is suggested that organisations can benefit from using the reference class forecasting method when planners have future-oriented perspectives to encourage them to take into consideration past experiences and failures.

- Planners are more knowledgeable about future outcomes. It was found that planners’ tendency towards misrepresentation increases when they recognise they have more information or more experience than their counterparts. In such a situation, where there is asymmetric information between planners and their counterparts, planners often withhold information and tend not to share it with others. They do this to downplay the amount of risk involved in projects so as to mislead the clients and gain strategic advantage over them. This finding is consistent with those of earlier studies (see e.g. Lichtenstein, 1996; Steinel and De Dreu, 2004; LePatner, 2008). Lichtenstein (1996), for instance, calls this the “principal-agent problem” (p. 253) and argues that in such a situation, knowledge is exclusively held by the agent, and, thus, he/she is able to act opportunistically and take actions based on information of which the principal is not in possession. Consequently, the principal cannot be sure whether the agent has made the best choices. In Chapter 8 of this thesis, all interviewees referred to asymmetric knowledge between them and the client’s team. They also seemed to agree that this asymmetric knowledge sometimes results in strategic changes in project plan for the purpose of benefiting the contractor. To redress this problem, organisations are advised to create a learning
environment in which knowledge, private details, and information can be shared across different levels and where there is minimal scope for deception.

- Planners have strong incentives at the project approval stage to represent projects’ outcomes as favourably as possible. As a result, they accentuate the positives and eliminate the negatives when forecasting the times or costs of projects. This type of incentive is divergent and misaligned because it is based on winning the tender or pleasing the contractors. Earlier studies also found that this type of incentive has a negative effect on the outcome of the projects and leads to more biased predictions (see e.g. Flyvbjerg, 2008; Halkjelsvik and Jørgensen, 2012). To avoid this, it is suggested that organisations offer an all-or-none type of incentive, rewarding the whole group for accurate estimates and punishing them for inaccurate ones.

As mentioned previously, Table 9.2 provides a summary of the differences between unintended and intended actions of planners.
Table 9.2: Unintended and intended actions of planners.

<table>
<thead>
<tr>
<th>Unintended actions of planners</th>
<th>Intended actions of planners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What planners do</strong></td>
<td><strong>Suggestions to improve</strong></td>
</tr>
<tr>
<td>They have the tacit imagination of future perfect</td>
<td>Using multiple scenarios technique</td>
</tr>
<tr>
<td>They do not think about the unexpected surprises</td>
<td>Listing all “possible” pitfalls that could occur during construction</td>
</tr>
<tr>
<td>They are overconfident in their judgements</td>
<td>Recalling past prediction failures</td>
</tr>
<tr>
<td>They are more present-oriented and less past/future-oriented</td>
<td>Considering the cosmological notions of timing</td>
</tr>
<tr>
<td>They do not have the right background knowledge for the design process.</td>
<td>Using more experienced project planners in the planning team</td>
</tr>
<tr>
<td>They do not have enough incentive to deliver reliable estimates</td>
<td>Offering incentives for more accurate estimates</td>
</tr>
</tbody>
</table>

Source: Field work
9.2.3 The influence of group discussion on the accuracy of time estimation

Previous research primarily focused attention on the role individuals play in generating predictions of completion times (see e.g. Kruger and Evans, 2004; Peetz et al., 2010). However, planning and forecasting project completion times are typically performed by groups of planners, not individuals (see Buehler et al., 2005, who call for research in psychological and cognitive science). Thus, the fourth and fifth objectives of this research have been formed to consider the role of groups in producing project completion time estimates and the process through which a diverse set of individual preferences coalesces into an agreed-upon, consensual group estimate. The findings of the current research demonstrate that, when group members carry out the aforementioned process, several issues can affect their aggregated interactions and the quality of their ‘joint’ estimates (see Table 9.3 for summary). These are as follows:

- Planners’ joint decisions could be influenced by a subjective sense of power. It was found that powerful members direct more attention to themselves and their personal preferences and are less likely to be influenced by other people’s opinions and viewpoints. This finding is in line with Pitesa and Thau (2013), who discovered that power makes people more self-focused and less dependent on others for their contributions. In addition, in Chapter 7, it was found that powerful members sometimes undermine others’ abilities to exert their influences and show “who is right” (see also Bazerman and Moore, 2012). This fosters feelings of competitiveness among team members and results in more individualistic approaches. As a result, team members do not feel that they all have to work together and need each other to succeed; they thus lack the “sense of we-ness” (Kent, 2006). In such a situation, it was found that the tendency towards power can be detrimental; it not only reduces the group-level construct of cohesion to an individual-level construct (Casey-Campbell and Martens, 2009) but may also lead to greater errors in time estimates. This result is supported by earlier studies (see e.g. Weick and Guinote, 2010; Tost et al., 2012). Weick and Guinote (2010), for example, found that powerful individuals are “less prone to recognise potential setbacks and interfering events” (p. 596) and so make more optimistic estimates in their judgements. Therefore, to prevent and control the subjective feelings of power, project managers and leaders are advised a) to learn how to avoid (or manage) the tendency towards power from emerging within their team effectively and
appropriately; b) to decentralise decisions and give everyone an equal chance to be impactful across teams; c) to allow less powerful people to cooperate in decision making and reassure them as to their value to the team so that their interactions with experts are less daunting; and d) to create a culture in which group members are encouraged to share information (Tjosvold, 1997; Tost et al., 2012).

- Planners’ joint decisions could be affected by members’ commitment towards the team and teamwork. For example, in some experimental groups, some group members were less inclined to accept the team goals and be committed to reaching them. This caused them to show lower degrees of effort to implement the task and produce output required to meet the team’s objectives. It was found that this poor commitment sometimes resulted in intersender conflict, dissatisfaction, impaired communication, and a tendency towards individualism among group members (see also Bishop and Scott, 2000). However, members were committed to be involved and participate in a group activity and in the decision-making process, it positively affected the quality of their “joint” decision. In such a situation, members perceived the value of teamwork and cared about each other. This finding is similar to previous studies which found that a high level of commitment improves interactions between team members (Hackman, 1986), sense of responsibility (Campion et al., 1993), and team performance (Bishop et al., 1997). To enhance the level of commitment and effective team functioning within teams, it is suggested that organisations encourage feelings of warmth and acceptance among team members; build trust among team members; and focus on various characteristics of the workplace environment that encourage employees (Piper et al., 1983; Kirkman and Rosen, 1999; Paillé, 2009).

- Planners’ joint decisions can be affected by the level of their confidence. It was found that more confident members often ignore less confident members in producing the joint estimation of the group. More importantly, this study demonstrated that less confident people do not challenge the decisions made by overconfident people. This finding was not only limited to experimental study; interviews with project planners emphasised this. Interviewees noted that sometimes the opinions of a senior person could change the outcome of teamwork, whereby they presume not to express their own views, but to follow
the lead of the senior member of the group. This finding is in line with previous research in various domains including planning (Lovelock and Kahneman, 2003), software development (Jørgensen, 2007), and organisational studies (Sniezek, 1992). In addition, in Experiment 2, it was found that, in general, less confident members of the group made better estimations of time than overconfident participants. The reasons for this might be that less confident members search for more detailed information to make more informed decisions (Kerschreiter et al., 2008); they are not as defensive as confident people (Zarnoth and Sniezek, 1997); and they consider more of the issues that may lead to negative consequences (Sniezek, 1992). As far as the author is aware, there has been no detailed work comparing the effects of different confidence levels on the quality of group decisions in construction management studies, and this could be an interesting avenue for future research. To manage the influences of more/less confident members in a team, managers should allow less confident members of a team to have an equal chance to speak out and air their opinions, and balance the power among team members, especially when there are more experienced people in the team. Otherwise, less confident people may not raise critical perspectives during face-to-face meetings.

- Planners’ joint decision can be affected by their cultural backgrounds. Since some of the experimental groups included in this study were from diverse cultural orientations, it was possible to notice how this can affect the outcomes of group discussion and the accuracy of time estimates produced by groups. It was discovered that Asians, especially East Asians, had a more collectivist-cooperative orientation to the task, by trying to have joint contributions to achieve team accomplishments, than did European individuals. The latter were more inclined to have a competitive orientation within their teams and to try to show their superiority and excellence. This tendency towards self-enhancement may be due to their individualistic cultures, which support and encourage individualism (Hofstede, 1980; Cox et al., 1991; Heine and Lehman, 1995). Moreover, the findings of this study illustrated that Asian participants were more accurate in their IndGroup estimations than European and English participants. However, this finding is not reliable since it is only based on observation and data from a few groups. It is consistent with previous studies,
which found that East Asians make less optimistic predictions than do Westerners (see e.g. Heine and Lehman, 1995; Chang et al., 2001; Fitzsimmons et al., 2011). To obtain the advantages of a cross-cultural group of planners, organisations need to understand the ways in which different cultures affect behaviour in team settings and whether they help or hinder performance.

- Planners’ joint decisions can be affected by conflict among group members. It was found that when members have task conflict—opposing viewpoints, ideas, and thoughts among team members—they produced more accurate time estimates due to better learning and exchange of creative ideas. On the other hand, when the members had relationship conflict—interpersonal incompatibilities—they made poor decisions and experienced poor performance as well. It was found that this relationship conflict mainly occurred due to a) members not being interested to hear negative thoughts; b) members wanting to increase their own authority and autonomy; c) members having an aggressive personality; d) members being from different cultural backgrounds; e) members having a one-win-the-other-obey approach; and f) members wanting to place the blame on others. Likewise, the extant literature shows relationship conflict is dysfunctional for team performance and leads team members to make poor decisions, have non-productive communications, and become unable to experience good collaboration and performance (see e.g. Tjosvold, 1997; De Dreu and Weingart, 2003; Deutsch, 2005). To avoid relationship conflict, it is suggested that organisations encourage members of the planning team to have a win-win approach within their team and enable them to find creative solutions and express ideas and opinions to arrive at a mutual understanding (see also West et al., 2005).

- Planners’ joint decisions can be affected by groupthink. Members deeply involved in cohesive teamwork, in order to maintain a shared positive identity as a group or to minimise conflicts or to hide doubts and uncertainties, were found to make poor time estimations. Group members in teams influenced in this way tend not to show signs of disagreement or disapproval in their interactions and thereby fail to critically assess the situation and consider potentially high quality alternatives. The same issue was addressed by project planners involved in this study, as described in Chapter 8. On the whole, they agreed that, if they have more experienced people in the team, they would trust,
respect, and rely on their opinions and discount their own. In this research, however, it is argued that, in such a situation, group members will be less likely to engage in fruitful discussion and so obtain more accurate results. This could also damage group decision quality and result in choosing the option that is favoured by the majority of group members rather than the best option. One might think that groupthink would enhance the collectivity involved in a group decision; however, the findings of this study showed that the opposite is true because although the final decision of the group may appear to be unanimous, many of the members self-censored themselves and disagreed with that decision privately. This finding is consistent with earlier studies, which found that groupthink inhibits the sharing of dissenting information and, consequently, eliminates or reduces the benefits of cognitive diversity in groups (see e.g. Janis, 1972; Esser, 1998; Häggren, 2010; Straus et al., 2011).

To overcome groupthink’s detrimental effects, organisations are recommended a) to limit their own expression of solution preferences (Janis, 1972); b) to let people freely express their ideas in open discussion (Häggren, 2010); c) to use structured group judgmental techniques such as nominal group technique and brainstorming (Chapman, 2006); d) to hold second-chance meetings to reassess decisions (Turner et al., 1992); and e) to allow the group to produce multiple alternative solutions so that no single solution is readily assumed as being the best option (Esser, 1998).

As mentioned previously, Table 9.3 provides a summary of different issues affecting the quality of planners’ “joint” time estimation.
Table 9.3: Issues affecting the quality of planners’ “joint” time estimation.

<table>
<thead>
<tr>
<th>Behaviours of planners within their team</th>
<th>Influential factors</th>
<th>When planners have sense of we-ness</th>
<th>When planners have sense of I-ness</th>
<th>Suggestions for enhancing collectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense of power</td>
<td>They look for more group cohesion and conformity</td>
<td>They direct more attention to themselves and their personal preferences</td>
<td>Giving everyone an equal chance to be impactful. Allowing less powerful members to cooperate in decision making</td>
<td></td>
</tr>
<tr>
<td>Commitment</td>
<td>They perceive the value of teamwork and care about each other</td>
<td>They are less inclined to accept the team goals and commit themselves to them</td>
<td>Encouraging feelings of warmth and acceptance among team members</td>
<td></td>
</tr>
<tr>
<td>Confidence level</td>
<td>They might be either overconfident or underconfident</td>
<td>They are overconfident and often ignore less confident members of the group</td>
<td>Allowing less confident members of a team to have an equal chance to speak out</td>
<td></td>
</tr>
<tr>
<td>Cultural diversity</td>
<td>They are from collectivist cultures and are more likely to sacrifice their personal interests for the accomplishment of group goals</td>
<td>They are from individualistic cultures and are more inclined to have competitive orientation within their team</td>
<td>Understanding how different cultures affect behaviour in team settings and whether they help or hinder performance</td>
<td></td>
</tr>
<tr>
<td>Conflicts</td>
<td>They might have task conflicts; but not relationship conflicts</td>
<td>They might have relationship conflicts and non-productive communications with other members</td>
<td>Encouraging members to have a win-win approach within their team</td>
<td></td>
</tr>
<tr>
<td>Groupthink</td>
<td>They choose the best option for the group, rather than the option favoured by the majority</td>
<td>They tend to reach quick agreement instead of assessing the situation and considering alternatives</td>
<td>Using structured group judgmental techniques such as nominal group technique</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field work
9.3 Conclusion

Taking up the challenge proposed by Flyvbjerg (2001, p. 166) to carry out research that “contributes to society’s capacity for value-rational deliberation and action” in order to make social science matter in the context of projects, the researcher tried to adopt a way of viewing and thinking about the problem of project delays in the construction industry that differed from the one promoted by narrowly instrumentalist, rationalist, and technicist project management thinking. In Chapter 2 of this thesis, it was contended that the simplistic cause-and-effect logic adopted by construction delay researchers tends to atomise research and disregard context by investigating cause-effect relationships, the rationale of which is to increase the efficiency and productivity of organisations by identify ‘critical success factors’ and so create a model depicting the ‘true’ nature of projects (Smyth and Morris, 2007). This classical mainstream view of project management perpetuate the belief that certain institutions, structures, or systems work or function in certain ways. Hence if any failure occurs in a project, researchers try to uncover the underlying causes of the incidents and propose corrective actions.

Based on the review of the literature on project delays, previous research appears to tacitly assume that the plan is always accurate at its inception and, therefore, only causes of deviations which occur during implementation need be corrected. However, this approach neglects the varying contexts in which a multitude of project planners enact reality and make decisions. In fact, the prevailing emphasis on searching for causes of deviations from the plan downplays the role planners have in responding to dynamic situations, where they make the plan and then behave of their own volition. Therefore, in studying the nature of project delays, it is argued that there is a need to move away from viewing delays simply as mere deviations to the taken-for-granted plan and instead to bring to the fore the significance of context and the role of planners’ intentionality in explaining project delays.

Drawing on the concepts of optimism bias and strategic misrepresentation (Flyvbjerg et al., 2009), that consider the critical role of social and political power associated with the planner’s role as well as the significance of a planner’s judgement concerning the project’s future outcomes, the concept of planning intentionality was introduced in Chapter 3 of this thesis. This concept emphasised that the agency of planners has intentionality, the deliberative ability to make choices and give shape to action plans, which in turn influences their choices, decisions, and behaviours. Adhering to this
concept would enable one to understand the intentionality behind planners’ actions so as to explain why they perform certain actions or operations, which can subsequently result in intended or unintended project delays. Therefore, it is concluded that increased attention should be paid to studying the intentionalities of planners involved in planning the schedule for projects since understanding the conditions leading to intended or unintended mistakes of planners would seem to be crucial in reducing their incidence within projects.

By analysing the data gathered from a mixed-methods study provided in Chapter 6, it was found that planners unintentionally fail to accurately estimate the completion time of projects because of a) a lack of background knowledge at the time of making decisions about future outcomes; b) not receiving any incentives or rewards for accurate estimation; c) thinking in the future perfect tense; d) not considering unexpected surprises and things that could go wrong; e) being overconfident; and f) holding a present-oriented view. In contrast, it was found that planners underestimate the completion time of projects intentionally because of a) having strong incentives to increase the likelihood of their project being funded; b) having more knowledge and experience than others; c) being less accountable for the outcomes of their decisions; d) maximising their own interests; e) being opportunistic in the competitive environment; and f) holding a future-oriented view by focusing on pay back in the long run.

In reality, decisions made about the outcomes of projects such as completion time are mainly taken by groups such as committees or work groups. However, reviewing the literature on project planning reveals that scholars have failed to consider the significant role of planners as a group (see Buehler’s et al., 2005 concern). The point that groups generally act and behave differently than individuals was raised in Chapter 3. As a result, the process through which a ‘group’ goes to produce a joint estimation of the completion time was investigated. In addition, two methods of aggregating the group members’ estimates to generate their forecasts collectively, namely face-to-face and the statistical aggregation method, were compared and contrasted to shed light on which of these produces more or less accurate group forecasts and why.

The result of an explanatory mixed-methods design provided in Chapter 7 has shown that group discussion and face-to-face meetings not only do not enhance the accuracy of time estimations made by a group but, in fact, result in poor estimation in comparison with no interaction among group members. To understand why the sense of we-ness
seems to be reduced during group discussion, qualitative data gathered as part of this study were analysed through conversation analysis, and six influential factors to account for this were discovered: sense of power, commitment, confidence level, cultural diversity, conflicts, and groupthink.

In order to strengthen and enhance the scope of the findings of two mixed-methods studies, seven interviews with project planners working for different construction companies were conducted in Chapter 8 of this thesis. Conducting directed content analysis revealed that a) for unintended delays, planners not only blamed the clients for their change requirements but also contended that a plan fails due mostly to inexperienced and unqualified planners and staff. In contrast, for intended delays, planners confirmed that in order to win the bid, award the contract, and obtain a higher turnover for their companies, they have to ‘squeeze’ the plan in such a way as to represent ‘everything is perfect’, even though they know that their estimates are immature and far from reality; b) planners shared the commonly held viewpoint that experienced members are expected to make better plans and better decisions overall as well as take to the lead in all team efforts and meetings. It was also found that a senior person can change the outcome of teamwork by not allowing the less experienced person to express his/her opinions; this latter will then simply follow the lead of the senior member of the meeting. In such a situation, collective intentionality seems to be taken for granted as a result of seniority (or hierarchical responsibilities), rather than anything else.

In short, the author concludes that understanding the planners’ moral and ethical motives as well as their intentions and personal drives is a rich vein to be explored with regard to the problem of time overruns. In addition, as the planner function embodied by a group rather than an individual, the researcher also sought to consider the identification of tensions, power asymmetries and patterns of communicative relating among individuals and groups and how they are being negotiated in the context.

9.4 Contributions of this research

This research project provided some significant theoretical and practical contributions to the study of project delays in construction management in particular and, by extension, to the wider field of project management. This study is one of a very few problematising the theoretical foundations and ideologies of conventional knowledge and its assumptions about the nature of project delays. Furthermore, by adhering to a
research tradition known as critical management studies, this research project challenged the conventional techno-rational view of studying delays in projects and highlighted the consequences of over-reliance on such an approach, such as limiting our understanding of the reality of the project delay, ignoring the power of human agency in making and enacting decisions, and reducing the possibility of stimulating further research and transferring knowledge to the practitioners in the construction industry. Instead, this research project urged for more attention to be paid to studying intentionalities of planners involved in scheduling projects and examined how intentionality can play a crucial role in advancing our understanding of project delays. By moving away from identifying ‘cause-and-effect’ mechanisms to attend more closely to the role intentionality plays in creating delays, this study makes the following theoretical and practical contributions.

9.4.1 Theoretical contributions

The first and foremost theoretical contribution of this research is the call for a broader perspective that brings to the fore the significance of context and the role of human intentionality in explaining project delays. This frames delays beyond causality studies, which tacitly assume that certain institutions, structures, or systems work or function in certain ways, and, thus, if any failure occurs in a project, the researcher tries to uncover the underlying causes of the incidents and to propose corrective actions. In addition, by giving centrality to the social phenomena of intentionality, we are able to elaborate the dynamics of human intentions and actions situated within an institutional context, including the way in which humans make decisions and behave of their own volition. This approach is, however, against the conventional and dominant cause-and-effect logic governing this area of research, which simply narrows explanations of project delays by taking the agent’s desires, wishes, beliefs, and intentions for granted. Indeed, such a critique extends to the wider field of project management, and there is greater purchase in the mainstream management literature in terms of exploring the role of human intentionality in seeking managerial outcomes (see e.g. Ghoshal, 2005; Rosenberg, 2008). Therefore, drawing on the concept of managerial intentionality developed by Lewin and Volberda (2003) and Hutzschenreuter et al. (2010) in management and organisations studies, the concept of planning intentionality was introduced. This concept is novel and unique to this study and is developed to urge for more attention to be paid to studying the intentionalities of planners involved in scheduling and budgeting for projects in order to explain why planners perform certain
actions or operations. This theoretical contribution also aims at providing a better understanding of the explanations recently provided for project cost overruns, namely, optimism bias and strategic misrepresentation (see e.g. Flyvbjerg et al., 2009; Winch, 2013; Pinto, 2013). By means of planning intentionality, this study proposed a direction for future research so that researchers could investigate the conditions and situational/contextual variations that result in unintended or intended mistakes of planners.

In addition, the methodological approach adopted for research project study magnified the impacts and contributions of its findings. Specifically, the project included two mixed-methods studies (two experiments followed by semi-structured interviews), preceded by a pilot study, and interviews with project planners in order to find answers to the aforementioned research questions (see Chapter 1). On one hand, the experimental strategy enabled this research project to collect valuable data about the dynamics behind (under)estimation of project completion times, especially when the estimate is made by the group. Collecting this data through more conventional research methods (i.e. questionnaires and ethnography and case studies) was not possible due to practical and ethical difficulties associated with these methods. On the other hand, semi-structured interviews with experimental subjects allowed this research project to identify the experience of participants and the meaning they make of that experience as well as understanding how they arrived at their estimates and the reasons for their specific preferences and actions. To supplement the mixed-methods studies, seven interviews with project planners were conducted and analysed with the help of content analysis. By means of this experimental study, it was possible to extend the findings to a real life situation, applying them to the study of the role that planning intentionality plays in explaining the presence of delays in practice.

This research project contributed substantially to the growing literature on how planners optimistically and/or strategically underestimate the cost and overestimate the benefits of projects (see Flyvbjerg et al., 2009; Winch, 2013; Pinto, 2013). First, previous studies did not address project time and time overruns but rather emphasised project cost and cost overruns. However, cost overruns are almost always accompanied by time overruns. Second, the relationship and dynamics between optimism bias and strategic misrepresentation have until now remained largely unexplored. The research to date has tended to focus on one or the other, but not on both of them in a single context (with the notable exception of Flyvbjerg et al., 2009 on megaprojects). Third, the applicability of
optimism bias and strategic misrepresentation to types and sizes of projects other than megaprojects has not been addressed. Fourth, previous studies did not address the intentionalities of planners. This research filled this knowledge gap by introducing the concept of planning intentionality and examining the formation of intended or unintended actions prior to producing estimations. Fifth, the collective role of planners had been neglected, as the role of planner as an individual had been emphasised. This study, however, sought to explore the efficacy of group decision-making subject to group composition, level of interaction among members, modus operandi of group meetings and interactions, etc.

This research project is multi-disciplinary. Its contributions are not bound by the field of construction management but extend to project management, philosophy, and psychology as well. While it benefited from using critical perspectives promoted by CMS scholars to review the literature of project delays (see e.g. Cicmil and Hodgson, 2006; Alvesson et al., 2009), it used methodological approaches rooted in behavioural and cognitive psychology (see e.g. Lovallo and Kahneman, 2003; Buehler et al., 2012). By the same token, the current study draws on implications of the notion of intentionality in philosophy of mind to define planning intentionality and differentiate between intended and unintended actions of humans. The contributions of this research project to each of these fields are noteworthy. For example, in construction management, this research contributed to the literature by extending the effects of Flyvbjerg’s cost overrun explanations (optimism bias and strategic misrepresentation) onto project time and time overruns. In project management, this research contributed to the literature of critical management studies by problematising the prevailing ontological and epistemological assumptions about the nature of delays, which had hitherto been unaddressed. In behavioural and cognitive psychology, this research project demonstrated the effect of accuracy incentive and the influence of knowledge and level of information on the accuracy of time estimation; while in philosophy, it not only introduced the concept of planning intentionality but also differentiated between the summative and non-summative approach to collective intentionality.

Another theoretical contribution of this research project was considering the role of groups in decision making, rather than focusing on individuals. Although voluminous literature exists on group activities and performance in management research, there is a dearth of studies investigating how a group of individuals participates in a collaborative effort to form a group judgement and arrive at some consensus about the outcomes of
the project such as completion time or amount of available resources under uncertainty. As a matter of fact, the group often acts and behaves differently from individuals in many circumstances. Yet construction management scholars often neglect to consider the outcomes of groups with the multitude of actors involved in the planning process. This study filled this research gap by focusing on the role of groups in producing estimations of project completion times and examining how group members move from a diverse set of individual preferences to agreement on a consensual estimate for the group (the formation of collective intentionality). In addition, the effectiveness of face-to-face meetings in combining the judgements of individual members in order to arrive at group decisions was questioned in this research. It was demonstrated that if these meetings are not well managed, e.g. less confident members have less chance to speak out, the collectivity involved in the joint decision of the group will be reduced dramatically. This issue was explained using the non-summative approach to collective intentionality as described in Chapter 7. As a result, by stressing a project-based view, this research calls for increased attention to be given to pluralism and diversity in theory, practice, and methodology.

9.4.2 Practical contributions

Time is costlier now than ever. Thus, organisations expend considerable money and effort to complete projects within the prescribed time. This research demonstrated that, in practice, as in the literature on project delays, the assumption held by practitioners is that the project plan is always ‘right’ at its inception and in the early stages of the project and thus any delays are a consequence of flawed execution. As a result, instead of spending more time and effort on the planning process at the front-end stage of projects, organisations tend to manage and control deviations from the plan. In this sense, planners are seen as technicians who should use a control system and corrective strategies in order to monitor the project and check back against the original plan for any deviations therefrom. In this study, however, planners were assumed to play a key role at the beginning of projects in terms of anticipating unforeseen issues, articulating problems correctly, and making accurate estimations. In addition, many strategies and issues have been proposed to both planners and their organisations for lessening planner bias, whether this bias be unintended or intended, in producing estimations of project completion times. For example, to control intended changes in the project plan, organisations should:

- Not blindly accept the lowest bid;
• Peer review forecasts by independent expert;

• Hire planners who have educational background and site experiences;

• Design incentive structures to reward planners for the purpose of increased estimation accuracy;

• Use reference class forecasting;

• Use a neutral observer in the planning team;

• Create a learning environment in which knowledge can be shared across different levels.

On the other hand, to reduce unintended consequences of project delays, organisations can ask planners to:

• Use multiple scenarios technique;

• List all “possible” pitfalls that could occur during construction;

• Recall past prediction failures;

• Consider the cosmological notions of timing;

• Use reference class forecasting.

Another significant contribution of this research to practice lies in investigating the process that a group of individual planners goes through in order to make decisions about future outcomes of projects, such as completion time. This research demonstrated that face-to-face meetings as a favourite method of eliciting project forecasts used by almost all organisations could be problematic in terms of enhancing the quality of judgements and reaching a collective choice. Accordingly, it showed that the collectivity of joint decisions could be influenced by a set of factors. These factors were consolidated and discussed in detail in this study, e.g. sense of power, commitment, confidence level, cultural diversity, conflicts, and groupthink. In addition, this research project suggested a set of strategies from which organisations can benefit to enhance the sense of we-ness among group members and consequently raise the quality of the group decision. These strategies are as follows:

• Giving everyone an equal chance to be impactful;

• Allowing less powerful members to cooperate in decision making;
- Encouraging feelings of warmth and acceptance among team members;
- Allowing less confident members of a team to have an equal chance to speak out;
- Understanding how different cultures affect behaviour in team settings and whether they help or hinder performance;
- Encouraging members to have a win-win approach within their team;
- Using structured group judgement techniques such as nominal group technique.

9.5 Limitations of the study

Each research project has limitations, as it has to be carried out over a specific duration and with a limited set of resources (Saunders et al., 2009). This applies to this research, which had to be completed in a predefined time period due to academic regulations and financial consideration. The following limitations governed this research project.

First, despite attempts to design the experimental tasks as realistically as possible and conducting interviews with experimental subjects, the issue of generalisability does arise, thus making extension of our findings to real-life projects problematic. As a matter of fact, lab experiments exclude the influence of external factors such as acts of God, natural disasters, inflation, and market risk in the estimation of project time completion. To mitigate this problem, however, seven interviews were carried out with project planners to enrich and extend the findings of the experimental studies to what is actually happening in planning practice and real-world settings. Despite this seemingly being too few interviews with which to embark on generalisation, it allowed the researcher to provide rich data and in-depth arguments on a series of ideas, topics, and issues related to the role of project planners and to the most relevant issues with respect to project delays and time estimation.

Second, the experimental subjects of this research were mostly undergraduate and postgraduate university students with no experience of completing construction projects. This limits the possibility of obtaining a more complete picture of group planning and prediction concerning large-scale projects in industrial and organisational settings. However, one advantage here was that, in most of the groups, the participants knew each other well from previous university courses and activities. This characteristic was similar to that of most groups working in a real project, which are not ad-hoc groups but rather are naturally occurring groups with a longer history of shared
experiences (He et al., 2012). In addition, after conducting interviews with project planners, it was noticed that the age of most senior project planners who participated in this research was approximately 40 years old with 10 years of work experience in the construction industry. Other interviewees were also younger and had fewer years of work experience. One could argue that this neglects the opinions of more experienced people in projects (e.g. those over 40), which might differ in terms of maturity and competence from those of less experienced planners.

Third, during interviews with project planners, it was noticed that they emphasised the importance of having more ‘experience and expertise’ as the main source of knowledge and the necessity of making an accurate project plan. Although it was discussed how this issue affected project planners in producing estimations of project completion times in Chapter 8 and the role of having more skill and expertise as one of the features of intended actions in Chapter 3, in the design of Experiment 1 this issue is neglected. Particularly, choosing the LEGO game for the experiments held the experience level constant, since people often have similar experiences in playing with LEGO from their childhoods. Consequently, the level of experience and expertise did not vary greatly across participants. This issue is of importance since, for example, a person with more experience in doing a task is assumed to have more confidence and dominance in a group activity (Credé and Sniezek, 2003). Therefore, future research needs to consider the influence of different levels of experience on time estimation, behaviours of team members, their intentional actions, and the quality of decisions made by the less/more experienced person.

Another limitation was apparent in Experiment 2 (Chapter 7). When the participants were asked to provide a single forecast through consensus, those who were shy or not confident were less involved in the discussions. In the interview session, when they were asked if money had been involved in the task, would they have arrived at the same consensus, most of them responded emphatically in the negative. Further research, thus, is needed to examine the possible effects of financial incentives and competitive stimuli on the way people reach group agreements about the completion time of tasks. Moreover, those interviews conducted with project planners were individual interviews. It is suggested that focus group interviews and ethnographic research provide a broader repertoire to observe the interactions among the members of the planning team and analyse the group decision-making process in detail.
Fifth, Experiment 2 of this research was designed in such a way as to consider group members as equal \textit{ex ante}. This is based on the assumption that planners’ teams are the unitary type of teams and each member has equal influence on the outcomes of the joint team decision. Although there is a lack of research on unitary teams and how the members aggregate their opinions to reach a single decision, in reality the joint decision of a unitary team could be influenced by powerful shareholders with competing preferences depending on the structure of hierarchical authority. Therefore, one needs not only to consider the outcomes of joint decisions made \textit{within} groups but also to examine the influence of power relations on those decisions \textit{between} groups.

\subsection*{9.6 Recommendations for further research}

Accordingly, it is recommended that further research be carried out to compensate for the limitations of this research project in order to enhance its research findings.

As mentioned earlier, since this research project was carried out within a limited time frame, it was not possible to explore each and every dimension that emerged during the research. However, the results of this research provide several interesting avenues for future research and, in order to generalise the findings of this study and satisfy the aforementioned research limitations, the following recommendations for further research are suggested:

- Although project planners play a key role in determining project completion times, the timely delivery of projects depends on the works of other parties involved in the projects, from stakeholders to the workers on site. Therefore, further research should be carried out to investigate how other parties could contribute to the late delivery of projects, whether intentionally or unintentionally. For instance, a natural extension of this work would be to contractors themselves, whose behaviours could also be explored through intentionality.

- Prevailing research on delays tends to assume that project plans are created in a future-oriented fashion, whilst the analysis of delays is contingent on past-oriented investigations. Therefore, one further research question that could be asked is to what extent do time orientations matter in the ways we, practitioners and researchers, view the concept of delays?
As mentioned previously, the notion of intentionality is often taken for granted in organisational studies and project management. In this research project, similar to what Rosenberg (2008) contends, it is argued that giving centrality to the social phenomena of intentionality enables us to elaborate on the dynamics of human intentions and actions situated within an institutional context. Therefore, further research should be conducted to attend more closely to the role intentionality plays in shaping the actions of stakeholders and their underlying decision-making and behaviours.

Embracing a broader repertoire of research methods such as case studies (Flyvbjerg, 2006) and ethnography (Pink, 2007) offers immense possibilities in studying how a group of individuals aggregate their views in order to reach a consensual ‘group’ decision and how individualism translates to collectivity in the meetings. This interesting avenue for further research could be investigated through examining the discourses within the group discussion leading to a consensus estimate.

The research findings on group forecasting reported in this research project were based on the outcomes of joint decisions made within groups (unitary team). Further work is therefore required to examine the influence of power relations on those decisions at different levels of hierarchical authority (e.g. between the planner’s team and the project manager).

The main part of the research findings of this research project was experiment-based. In order to improve the generalisability of the findings, further research is required to investigate the applicability of the experimental findings of this research to real-settings. This will not only help to validate the results obtained in this research but would additionally facilitate the investigation of possible variations.

Further research could also benefit from assessing the findings of this research project in the context of construction projects with pre-existing working groups with a shared history of relevant experience, organically grown groups such as would be found on a construction project. The findings for such groups may differ from those in the groups populating this study.
References


Fitzgerald, J. (1999). What is this thing called" balance?". The Reading Teacher, 100-107.


Appendix A

The list of 60 studies adopting conventional approach to study delays in construction
(Source: Literature review)

<table>
<thead>
<tr>
<th>Number</th>
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<th>Country</th>
<th>Aim of study</th>
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<td>1</td>
<td>Hwang et al.</td>
<td>2013</td>
<td>Singapore</td>
<td>To identifying the critical factors affecting schedule performance</td>
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<td>2013</td>
<td>Oman</td>
<td>To investigate the causes of delay in oil and gas processing facilities.</td>
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<td>Venkatesh et al.</td>
<td>2013</td>
<td>India</td>
<td>To investigate the causes of delays.</td>
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<td>4</td>
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<td>To identify and rank the causes of delays.</td>
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<td>Palestine</td>
<td>To investigate the time performance of road construction projects &amp; To identify causes.</td>
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<td>Ramanathan et al.</td>
<td>2012</td>
<td>Malaysia</td>
<td>To rank the delay causes based on 41 past studies.</td>
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<td>Shebob et al.</td>
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<td>Libya</td>
<td>To analyse the impact of delay factors.</td>
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<td>8</td>
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<td>2011</td>
<td>Singapore</td>
<td>To identify and evaluate the common delay factors among owners, consultants, contractors</td>
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<td>Haseeb et al.</td>
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<td>Pakistan</td>
<td>To analyse the causes of delays.</td>
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<td>Canada</td>
<td>To identify the reasons for time and cost overruns.</td>
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<td>Asnaashari et al</td>
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<td>To mitigate delay by identifying the main causes that lead to delay.</td>
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<td>Malaysia</td>
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<td>Tumi et al.</td>
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<td>To identify the main causes of delays.</td>
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<td>15</td>
<td>Al-hadi et al</td>
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<td>Jordan</td>
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<td>China</td>
<td>To understand the key risks.</td>
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Source: Field work
## Appendix B

Causes of construction delays along with the types of delays and the responsible party
(Source: Literature review)

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<th>Factor groups</th>
<th>Causes of delay</th>
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<td>Contractor</td>
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<td>Contractor bankruptcy</td>
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<td>Contractor</td>
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<td>Delay in payments</td>
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<td></td>
<td>Owners' financial difficulties</td>
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</tr>
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<td></td>
<td>Owner bankruptcy</td>
<td>Excusable with compensation</td>
<td>Owner</td>
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<td><strong>Design related</strong></td>
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<td>Design changes by owner</td>
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<td><strong>Management related</strong></td>
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<td>Contractor</td>
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<td>Controlling &amp; managing sub-contractors</td>
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<td>Poor monitoring and site management</td>
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<td>Slowness in making decisions</td>
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<td>Excessive bureaucracy</td>
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<td>Adopting lowest bid</td>
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<td>Taking too many projects by contractor</td>
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<td>Underestimate project duration by contractor</td>
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<td>Inaccurate prediction of craftsman production rate</td>
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<td>Absence of consultant's site staff</td>
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<td>Change in safety regulations</td>
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Appendix C

Informed consent form used for pilot study.

Preamble: This informed consent form to provide you with brief information about the afore-mentioned research project, so that you can make an informed decision regarding your participation in the experiment.

Brief description of research project: The purpose of this research is to investigate issues relating to the planning of projects. This experiment forms part of the exploratory phase of the study for this purpose. In this experiment, you will be asked to do a simple task, which will be observed by the researchers. Following the task, you will be asked a series of questions relating to this task. Further instructions about the task will be provided at the start of the experiment, and you can opt out of this research at any point in time.

The use of research data: The experiment and interview will be audio-recorded for the purpose of analysis, accuracy and better feedback. The interviews will also be transcribed verbatim, and saved as encrypted files in the researcher’s computer based at the University of Manchester. Data will not be disclosed to a third party under any circumstance, and all information will be treated with the strictest of confidence. Where data is used in academic publications, these will be anonymised. Direct quotations will also be selected based on how typical and general these can be gleaned from the transcripts. Participants will be invited to view and agree to drafts of publications prior to submission.

Having considered the rationale for the research and the way data is collected, analysed and used:

<table>
<thead>
<tr>
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<tr>
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<tr>
<td>I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving a reason.</td>
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<td>I understand that the session will be audio-recorded.</td>
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<tr>
<td>I agree to the use of anonymous quotes.</td>
<td></td>
</tr>
<tr>
<td>I agree that data collected will be used for academic purposes and may be passed on to other academic researchers.</td>
<td></td>
</tr>
<tr>
<td>I agree to take part in this project.</td>
<td></td>
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</table>

* Please put a ‘X’ where appropriate.

Name of participant: Email Address:
Appendix D

Individual pre-task questionnaire for pilot study.

**SECTION 1**

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</tr>
<tr>
<td>Telephone Number</td>
</tr>
<tr>
<td>Email address</td>
</tr>
</tbody>
</table>

**SECTION 2**

How long does it take for you to move the balls from box A to box B?

Write it here in min ---- and sec ------

Note that you can only move 2 balls simultaneously. Also, if your hands touch box B or any balls drop from your hands, you will get a negative score.
Appendix E

Pre-task questionnaire in pilot experiment

SECTION 1

Task familiarity

1: Very much               11: Not at all

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Task interest

1: Very much               11: Not at all

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SECTION 2: LOT-R Test

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<th>Strongly Disagree</th>
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</thead>
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<td>A</td>
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1. In uncertain times I usually expect the best.
2. It’s easy for me to relax.
3. If something can go wrong for me, it will.
4. I’m always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don’t get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.
SECTION 3

You are in category ------

**Category A:** The average of the estimated time was ------; and the average of the actual time was ------; for all 12 participants at the pre-test stage.

**Category B:** The average of the actual time was ------ for all 12 participants at the pre-test stage.

**Category C:** Your estimated time was ------ and your actual time was ------.

Your new estimated time is ------ min and ------ sec.
Appendix F

The blueprints of the LEGO house and the project brief for both experiments.

Blueprints
**Project Brief**

The purpose of this research is to investigate issues relating to the planning of projects. This experiment forms part of the exploratory phase of the study for this purpose. In this experiment, you will be asked to build a two-story house with LEGO Bricks. This house located in the corner of a rectangular shaped base-plate of 25 cm x 12.5 cm. All dimensions are in centimetre and clearly presented in the attached blueprint. Furthermore, you can find the image of the completed LEGO building in the documents. Following the task, you will be asked a series of questions relating to this task. Further instructions about the task will be provided at the start of the experiment, and you can opt out of this research at any point in time.
Appendix G

This informed consent form is to provide you with brief information about the afore-mentioned research project, so that you can make an informed decision regarding your participation in the experiment.

**Brief description of research project:** The purpose of this research is to investigate issues relating to the planning of projects. This experiment forms part of the exploratory phase of the study for this purpose. In this experiment, you will be asked to build a two-storey house with LEGO Bricks. This house located in the corner of a rectangular shaped base-plate of 25 cm x 12.5 cm. All dimensions are in centimetres and clearly presented in the attached blueprint. Furthermore, you can find the image of the completed LEGO building in the documents. Following the task, you will be asked a series of questions relating to this task. Further instructions about the task will be provided at the start of the experiment, and you can opt out of this research at any point in time. It is simple and fun.

**The use of research data:** The experiment and interview will be video-recorded for the purpose of analysis, accuracy and better feedback. The interviews will also be transcribed verbatim, and saved as encrypted files in the researcher’s computer based at the University of Manchester. Data will not be disclosed to a third party under any circumstance, and all information will be treated with the strictest of confidence. Where data are used in academic publications, these will be anonymised. Participants will be invited to view and agree to drafts of publications prior to submission.

Having considered the rationale for the research and the way data are collected, analysed and used:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Yes*</th>
<th>No*</th>
</tr>
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<tr>
<td>I confirm that I have read and understood this information and have had the opportunity to consider the potential of my participation satisfactorily.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving a reason.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I understand that the experiment will be video-recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I agree to the use of anonymous quotes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have had previous experience with LEGOs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I agree to take part in this project.</td>
<td></td>
<td></td>
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</table>

* Please put a ‘X’ where appropriate.

Name of participant:                                Email Address:
Appendix H

Pre-task questionnaire in experiment 1.

SECTION 1

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</tr>
<tr>
<td>Telephone Number</td>
</tr>
<tr>
<td>Email address</td>
</tr>
</tbody>
</table>

You have 5 minutes to decide about the time of the task in your group:

The time now is ________,

1. At what time do you think you will build this LEGO House in your group? ________.
2. ________.
3. ________.

SECTION 2

Task familiarity: (1: Very much; 11: Not at all)

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Task interest: (1: Very much; 11: Not at all)

<p>| | | | | | | | | | | |</p>
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Appendix I

Pre-task questionnaire in experiment 2.

SECTION 1

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<tr>
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<td>Email address</td>
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</table>

SECTION 2

Without talking with others please answer the following two questions. Note that you have 5 minutes.

The time now is --------,

At what time do you think you will build this LEGO House individually? --------

At what time do you think you will build this LEGO House in a group of 3-persons? ----

SECTION 3

The time now is  --------,

You have now 5 minutes to negotiate with your group members and answer the following question.

At what time do you think your group will be able to build this LEGO House? --------
SECTION 4

Task familiarity

1: Very much 11: Not at all

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |

Task interest

1: Very much 11: Not at all

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
 Appendix J 

The estimated time of participants in IndInd, IndGroup, and GroupGroup situations of experiment 2.

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<th>Est. time (GroupGroup)</th>
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Appendix K

Calculation of each individual’s IEBs of experiment 2.

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<th>Group numbers</th>
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### Table 1: Content analysis of Responses, questions 1-6

<table>
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<tr>
<th>#</th>
<th>Understanding of planners about project plan</th>
<th>Is project plan accurate to begin with?</th>
<th>What is the role of planners in time estimation?</th>
<th>To what extent delay is intended or unintended</th>
<th>Reasons for delays</th>
<th>Knowledge, skills, Incentive</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-Knowing the environment and the company very well -Resource management -Outline responses to contingencies -Stage planning -Budgeting -Is responsible for safety</td>
<td>-Specialised knowledge about the type of project is needed for proper planning -Experience determines how well a plan adjusts to contingencies -I always leave a margin of error, taking into account changes in the work of the people below -When you have done it before, you are expected to do it right</td>
<td>-Consider every single details by asking HOW questions. -Can approximate how this work can be done -Plan breakdown -They use previous experience</td>
<td>-Under normal conditions mistakes should not take place because you have done that before -Planning is a human thing you’re dealing with different people, and you’re not going to be able to predict what they are going to do -Planners sometimes try to find ways to make more money and have higher financial turn-back</td>
<td>-Inexperience can result in delays. -External shocks which cannot be foreseen -Large projects are prone to unforeseeable scenarios like recession -Changes usually come with additional budget</td>
<td>If you are working in a team, you rely on the knowledge of others. -Greater knowledge and greater experience go together -Incentives for accuracy works -Knowledge about the concrete conditions of a project is crucial for its success. -Project planning knowledge is about the ideal scenario</td>
<td>-A plan’s accuracy increases with experience -Experience is essential to problem identification and resolution</td>
</tr>
<tr>
<td>2</td>
<td>-The project plan assures that everyone (client, company) benefits -Contingency planning -Resource management</td>
<td>-Plan definitely changes. But it needs a good contract to address the consequences of those changes -The plan presumes low, medium, or high</td>
<td>-Work according to milestones and monitoring -Submit timesheet -Develop milestones -Re-allocationing milestones when deadlines not met</td>
<td>-There are many changes involved which are unintended. -Changes usually come with additional budget -Change management</td>
<td>-Client asks for changes and they are both resource and time consuming -A good contract is a need</td>
<td>-A good project manager knows about contingency management -Communication skills are important -Execution strategy</td>
<td>-Experienced project planner have a good idea about the contingency</td>
</tr>
<tr>
<td>Contingency Levels</td>
<td>Is one of the most important parts of a project</td>
<td>A good project manager knows about contingency</td>
<td>A plan’s accuracy increases with experience</td>
<td></td>
<td></td>
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<td></td>
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<tr>
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<td>-----------------------------------------------</td>
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</tr>
<tr>
<td>Plan should outline the sequence of the work and explain how to manage a set of packages Stage planning - Outline responses to contingencies</td>
<td>Plans are very changeable - An accurate plan is proof of professional expertise - Plans are by nature contingent - Breakdown the stuff into different packages - You should know about clients’ demands before tendering - Budget is the most important part - Planners’ actions are very important in getting the project - If there is a big difference in completion time, you won’t win the bid - You should prove to client that you can reach the time - You cannot predict every details in 100%, but technical is not the main reason - Politics do affect a lot, more than anything - External shocks which cannot be foreseen - Lack of information is likely to produce delays - Politics, communication failure</td>
<td>- A good project manager knows about contingency - Clients don’t know much about the projects</td>
<td>- A plan’s accuracy increases with experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Based on the milestones given by clients, planners make high level plans. - You need to plan in very detail otherwise the chance of going wrong is high</td>
<td>- Plans can always change. Real life problems create contingencies - Detail planning and experience are important for the plan to take changes into account - Planners are not taken seriously - Develop as a master program - Must take everyone’s role into account - Planners must be persuasive - Budgeting and cost control - Under normal conditions mistakes should not take place (no technical problem) - Change management is important. - There is always pressure from clients - I plan for the worse - Improper planning - Inexperience can result in delays - Time pressure on behalf of the client - Changes in design can cause considerable delays</td>
<td>- A plan’s accuracy increases with experience</td>
<td>- Experience means that you are able to foresee possible emerging delay issues</td>
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<td>- Resource management - Outline responses to contingencies - Stage planning</td>
<td>- Timing should benefit the company not the client - Work according to milestones and monitoring</td>
<td>- Communication skills are important - Execution strategy</td>
<td>- A plan’s accuracy increases with experience</td>
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<td>- Recovery plans come as a result of changes from the client’s side - Under normal conditions mistakes</td>
<td>- Politics, communication failure</td>
<td>- Government projects inherently carry delays</td>
<td>- A plan’s accuracy increases with experience</td>
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</table>
| 6 | -Project Plan based on past experiences  
-Planning, Planning, Planning  
-Stage planning  
-Resource management  
-Must take everyone’s role into account  
-A plan affects the relationship with the client | -The plan must remain flexible to some extent  
-Detail planning and experience are important for the plan to take changes into account  
-Experience determines how well a plan adjusts to contingencies | -Planner needs to take into account a little bit of contingency for the unforeseeable matters  
-Planner need to take on board all the surveys, all the investigations, all the utilities  
-Planners need to know availability of client’s financial resources | -You should adjust your plan based on clients’ demands  
-It’s human nature, but a professional wouldn’t be optimistic.  
-Lots of pressure from client to make changes  
-Under normal conditions mistakes should not take place  
-People follow their self-interest due to financial, political or to prove themselves  
-Client asks for changes and they are both resource and time consuming  
-Changes in design can cause considerable delays  
-Time pressure on behalf of the client | -Client asks for changes and they are both resource and time consuming  
-Changes in design can cause considerable delays  
-Time pressure on behalf of the client | -Knowledge about the concrete conditions of a project is crucial for its success.  
-Clients have no knowledge about specific issues in projects | -Experience provides better judgement in general |

| 7 | If construction workers and managers don’t agree with the plan, they are not going to follow that | -Experience determines how well a plan adjusts to contingencies  
-Plans can always change. | -Role of project planners is often neglected in construction projects  
-Planners intentionally attempt to convince clients to choose them | -clients’ changes in requirement  
-Inexperienced workers | -Knowledge about every single details of the project is crucial for a good planning | -When experienced people are on the team, you feel more confident.  
-I do respect senior planners |
<table>
<thead>
<tr>
<th></th>
<th>Meetings as part of the decision making process</th>
<th>The role of teamwork from a planning Point of View</th>
<th>Aspects that affect the decision making process (Power, commitment, diversity, Confidence, Peer pressure)</th>
</tr>
</thead>
</table>
| 1 | -Face to face meetings can improve the accuracy of a plan, because people express their point of view with respect to time and resources to use  
- Decisions are made based on the knowledge and information you can get | -Greater team experience helps a plan to develop smoothly  
- Unforeseen scenarios are better addressed by a team than individuals alone  
- Teamwork with new members can be very complicated  
- Teamwork means streamlining | - Seniority is key in terms of better planning and decision-making.  
- Local conditions are important determinants of a planners work  
- Personal interests tend to come first that team effort. (except those of interviewee)  
- Experienced people collaborate more than inexperienced  
- Dominant people are usually managers  
- Diversity of knowledge and experience is valuable to develop effective team work |
| 2 | - Decisions should be made primarily by those in higher echelons of power  
- People with the higher experience will make the best decisions  
- Leaders should take care of conflict between team members | - Teamwork means streamlining (and can carry delays)  
- Teamwork with new members can be very complicated  
- Working with experienced team members is more enjoyable (you feel more confident about the project’s success) | - Seniority is key in terms of better planning and decision-making.  
- Planning should be done based on Medium contingency levels  
- The purpose of planning is financial gain  
- Outsiders (contractors) show less commitment than insiders to the company  
- The client has the money and the company should benefit  
- Work ethics are akin to adhering to a code of conduct and the company’s responsibilities to a contract  
- Dominant people are usually unprofessional |
| 3 | - Meetings help to avoid extra costs  
- People with the higher experience will make the best decisions (regarding costs) | - Teamwork is good when everything goes according to plan  
- Teamwork means streamlining  
- The right attitude is important for teamwork to be productive  
- Working with experienced team members is more enjoyable (you feel more confident) | - The purpose of planning is financial gain  
- The client has the money and the company should benefit (but clients can be unreasonable)  
- Seniority is key in terms of better planning and decision-making.
<table>
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<th>4</th>
<th>Decisions are made based on the knowledge and information you can get. Knowledge and experience imply better decisions. People with the higher experience will make the best decisions. Meetings help to discuss past projects and learn from past mistakes. Meetings help to avoid inefficiencies in the team.</th>
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<td>Decisions are made based on the knowledge and information you can get. Face to face meetings can improve the accuracy of a plan, because people express their point of view with respect to time and resources to use.</td>
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<td>6</td>
<td>Decisions are made based on the knowledge and information you can get. Knowledge and experience imply better decisions.</td>
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<td>People with higher experience lead the meetings. I usually trust them because they are more experienced. Experienced people give more chance to people to share their ideas.</td>
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<td>Teamwork is good when everything goes according to plan. Teamwork is about understanding who the stakeholders are. Teamwork means streamlining. The right attitude is important for teamwork to be productive.</td>
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<td>Teamwork is not about shared decision making. Teamwork is about understanding who the stakeholders are.</td>
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<td>Seniority is key in terms of better planning and decision-making. Experienced people collaborate more than inexperienced. Work ethics are akin to adhering to a code of conduct and the company’s. Monetary incentives cannot determine a person’s commitment. Experienced people collaborate more than inexperienced. Personal interests tend to come first that team effort. (Except those of interviewee) Employees can be afraid of being critical or making mistakes.</td>
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<td>When experienced people are in the team, you are more confident. Definitely, everyone experiences the conflict when you are 5 people working together for 10 hours, 7 days.</td>
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