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Addressing Sustainable Construction in Procurement Strategies

by

Amr Sourani

A dissertation thesis submitted in partial fulfilment of the requirements for the award of the degree

Doctor of Philosophy

at

Loughborough University

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Acknowledgment

First of all, I must thank my supervisor, Dr. M. Sohail for making this thesis possible and for his support and guidance.

I would like to thank my family for their love, direction and support throughout my life. Special thanks from the bottom of my heart go to my father, Issa, and my mother, Asma, for everything they have done for me over the years. Words of appreciation are not enough to express my feelings towards them.

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Abstract

Sustainable construction is about achieving a balance between the social, economic and environmental aspects of construction so that the costs and the benefits, evaluated along these three dimensions, are optimised. In the light of the huge expenditure of the UK public sector on construction, the benefits that can be gained from integrating sustainability into construction procurement can be very significant. The aim of this thesis is to develop a theoretical framework to assist UK public clients in addressing sustainability issues in construction projects’ procurement strategies. The objectives include: (1) developing agreed sets of social, economic, and environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy; (2) identifying the factors that are important to better address sustainable construction by UK public clients in developing a procurement strategy; (3) identifying potential barriers (4) identifying the parties that are most capable of removing such barriers; (5) identifying whether or not local authorities are addressing sustainability in their procurement strategies, policies, guidelines and procedures; and (6) identifying how public clients are addressing sustainability in their procurement strategies, policies, guidelines and procedures.

The components of the theoretical framework were derived from a thorough analysis of information obtained from a variety of sources (e.g. public sector practitioners, academics, professionals/consultants, and contractors) and through the utilisation of a variety of research methods and techniques within a triangulated approach. These included (1) a Delphi Exercise in which 17 experts in sustainability participated, (2) interviews with 9 key professionals and experts, (3) a questionnaire survey to which 132 local authorities in the UK responded, and (4) two case studies of local authorities demonstrating good practice in sustainable procurement. Triangulation was utilised within and across the methods and the techniques adopted. It facilitated the access to different levels of reality, through combining qualitative and quantitative methods. Validation of the parts of the framework was conducted in several ways. These included validating the findings from each Delphi round in the subsequent round, validating the findings obtained from one method or technique by utilising another; and facilitating comments by the respondents/interviewees regarding any of the items included in the questionnaires/interview guides used in this research.

Agreement among sustainability experts participating in this research was developed
regarding sustainability criteria that should be addressed by UK public clients in
developing a procurement strategy. These included 17 social sustainability criteria, 12
economic sustainability criteria, and 13 environmental sustainability criteria. There
were 41 factors identified as important, very important, or extremely important factors
for UK public clients to better address sustainable construction. These included
knowledge and perception factors, organisational and management factors, political
and regulative factors, contractual factors, instrumental factors, logistical factors,
strategic factors and financial factors. The investigation carried out in this research
enabled the identification of 12 main barriers. Among these are barriers related to
vagueness and diversity of definitions and interpretations; insufficiency of guidance
and tools; insufficiency and inconsistency of policies, regulations and commitment by
leadership; lack of funding; and separation of capital and operational budgets. There
were 4 main parties identified as those most capable of removing the barriers. These
included governmental/regulatory bodies, supply chain, professional/educational
bodies and users. The results of the investigation show the extent to which attention is
paid to each sustainability criterion by local authorities and hence highlight the areas
requiring further attention. The results also show different ways of addressing
sustainability by local authorities.

The framework developed is of an evidence-based and comprehensive nature. It
provides a clear vision of what needs to be addressed and what would enable the
achievement of sustainable construction procurement by UK public clients. It also
anticipates what the barriers are and who would be best placed to tackle them. It also
provides demonstrations from the “real world”.

The contribution of this thesis to the existing body of knowledge is threefold: (1)
academic, through addressing significant research questions that have not been
addressed before and providing the evidence base of the findings; (2) procedural,
through developing a comprehensive framework to assist public clients in better
addressing sustainable construction in developing a procurement strategy and through
overcoming one of the major obstacles to obtaining sustainable procurement, which is
the obstacle of confusion and disagreement regarding what needs to be addressed; and
(3) methodological, through the use of the triangulation (which construction
management research has been reluctant to use) and through the provision of a
comprehensive review, successful application and clear demonstration of the use of
the Delphi Method (which has been rarely used in construction management research
despite its powerfulness).

Recommendations have been provided to the key parties which are able to advance the sustainable procurement agenda. Government and regulatory bodies should reconsider the financial restrictions imposed on public clients spending, in order to enable the investment in sustainable solutions, and should remove any inconsistencies in existing policies and regulations. Further attention should be given to government’s publications about sustainability in relation to the quantity of these publications as well as their quality. The scope of regulations should be extended to incorporate a wider range of sustainability issues. Simple but comprehensive tools and techniques for assessing sustainability need to be developed.

For individual public procurers, on top of compliance with legislation, regulations and government policies with regards to sustainability, there is a great scope to do more. Training on sustainability issues at all levels has to be provided. Sufficient time has to be allowed in order to address sustainability. Communication and knowledge sharing have to be improved within the client organisation. Attention should be given to integrating sustainability within contractual procedures.

Professional and educational bodies have an important role to play with regards to increasing the awareness of the society as a whole in relation to sustainable development. Demand by users for sustainable products should be stimulated to move the sustainable procurement agenda forward. Contractors should consider a more proactive approach together with the concept and the practices of corporate social responsibility. The supply chain as a whole should consider further integration within itself.
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Glossary of Terms

BRE: Building Research Establishment
BREEAM: BRE Environmental Assessment Method
CIB: International Council for Research and Innovation in Building and Construction
CSR: Corporate Social Responsibility
DEFRA: Department for Environment, Food and Rural Affairs
Delphi method: refers to Delphi as a research method or technique
Delphi Exercise: refers to the particular Delphi study which was undertaken in this research and which employed the Delphi method
DETR: Department of Environment, Transport and the Regions
DTI: Department of Trade and Industry
FSC: Forest Stewardship Council
GCCP: Government Construction Client Panel
NAO: National Audit Office
NHS: National Health Service
ODPM: Office of the Deputy Prime Minister
OGC: Office of Government Commerce
OJEU: Official Journal of the European Union
WCED: World Commission on Environment and Development
ICE: Institution of Civil Engineers
IDeA: Improvement and Development Agency
Chapter 1: Introduction

1.1 Background

Sustainable development has become an increasingly important topic at the global level. It was declared as "an overarching policy goal" by governments represented at the Earth Summit on Development and Environment (Parkin et al, 2003). The Sustainable Development Research Network (2002) describes sustainable development as "the most fundamental long-term challenge facing the world community". Given the increasing recognition of the concept, more than 200 definitions of sustainable development exist (Parkin et al, 2003). Possibly, the best known definition is the one introduced by the World Commission on Environment and Development (WCED): "Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987; p. 8).

Sustainable construction, in general, refers to the application of the principles of sustainable development to the construction industry. Sustainable construction encompasses several dimensions which involve, at least (1) a social dimension (focusing on issues such as health and safety and stakeholders' involvement), (2) an economic dimension (focusing on issues such as whole life costing and support of local economies) and (3) an environmental dimension (focusing on issues such as using renewable resources and minimising pollution). Some publications in the literature have mentioned other dimensions of sustainability such as technical sustainability (Hill and Bowen, 1997; Ashley et al, 2003), cultural sustainability (CIB, 1999; Ofori, 1998; Langford et al, 1999), community sustainability (Ofori, 1998) and managerial sustainability (Ofori, 1998). However, in the context of the UK construction industry, the concept of the triple bottom line which focuses on social, economic and environmental sustainability remains dominant.

Procurement, according to Office of the Deputy Prime Minister (ODPM) can be defined as "the process of acquiring goods, works and services, covering both acquisitions from third parties and from in-house providers" (ODPM, 2003; p. 17). This process "spans the whole cycle from identification of needs, through to the end of a services contract or the end of the useful life of an asset" (ODPM, 2003; p. 17). In the UK context, the Department for Environment, Food and Rural Affairs (DEFRA) defines sustainable procurement as "a process whereby organisations meet their
needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimising damage to the environment" (DEFRA, 2006a; p. 10). Several publications were produced by governmental departments and organisations (such as the Department of Environment, Transport and the Regions (DETR), the Government Construction Client Panel (GCCP), the Office of Government Commerce (OGC) and DEFRA) to address the subject. Examples of these Publications include DETR (2000), GCCP (2000), OGC (2005a) and DEFRA (2006a).

Despite the production of many publications addressing the subject, when the objectives of this research were established, there was a lack of agreed and comprehensive sets of social, economic and environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy. Although the publication of the Guide “Sustainability” (OGC, 2005a) at a later stage represented a significant development in this regard, the evidence base of the information reported in that publication was not made clear. In relation to the Sustainability Action Plan (GCCP, 2000), the framework developed in that plan was based on 10 themes for action. Although these themes provided many useful sustainability principles in general, they did not embrace important principles mentioned in the literature (such as creating employment opportunities or social inclusion). Again, the evidence base of the framework shown in the plan was not highlighted. This research contributes further to the development of this area not only by presenting comprehensive sets of sustainability criteria but also by providing evidence-based agreement among sustainability experts regarding these criteria.

In addition to the lack of agreed and comprehensive sets of sustainability criteria, there was a lack of sufficient research regarding what factors are important to better address sustainable construction in developing a procurement strategy, what the potential barriers are and which parties are most capable of removing these barriers. In addition, there were insufficient demonstrations and case studies to clarify how sustainability considerations are addressed by public client organisations and insufficient information regarding the extent to which the considerations are addressed or planned to be addressed by these organisations.

It is around the gaps identified above that the objectives of this research were formulated (Section 1.4). Achieving the objectives provided a suitable basis for
formulating the theoretical framework which was developed in this study and aimed at assisting UK public clients in addressing sustainable construction in their procurement strategies. The developed framework is of evidence-based and comprehensive nature. It drew its components from a thorough analysis of information obtained from a variety of sources (e.g. public sector practitioners, academics, professionals/consultants and contractors) and from utilising a variety of methods and techniques within a triangulated approach. The framework provides public client organisations and other organisations interested in assisting this sector with a clear vision of what needs to be addressed and what would enable achieving sustainable construction procurement. It anticipates what the barriers are and who would be best placed to tackle them. The framework also provides demonstrations from the "real world".

This chapter introduces the context of this research project. It defines who public clients are, shows what construction within the public sector involves and highlights its significance. It underlines the need to integrate sustainability into construction procurement and establishes the importance of paying particular attention to the stage of developing a procurement strategy in order to attain a sustainable outcome. The chapter shows the areas where further research was needed and which became the basis of establishing the aim and the objectives of this thesis. This is followed by introducing the aim and the objectives of the research and the structure of this thesis.

1.2 Public clients and the construction activity

The public sector accounts for 40% of the Gross Domestic Product of the UK and employs around a quarter of the UK workforce (OGC, 2005b). It encompasses several organisations and departments including central civil government departments and agencies, the National Health Service (NHS) and its local trusts, the Ministry of Defence, Northern Ireland Assembly, National Assembly for Wales and Scottish Executive, local authorities, universities and colleges.

The UK construction industry contributes significantly to the national economy. According to the National Audit Office (NAO), this industry accounts for over 8% of the national gross domestic product (NAO, 2005a). Construction in the public sector includes a wide range of activities comprising major infrastructure and civil engineering projects, major building programmes (such as hospitals, schools, prisons and social housing), in addition to refurbishment and maintenance activities. While all
government bodies are involved in construction activities, the involvement of these bodies can range from engaging in construction as a core business for some bodies (as in the case of the Highways Agency) to occasional involvement of other bodies in significant construction projects (for example every 20 or 30 years). Most of the government bodies however undertake repair and maintenance programmes (NAO, 2005a). Taking into account the significance of the public sector, considerable social, economic and environmental benefits can be gained from integrating sustainability into public procurement of construction projects.

1.3 Addressing sustainability in construction procurement

The need to address sustainability principles in construction procurement has been increasingly acknowledged. For example, according to Rowlinson et al (2000), sustainability is one of the developing themes in the context of construction procurement which are expected to grow significantly. Adetunji et al (2003) point out that “client procurement policy” is one of three highest ranked drivers for implementing sustainability.

Official reports published in the UK have reflected the increasing emphasis on sustainable procurement. The report “Accelerating Change” recommends that the industry must take responsibility for the sustainability of its products as well as its processes (Strategic Forum for Construction, 2002). DETR (2000) reports that a new programme will require all departments and agencies to adopt an action plan for more sustainable construction procurement. According to Rethinking Construction’s Respect for People Working Group (2002), addressing procurement in a sustainable way is a need that clients are starting to acknowledge. More recently, the government published the Sustainable Procurement Action Plan. Among the goals set in the plan, which was published in 2007, was for the UK to be “among the European Union (EU) leaders in sustainable procurement by 2009” and to achieve “a low carbon more resource efficient public sector” (DEFRA, 2007; p. 3). The plan described the targets in detail and specified how the government will achieve them.

In June 2008, a joint industry-government strategy for sustainable construction was launched (HM Government and Strategic Forum for Construction, 2008). The strategy has been agreed across government and covers both buildings and infrastructure (CIRIA, 2008). The strategy aims to provide clarity around the existing policy framework and the range of commitments, targets and actions relevant to sustainable
construction (HM Government and Strategic Forum for Construction, 2008; CIRIA, 2008). A set of overarching targets has been presented to deliver the strategy. These targets are related to both the ends of sustainable construction (which relate directly to sustainability issues e.g. biodiversity) and the means of sustainable construction (i.e. the processes helping to achieve the ends). Among these are six targets representing the ends (including climate change mitigation, climate change adaption, water, biodiversity, waste and materials) and five targets representing the means (including procurement, design, innovation, people and better regulation).

According to the strategy, the overarching target of procurement is to “achieve improved whole life value through the promotion of best practice construction procurement and supply side integration, by encouraging the adoption of the Construction Commitments ..... in both the public and private sectors and throughout the supply chain” (HM Government and Strategic Forum for Construction, 2008; p. 7). The commitments referred to by the strategy relate to:

- ethical resourcing (enabling best value to be achieved and encouraging integration of the supply chain)
- valuing people (leading to a more productive workforce and facilitating recruitment and retention of staff and engagement of local communities)
- client leadership
- sustainability
- design quality (ensuring that the design is creative, imaginative, sustainable and capable of meeting delivery objectives and the needs of all stakeholders), and
- health and safety.

The procurement strategy “identifies the best way of achieving the objectives of the project and value for money, taking account of the risks and constraints, leading to decisions about the funding mechanism and asset ownership for the project. The aim of a procurement strategy is to achieve the optimum balance of risk, control and funding for a particular project.” (OGC, 2003a; p. 2). In the context of public procurement in the UK, key tasks in developing a procurement strategy include: producing outline business case, determining procurement route (including contract strategy), producing output-based specification and criteria for selection and award and placing an advertisement in the Official Journal of the European Union (OJEU) if required (OGC, 2003a). The importance of considering sustainability at the stage of
developing a procurement strategy has been highlighted in several publications. For example:

- The Improvement and Development Agency (IDeA) shows that "the key opportunity to consider environmental and social issues is at the earliest stages of the procurement cycle: identifying needs and building them into the design or specification. Adverse impacts should be managed out at this point" (IDeA, 2003; p. 3).

- The National Procurement Strategy for Local Government, in establishing how to achieve community benefits through procurement, provides the following recommendation: "implement sustainable design and sustainable procurement strategies and build sustainability into procurement processes and contracts, where relevant to contract. Sustainability in design (buildings, infrastructure, urban, green spaces, products) and procurement should be addressed in risk-based strategies that complement the corporate procurement strategy and the community plan. Include environmental requirements in the user needs and specification at the earliest stages of the procurement process" (ODPM, 2003; p. 50).

- OGC shows that the project brief, as part of the procurement process, must highlight the importance of sustainability and that the client must include sustainable performance objectives in the specification to enable tenderers to respond to these objectives (OGC, 2005a).

- Addis and Talbot (2001) argue that delivering sustainable construction is dependent upon adopting the right procurement strategy.

Despite realising the importance of addressing sustainability in procurement strategies, further research was still needed in order to fill the gaps mentioned in Section 1.1. The aim and the objectives of this research address these gaps.

1.4 Aim and objectives

The discussion provided in Section 1.1 and the knowledge gap of addressing sustainability in procurement strategies (as highlighted in Section 2.7.5) provided the basis for establishing the aim and the objectives of this research.

The aim of this research is to develop a tested, evidence-based and comprehensive theoretical framework to assist UK public clients in addressing sustainability issues in
construction projects’ procurement strategies.

Public clients need to understand in a comprehensive and unambiguous way what sustainability criteria (whether social, economic or environmental) need to be addressed in their procurement strategies. Objective 1 can be stated as follows:

**Objective 1:** To develop agreed sets of the major social, economic and environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

**Sub-Objective 1a:** To develop an agreed set of the major social sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

**Sub-Objective 1b:** To develop an agreed set of the major economic sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

**Sub-Objective 1c:** To develop an agreed set of the major environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Once the criteria are identified, there is a need to identify what would enable addressing them. Objective 2 can be stated as follows:

**Objective 2:** To develop the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy.

Several barriers however are expected. These barriers, in addition to the parties who are best placed to remove them, need to be identified. Objectives 3 and 4 can be stated as follows:

**Objective 3:** To identify the barriers to better addressing sustainable construction in developing a procurement strategy.

**Objective 4:** To identify the parties which are most capable of removing such barriers.

There is a need to identify whether or not the different sustainability criteria are addressed in real practice as this would enable turning the focus to sustainability areas that are not receiving sufficient attention. Examples and demonstrations from the “real world” about organisations demonstrating good practice in sustainable construction procurement need to be provided as a further source of assistance to public sector clients. Objectives 5 and 6 can be stated as follows:
Objective 5: To identify whether or not local authorities in the UK, as a major sector of public clients organisations, are following/planning to follow policies or guidelines which indicate the need to have sustainability considerations addressed in construction projects' procurement strategies.

Objective 6: To identify and demonstrate how local authorities in the UK are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures.

The process of developing the aim and the objectives is captured in Figure 1.1. Chapter 11 summarises how the aim and the objectives were achieved. The major findings are captured in the framework shown in Figure 11.1.

1.5 Structure of the thesis

This thesis commences with a review of the literature and an examination of relevant methodological issues. It then presents and describes the process of achieving the several objectives of the research. Finally, it highlights the main conclusions and provides recommendations for the key parties which can advance the sustainable procurement agenda and also recommendations for further research.

Each chapter in the thesis describes the attainment of one of the parts constituting the developed framework. At the end of each chapter, a figure that illustrates the relevant part of the framework is provided. The complete framework developed in this thesis is shown in Figure 11.1.

Chapter 2 provides a literature review of sustainable construction, highlights some knowledge gaps in the field and elaborates on the knowledge gap “addressing sustainability in procurement strategies” which provided the basis of setting the objectives of this research.

Chapter 3 presents methodological issues. It highlights the various elements of research design and introduces research methods and techniques. It defines the criteria for assessing the quality of research and presents their application in the context of this research.

Chapters 4, 5 and 6 discuss and present the findings in relation to the development of agreed sets of the major social, economic and environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (objective 1). Chapter 4 addresses the social side, Chapter 5 addresses the economic
side and Chapter 6 addresses the environmental side (sub-objectives la, lb and lc).

Aim:
To develop a theoretical framework to assist UK public clients in addressing sustainability issues in construction projects' procurement strategies.

Objective 1: To develop agreed sets of the major social, economic, and environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Objective 2: To develop the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy.

Objective 3: To identify the barriers to better addressing sustainable construction in developing a procurement strategy.

Objective 4: To identify the parties which are most capable of removing such barriers.

Objective 5: To identify whether or not local authorities in the UK, as a major sector of public clients organisations, are following / planning to follow policies or guidelines which indicate the need to have sustainability criteria addressed in construction projects' procurement strategies.

Objective 6: To identify and demonstrate how local authorities in the UK are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures.

Public clients need to understand what criteria they need to address.

Once the criteria are identified, public clients need to understand what would enable them better to address these criteria.

However, several barriers would be expected when public clients attempt to address sustainability criteria. These barriers need to be identified.

To ease overcoming the barriers identified, there is a need to identify the parties which are most capable of removing them.

To enable turning the focus to sustainability areas that are not receiving sufficient attention, there is a need to identify whether or not the different sustainability criteria are addressed in real practice.

To assist public clients in addressing sustainability in their procurement strategies, examples and demonstrations from the "real world" about organisations demonstrating good practice in sustainable construction procurement need to be provided.

Figure 1.1 – The process of developing the aim and the objectives
Chapter 7 presents the findings in relation to the development of the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy (objective 2).

Chapter 8 presents the findings in relation to the identification of the barriers to better address sustainable construction in developing a procurement strategy and the parties most capable of removing such barriers (objectives 3 and 4).

Chapter 9 presents the findings in relation to the identification of whether or not local authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have sustainability considerations addressed in their construction projects' procurement strategies or contracts (objective 5).

Chapter 10 presents the findings in relation to the identification and the demonstration of how local authorities in the UK are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures (objective 6).

Chapter 11 provides the main conclusions. It summarises how the research objectives were achieved and shows the resulting evidence-based framework. It also provides recommendations to the key parties which can advance the sustainable procurement agenda and recommendations for further research.
Figure 1.2 – Structure of the thesis (in terms of where the findings relevant to each objective are reported)
Chapter 2: Literature Review

2.1 Introduction

This chapter provides a literature review related to sustainable construction. Following an introduction of some relevant definitions, the chapter shows the multidimensional nature of sustainability and discusses how the specific issues underpinning each dimension and the priority given to these issues are shaped by the context of study. The chapter then discusses the issue of awareness of sustainable construction and introduces potential barriers. This is followed by highlighting some knowledge gaps in the field, namely: “conceptualisation”, “linking to the project life cycle”, “implementation mechanisms and tools”, “linking to project management”, “addressing sustainability in procurement strategies” and “assessing the potential of procurement systems to deliver sustainability”. Finally, the chapter elaborates on the knowledge gap “addressing sustainability in procurement strategies” which provided the basis of setting the objectives of this research. Figure 2.1 illustrates the structure of this chapter.

As subsequent chapters (in particular Chapters 4 to 10) include presentation and discussion of the findings obtained in this research, the reader will find that the discussion provided in each of these chapters will also touch on several aspects of the literature.

Figure 2.1 – Structure of Chapter 2
2.2 Defining sustainable construction

As introduced in Chapter 1, sustainability is about meeting the needs of the present without compromising the ability of future generations to meet their own needs. According to Hill and Bowen (1997), the term sustainable construction was proposed to describe the responsibility of the construction industry in attaining sustainability. A more detailed definition, which illustrates the social, economic and environmental dimensions embedded in the concept of sustainability, was offered by the UK Minister for Housing, Planning and Construction (Raynsford, 2000; p. 16): "Sustainable construction is the set of processes by which a profitable and competitive industry delivers built assets (buildings, structures, supporting infrastructure and their immediate surroundings) which

- enhance quality of life and offer customer satisfaction
- offer flexibility and the potential to cater for user changes in the future
- provide and support desirable natural and social environments
- maximize the efficient use of resources."

A noticeable issue in Raynsford's definition is the emphasis that is given not only to the product but also to the process. The definition introduces some aspects of social sustainability such as customer satisfaction and support for desirable social environments. It also introduces some aspects of environmental and economic sustainability such as maximising the efficient use of resources and emphasising profitability and competitiveness of the industry. However, the definition does not clearly capture the many aspects of sustainable construction. A more comprehensive definition is offered by Constructing Excellence which introduces sustainable construction as the application of sustainable development in the construction industry and suggests that sustainable development is "all about ensuring a better quality of life for everyone, now and for generations to come, through:

- social progress which recognises the needs of everyone
- maintenance of high and stable levels of economic growth and employment, whilst
- protecting, and if possible enhancing, the environment, and
- using natural resources prudently"
Sustainable development embraces the three broad themes of environmental, social and economic accountability, often known as the 'triple bottom line'." (Constructing Excellence, 2004a)

Both Hill and Bowen (1997) and Ofori (1998) point out that sustainability principles are still poorly defined and argue that these principles are subject to confusion and disagreement. Ofori (1998) argue that this could even be extended to the frequently quoted definition of sustainable development offered by WCED (1987). The lack of understanding and fuzziness of the concept present one of the barriers to the implementation of sustainable construction (Adetunji et al, 2003). Possibly, the above definitions remain at the abstract level and do not offer clear insights into the issues underpinning the social, economic and environmental dimensions of sustainability and their application in the context of construction projects. Moreover, they do not show the interrelationships between these dimensions. Further work, therefore, is still needed to better conceptualise and clarify sustainable construction.

2.3 The multi-dimensional nature of sustainability

Despite the variances between the different definitions of sustainability, there is a wide acceptance that sustainable development integrates, at least, three dimensions: (1) social dimension, including issues such as health and safety, stakeholders' involvement, workforce conditions, user needs and satisfaction and employment creation; (2) economic dimension, including issues such as whole life costing and supporting local economies; and (3) environmental dimension, including issues such as using renewable resources in preference to non renewable resources, maximising resource reuse and/or recycling and minimising air, land and water pollution at global and local levels (Hill and Bowen, 1997; Rethinking Construction, 2003; Ashley et al 2003). The environmental dimension has been traditionally the focus of the literature of sustainability. In addition, some publications in the literature have mentioned other dimensions of sustainability such as technical sustainability (Hill and Bowen, 1997; Ashley et al, 2003), cultural sustainability (CIB, 1999; Ofori, 1998; Langford et al, 1999), community sustainability (Ofori, 1998) and managerial sustainability (Ofori, 1998).
2.4 **The role of context in shaping sustainability**

The fact that the needs and the conditions of the developed countries are widely different from those of the developing world has an impact on sustainable construction (Sourani and Sohail, 2004a). For example, the principles highlighted by Gibberd (2002) have been developed to support sustainable construction in developing countries and in particular South Africa. In the comment offered by Ofori (1998) on the paper of Hill and Bowen (1997), Ofori argued that the paper of Hill and Bowen was written to reflect, at large, the point of view of developed countries in spite of mentioning some issues that were relevant to the context of South Africa. Realising the differences between developed and developing countries, the International Council for Research and Innovation in Building and Construction (CIB) and other organisations published “Agenda 21 for Sustainable Construction in Developing Countries” (CIB and UNEP-IETC, 2002). According to this publication, such differences are related to the problems and their scale, development priorities, capacity of local industry and government, skill levels in addition to cultural and world view issues which influence the understanding and implementation of sustainable development and construction. Studying sustainable construction, therefore, needs to take into consideration the context of study. Social, economic and environmental dimensions will always exist regardless of the context. What could differ according to the context are the specific criteria underpinning each dimension and/or the priority given to these issues. Many of the sustainability criteria that were reported in the literature in relation to developing countries, therefore, might not be highly relevant to the UK sustainability Agenda. For example, in many developing countries, poverty alleviation may have a top priority within the social dimension of sustainability. In the UK context, reducing poverty might be considered important but more attention may be given to other criteria within the social side, such as user satisfaction or equality and diversity issues. This research aims to identify the major criteria underpinning the social, economic and environmental dimensions of sustainable construction in the UK context.
2.5 Awareness of sustainable construction

Several publications showed that the level of awareness regarding sustainable construction issues has been found low in several countries. In the Netherlands, for example, a survey which was carried out in 1998 showed that quarter of architects and half of the building contractors did not know what sustainable construction was (Van Bueren, 2002). In the US, Landman (1999) showed that lack of training and education in sustainable design/construction was one of the primary barriers to more widespread sustainable building practices. Watuka and Aligula (2002), in their study of sustainable construction practices in the Kenyan construction industry, reported that sixty four percent of the respondents on a questionnaire administered to architects, engineers, quantity surveyors and contractors indicated lack of awareness about sustainable construction practices.

In the context of the UK, promoting awareness and understanding of sustainable construction was declared as one of the objectives of the UK strategy for more sustainable construction (DETR, 2000). According to the Sustainable Construction Task Group (2003), although awareness within the construction professions and trades was increasing, it was not enough. The need to raise awareness of sustainable development throughout the industry was also highlighted by the Institution of Civil Engineers (ICE) and other organisations in their publication “Society, Sustainability and Civil Engineering” (ICE et al, 2002). According to DEFRA et al (2006), there is a need to increase awareness and understanding in relation to sustainable development issues amongst government office staff. Lack of awareness might be attributed to a number of factors such as lack of clear conceptualisation of sustainability, lack of clear case for sustainability benefits, lack of integration of sustainability issues in education and training programmes. Other contributing factors may include the traditional perception that limits the understanding of sustainability within the environmental dimension, the dominance of economic drivers in the performance of businesses at the expense of social and economic issues and lack of long term perspective.

Without raising the level of awareness in relation to sustainable construction issues, progress in construction practice would not be possible to achieve. However, raising awareness in itself is not sufficient; appropriate action has to follow to achieve the progress needed.
2.6 Barriers to sustainable construction and sustainable procurement

Lack of awareness is not the only barrier to achieving sustainability, which still seems far from reach in an industry considered as "inherently defensive" for change (CIB, 1999). There is evidence that the construction industry is falling behind other sectors in its attitude towards sustainability (CRISP Sustainable Construction Theme Group, 1999). The progress in the field has been hindered by many barriers, such as the industry’s fragmented nature, lack of long term perspective, clients’ unwillingness to share burden, lack of clear concept definition of sustainable construction and its benefits, regulatory constraints and inconsistent government policy and lack of fiscal incentives (CRISP Sustainable Construction Theme Group, 1999; Adetunji et al, 2003; Rethinking Construction, 2003a).

In the context of public procurement, the main barriers to sustainable procurement in central government, as identified by NAO (2005b), involve:

- conflict between sustainable procurement and reducing costs
- lack of leadership on sustainable procurement
- lack of integration of sustainable procurement into standard procurement processes, indicating the possibility of not taking sustainability issues into account
- lack of central control over procurement in departments, detonating the difficulty in enforcing sustainable procurement, and
- lack of knowledge about what sustainable procurement is and how to achieve it.

The barriers mentioned above (including those reported by CRISP Sustainable Construction Theme Group, 1999; Adetunji et al, 2003; Rethinking Construction, 2003a and NAO, 2005b) are either barriers to sustainable construction in general (without addressing in particular procurement strategies in the public sector context) or barriers to sustainable procurement in general (without addressing construction in particular). Furthermore, these barriers are not specific to the stage of developing a procurement strategy. In other words, all the barriers illustrated above do not represent the barriers to better address sustainable construction by UK public clients in developing a procurement strategy. Identifying such barriers is one of the objectives of this research.
2.7 Knowledge gaps

As discussed in Sections 2.2, 2.5 and 2.6 sustainability is poorly understood. This may be partly attributed to conceptualisation of sustainability; definitions of sustainability remain at the abstract level, no consensus on the issues underpinning the dimensions of sustainability exists and general perceptions viewing sustainability as an environmental problem are still present. Such a problem will be further explored in Section 2.7.1, as one of the knowledge gaps.

Lack of understanding may not only be related to how sustainability is conceptualised, but also to insufficient guidance in relation to how this conceptualisation is linked to the project life cycle (as will be further discussed in Section 2.7.2). Even where sustainability principles are discussed in some detail, there is clearly insufficient tools and mechanisms to assist in implementing sustainability, as will be discussed in Section 2.7.3.

Lack of understanding can also be attributed to lack of integration of sustainability in relevant professional guidance such as Project Management’s Body of Knowledge and Procurement guides. Hence, the impact of integrating sustainability in relevant theories and practices is not well-understood. These issues will be further explored in Sections 2.7.4, 2.7.5 and 2.7.6.

2.7.1 Conceptualisation

To some extent, views perceiving sustainability as an environmental problem can still be found in the literature. Consequently, the balance that needs to be created between the environmental dimension and other sustainability dimensions is not adequately acknowledged. There is also a noticeable lack of consensus on the issues underpinning sustainability. Furthermore, the principles of sustainability are subject to confusion and disagreement (as detailed in Section 2.2). Further work, therefore, is still needed to better conceptualise sustainable construction.

This research does not focus primarily on filling the gap of conceptualisation. However, the project makes some contribution to the development of this area through identifying the social, economic and environmental sustainability criteria that should be addressed in developing a procurement strategy (Chapters 4, 5 and 6).

2.7.2 Linking to the project life cycle

The project life cycle involves several stages which could encompass verification of
need, assessment of options, development of procurement strategy, construction process, operation and management in addition to disposal and re-use. Sustainable construction could be better understood if aligned to the different phases of the project life cycle. From an implementation point of view, it would be more appropriate to provide such an alignment (Uher, 2000). Among the publications that addressed sustainability within phases of the project life cycle are: Kibert (1994), where the different project phases were integrated within a model for sustainable construction; Casella Stanger et al (2002), where a sustainability accounting plan considered the different phases of the project; Ashworth and Langston (2000), where whole of life assessment was linked to the measurement of sustainability. However, there still seems a lack of understanding regarding how the principles underpinning the different dimensions of sustainability could fit within the different phases of the project life cycle and what impact this issue could have on the different activities carried out within these phases.

This research makes partial contribution to developing linkages between sustainability and the stages of the project lifecycle by focusing on sustainability issues at one of these stages; that is the stage of developing a procurement strategy.

2.7.3 Implementation mechanisms and tools
A significant part of the literature discussed the principles of sustainability without sufficient consideration of how they could be implemented, an issue that was also raised by Uher (2000). More work is needed to identify implementation mechanisms and tools and to identify how sustainability could be integrated in the decision making process.

Sustainability has different dimensions and criteria, which might be in conflict sometimes. An assessment of sustainability needs to take into account the different criteria underpinning it. This could lead to the use of multi-criteria decision making techniques for assessment. Such techniques were used for solving problems in construction management (Cheng, 2002) and selecting construction procurement strategy (Al-Tabtabai, 2002). In some cases, multi-criteria decision making was used with sustainability provided the basis for choosing criteria for decision making. For example, in the context of the UK water industry, Ashley et al (2003) developed a framework of decision support processes that can be used to include the principles of sustainability more effectively within the decision making processes. There is
potential to use such techniques to make informed decisions considering sustainability criteria when attempting to deal with problems such as selection of contractor or choice of procurement system (Sourani and Sohail, 2005a).

Although this gap has been identified in this research, filling this gap lies outside the scope of this project.

2.7.4 Linking to project management

Project management may be defined as "the planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance." (BS, 2000). Project management could provide a suitable framework to implement sustainable construction, and project managers, through their leading role in the project, could be in an ideal position to promote it (Uher, 2000). However, there is little evidence that sufficient research has been carried out to establish clear linkages between sustainable construction and project management. An examination of a summary of the UK Association of Project Management's Body of Knowledge as introduced by Morris (2002) would indicate that sustainability does not feature as one of the key topics in that body. It is important to mention here that some of the topics addressed there – such as safety, health and environment; and value management are closely related to sustainability. Yet, they do not provide sufficient coverage of all the issues underpinning it. One of the few attempts to link sustainability to project management was carried out by Uher (2000) who developed a project management model for achieving sustainable construction and presented the need to integrate sustainable construction into the traditional project delivery strategy, which is constrained by time, cost and quality objectives. The model developed by Uher (2000) focused only on the conceptual stage of the project life cycle. Further work linking sustainability and project management and considering the different phases in the project life cycle is still needed.

Again, although this gap has been identified in this research, filling this gap lies outside the scope of this project.

2.7.5 Addressing sustainability in procurement strategies

The importance of integrating sustainability principles into construction procurement was discussed in detail in Chapter 1. However, under this subject matter, several issues have failed to receive sufficient attention. Among these are:
• identifying agreed sets of social, economic and environmental sustainability criteria that should be addressed by UK public clients in developing procurement strategies
• identifying the factors that are important for these clients to better address sustainable construction in developing procurement strategies
• identifying potential barriers and the parties that are most capable of removing such barriers
• identifying the extent to which the different sustainability areas are receiving attention by public sector procurers, and
• demonstrating the inclusion of sustainability issues in the policies, strategies, guidelines and procedures guiding the development of construction procurement strategies and contracts by public sector procurers.

The need for further research in all these areas formed the basis for formulating the objectives of this research, as discussed in Chapter 1. The primary focus of this research therefore is on filling the gap of addressing sustainability in procurement strategies.

2.7.6 Assessing the potential of procurement systems to deliver sustainability

The selection of a procurement system needs to take into consideration many factors associated with client needs, contractor requirements and project characteristics (Ambrose and Tucker, 2000). However, according to Newcombe (2000; p. 104), the selection of appropriate procurement path is "not as obvious as it sometimes appears and divergent choices are sometimes argued". What exacerbates the problem is that despite the increasing recognition of the need to accommodate sustainability criteria in procurement strategies, such criteria do not feature as a key aspect in the selection of procurement systems. However, there are some indications that the situation is changing. For example, the criteria "control over sustainability issues" is now among the evaluation criteria of procurement systems, as appears in the evaluation template developed by OGC (2003a). Such systems have shown different levels of performance in attaining certain objectives such as speed, cost, certainty, flexibility, non-adversarial focus, risk allocation, etc. (Love et al, 1998; Ambrose and Tucker, 2000; Alhazmi and McCaffer, 2000). The challenge now is to assess the potential of these systems in attaining the objectives of the different dimensions of sustainability.
Following this assessment, informed decisions that consider the different sustainability objectives, the priority given to meeting such objectives and the performance of the different systems in attaining them, can be made.

Although this research does not focus primarily on filling the gap of assessing the potential of procurement systems to deliver sustainability, it makes some contribution in this area. This contribution involves identifying the views of practitioners working in local authorities regarding the existence of differences among procurement systems in relation to their potential to deliver sustainability. This contribution is illustrated in Chapters 7 and 9.

2.8 Summary

Sustainable construction, in general, refers to the application of the principles of sustainable development to the construction industry. Given the increasing recognition of the concept, huge number of definitions of sustainable development exists.

Despite the variances between the different definitions of sustainability, there is a wide acceptance that sustainable development integrates, at least, three dimensions: social, economic and environmental. However, there is a need to take into account the specific context of study to develop a better understanding of the concept.

Awareness of sustainable construction issues seems to be insufficient. However, this is not the only barrier to sustainable construction. Other barriers introduced by the literature include, among others, the industry's fragmented nature, lack of long term perspective, lack of clear concept definition of sustainable construction and its benefits in addition to regulatory constraints and inconsistent government policy.

Several knowledge gaps in the field were also discussed in this chapter. These included "conceptualisation", "linking to the project life cycle", "linking to project management", "implementation mechanisms and tools", "addressing sustainability in procurement strategies" and "assessing the potential of procurement systems to deliver sustainability". The gap "assessing the potential of procurement systems to deliver sustainability" was further discussed in the chapter as this provided the basis of setting the objectives of this research.
Chapter 3: Research Methodology

3.1 Introduction

This chapter addresses the methodological issues associated with conducting the research. It introduces research design and discusses the various elements included in it. Such elements include the purpose of study, research strategy and methods, type of investigation, extent of researcher interference, study setting, unit of analysis, time horizon, sampling, etc. The chapter reviews the different methods and techniques used in data collection. These include a Delphi Exercise, a questionnaire survey, semi-structured interviews and case studies. The chapter also defines the criteria for assessing the quality of both qualitative and quantitative research and shows how these were considered in the context of this research. Finally, the chapter introduces the strategy of triangulation and highlights its application in this research. Figure 3.1 shows the structure of this chapter and illustrates how its components relate to the research methods and strategies adopted.

3.2 Research Design

Quite often, terms used in discussing methodological issues are used interchangeably. To avoid any confusion, the terms “research design” and “research methodology” need to be clarified. According to Bryman and Bell (2003), research design is the structure which guides the execution of a research method and the analysis of data. Research methodology, on the other hand, is “the analysis of, and rationale for, the
particular method or methods used in a given study, and in that type of study in general” (Jankowicz, 1991; p. 160).

Distinction has to be made also between a “research method” and a “data collection technique”. A research method is “a systematic and orderly approach taken towards the collection of data so that information can be obtained from those data” (Jankowicz, 1991; p. 158). The main research methods available include experiments, surveys (involving both interviews and questionnaires), archival analysis, history and case studies (Yin, 1994; Jankowicz, 1991). Techniques, on the other hand, are “particular, step by step procedures which you can follow in order to gather data, and analyse them for the information they contain” (Jankowicz, 1991; p. 158). Jankowicz (1991) groups some of the techniques as follows:

- Semi-structured, open ended techniques: these involve the conversation, the individual interview, the key informant interview and the focus group.
- Fully structured techniques: these involve the structured questionnaire, the structured face to face interview, together with material on postal and telephone variants.
- Additional techniques: these involve the repertory grid, attitude scaling and the observational techniques of structured observation and the field experiment.

Again, research methods and techniques may be used in a confusing way. A case study, for example, is essentially a research method; however, some may refer to it as a data collection technique. A case study needs to be viewed as a research method involving the use of certain technique(s). Once a case has been selected, appropriate techniques to collect the data (e.g. interviews, document analysis or questionnaires) need to be identified. Without deciding what techniques would be used within the case study, no data would be collected because selecting a case study would not lead in itself to the collection of any data (Bryman and Bell, 2003). The various methods and techniques used in this project are overviewed in this section and are discussed in detail in Section 3.3.

The main focus of the remaining discussion in this section is on the elements of research design. Research design includes certain rational decision making choices (Sekaran, 2003). Adopting appropriate research design would involve making decisions in relation to issues such as the purpose of study, research methods and techniques, type of investigation, extent of researcher interference, study setting, unit
of analysis, time horizon, measurement and measures, sampling and data analysis. These elements are discussed in more detail below.

3.2.1 Purpose of study

Based on their nature, studies can be classified as exploratory studies, descriptive studies, hypothesis testing studies, or case study studies (Sekaran, 2003). The nature of the study depends on how advanced the knowledge about the subject is. More exhaustive design decisions can be obtained when the research advances from the exploratory stage, to the descriptive stage and then to the hypothesis testing stage.

Exploratory research deals with a problem about which there is a little knowledge. In such a case, there is a need to assess appropriate concepts and theories, develop new theories if needed and identify the possibility of using existing methodologies (Phillips and Pugh, 2000). Qualitative methods are used with exploratory studies and this leads to more structured or quantitative studies (Hakim, 1987).

Descriptive studies are conducted to find out the characteristics of the variables of interest e.g. to describe the age and educational level (Sekaran, 2003). They require collecting and analysing quantitative data e.g. mean, standard deviation etc.

Testing out research tries to "find the limits of previously proposed generalisations" (Phillips and Pugh, 2000; p. 50). Such generalisations can be improved through the processes of specifying, modifying and clarifying. Generally, hypothesis testing aims at explaining the nature of particular relationships between variables or at finding out the differences among groups (Sekaran, 2003). It can be used with both quantitative and qualitative data.

A Case study may be defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 1994; p. 13). Case studies can provide a thorough analysis of similar situations where similar problems are experienced (Sekaran, 2003). Carefully selected case studies could provide many useful insights into the factors contributing to the situation. Case studies can be of exploratory, descriptive, or explanatory type. According to Yin (1993), data collected in a case study may be of qualitative or quantitative nature.

The triangulation strategy, which was utilised within and across the methods and techniques adopted (see Section 3.4.3), involved both exploration and testing out. For
example, the Delphi Exercise was used for exploration and testing out purposes. The first round of Delphi was of an exploratory nature; as it aimed at identifying sustainability criteria that should be addressed by UK public clients in developing a procurement strategy and at identifying the factors that are important for public clients to better address sustainable construction in developing a procurement strategy. The second round involved testing out the results obtained from the first round. The interviews/case studies conducted represented also an exploration of the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy. At the same time, the results obtained from these interviews/case studies in relation to such factors represented a testing out for the results obtained from Delphi. Finally, facilitating comments by the respondents/interviewees regarding any of the items included in the questionnaires/interview guides used in this project represented a testing out for the results obtained from Delphi regarding sustainability criteria.

3.2.2 Research methods and techniques

Several research methods exist. These can include, among others, experiments, surveys (involving both interviews and questionnaires), archival analysis, history and case studies (Yin, 1994; Jankowicz, 1991). Yin (1994) provides a useful framework that shows relevant situations for different research methods (Table 3.1).

<table>
<thead>
<tr>
<th>Method</th>
<th>Form of research question</th>
<th>Requires control over behavioural events?</th>
<th>Focuses on contemporary events?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>how, why</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>who, what, where, how many, how much</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Archival analysis</td>
<td>who, what, where, how many, how much</td>
<td>No</td>
<td>yes/no</td>
</tr>
<tr>
<td>History</td>
<td>how, why</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case study</td>
<td>how, why</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 3.1 – Relevant Situations for different research methods (Source: Yin (1994))

Experiments refer to situations where the investigator can manipulate behaviour directly, precisely and systematically (Yin, 1994). This can be found in environments facilitating high degree of control over variables (as in a laboratory environment). Experiments are rarely used in management research for reasons related to the difficulty of achieving the needed degree of control (Bryman and Bell, 2004).

Survey research involves the use of an instrument composed of closed or open ended
structure. Surveys include both interviews (normally referring to the face-to-face administration) and questionnaires (normally referring to mail or other indirect methods of administration) (Garson, 2007).

Archival analysis is a form of the observational method that involves examining documents or archives. As for history, the distinctive contribution of such a method is in situations dealing with the dead past (Yin, 1994). This is the case encountered when there are no relevant persons to report and where documents as well as cultural and physical artefacts become the main sources of evidence (Yin, 1994). In relation to the case study, it was discussed in Section 3.2.1.

The boundaries between the different methods are not sharp. According to Yin (1994), although each method has its own characteristics, there is a significant amount of overlap between them. The framework presented in Table 3.1, therefore, should be viewed as a guide for the investigator to determine the method that is most advantageous. The framework is based on three elements: form of research question, the extent of control an investigator has over actual behavioural events and the degree of focus on contemporary as opposed to historical events.

The “from of research question” is the first and most important condition to distinguish between the different methods (Yin, 1994). It refers to the type of question used. For example, “how” and “why” research questions indicates the possibility of using experiments, history and case studies (see Table 3.1). However, with “what” questions, the situation is not as straightforward as with “how” or “why” questions. The complexity arises from what is meant by “what”. Yin (1994) suggests that the use of “what” research questions introduces two possibilities. The first possibility arises when a “what” question is of exploratory nature. In such a case, there can be a “justifiable rationale” to undertake an exploratory study, and as a result, any method among those listed in Table 3.1 can be used. However, if a “what” question is in the form of “how many” or “how much”, then surveys or archival methods are favoured.

The extent of control an investigator has over behavioural events is another factor to be considered when deciding on an appropriate method (see Table 3.1). When there is control over behavioural events, experiments are favoured. On the other hand, none of the other methods (surveys, archival analysis, history, case studies) requires this control.

The third factor to consider when deciding on an appropriate method is the degree of
focus on contemporary events (see Table 3.1). When contemporary events are the focus of the study, experiments, surveys and case studies are favoured. Archival analysis and history are appropriate to adopt when there is no focus on such events.

The framework presented in Table 3.1 can be utilised to choose appropriate research methods for this research. This leads to the adoption of the survey method (involving both interviews and questionnaire survey) and the case study method. Sections 3.3.2, 3.3.3 and 3.3.4 provide details about these methods (e.g. how they were designed, etc.). A point to note though is that this research employed a method that was not included in the framework by Yin (i.e. the Delphi method). As such, a detailed discussion about Delphi and the reasons for its use is provided in Section 3.3.1.

The research questions of this thesis are derived from the objectives outlined in Section 1.4. Table 3.2 lists these questions.

<table>
<thead>
<tr>
<th>Research Question</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. What are the major sustainability criteria that should be addressed by UK public clients in developing a procurement strategy?</td>
<td></td>
</tr>
<tr>
<td>Q2. What factors are important for UK public clients to better address sustainable construction in developing a procurement strategy?</td>
<td></td>
</tr>
<tr>
<td>Q3. What are the barriers to better addressing sustainable construction in developing a procurement strategy by UK public clients?</td>
<td></td>
</tr>
<tr>
<td>Q4. Which parties are most capable of removing the barriers to better addressing sustainable construction in developing a procurement strategy by UK public clients?</td>
<td></td>
</tr>
<tr>
<td>Q5. To what extent are local authorities in the UK, as a major sector of public clients' organisations, following/planning to follow policies, guidelines or procedures which indicate the need to have sustainability criteria addressed in construction projects' procurement strategies or contracts?</td>
<td></td>
</tr>
<tr>
<td>Q6. How are local authorities in the UK addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures?</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2 – Main research questions

By applying the framework by Yin (1994) to the proposed research questions (see Tables 3.3 to 3.6), it was found that the survey and the case study were the most suitable research methods for answering Q1, Q2 and Q3. The survey was also the most suitable method for answering Q4 and Q5. Survey questions can be organised in interviews or questionnaires (Fink, 2003b). Both methods will be used in this research to answer questions Q1, Q2, Q3, Q4 and Q5. In relation to the question Q6, the case study is the most suitable method to address that question. Table 3.6 include detailed information about the use of the different research methods and techniques when addressing the questions Q1 to Q6. It also makes reference to chapters and sections of the thesis discussing these methods and techniques and discussing the findings.
relevant to each research question. A summary of the information about the use of the different research methods and techniques is provided in Table 3.6. Figure 3.2 captures the complete research process that led to achieving the objectives. Table 3.13 provides a summary of the main issues involved in the different research methods and techniques adopted.

<table>
<thead>
<tr>
<th>Method</th>
<th>From of research question</th>
<th>Requires control over behavioural events?</th>
<th>Focuses on contemporary events?</th>
<th>Suitability for the proposed research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>how, why</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Survey</td>
<td>who, what, where, how many, how much</td>
<td>No</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Archival analysis</td>
<td>who, what, where, how many, how much</td>
<td>no</td>
<td>yes/no</td>
<td></td>
</tr>
<tr>
<td>History</td>
<td>how, why</td>
<td>no</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>Case study</td>
<td>how, why</td>
<td>no</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3 – Relevant situations for research methods: Application for the research questions Q1, Q2 & Q3

<table>
<thead>
<tr>
<th>Strategy</th>
<th>From of research question</th>
<th>Requires control over behavioural events?</th>
<th>Focuses on contemporary events?</th>
<th>Suitability for the proposed research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>how, why</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Survey</td>
<td>who, what, where, how many, how much</td>
<td>no</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Archival analysis</td>
<td>who, what, where, how many, how much</td>
<td>no</td>
<td>yes/no</td>
<td></td>
</tr>
<tr>
<td>History</td>
<td>how, why</td>
<td>no</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>Case study</td>
<td>how, why</td>
<td>no</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.4 – Relevant situations for research methods: Application for the research questions Q4 & Q5.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>From of research question</th>
<th>Requires control over behavioural events?</th>
<th>Focuses on contemporary events?</th>
<th>Suitability for the proposed research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>how, why</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Survey</td>
<td>who, what, where, how many, how much</td>
<td>no</td>
<td>yes</td>
<td>x</td>
</tr>
<tr>
<td>Archival analysis</td>
<td>who, what, where, how many, how much</td>
<td>no</td>
<td>yes/no</td>
<td>x</td>
</tr>
<tr>
<td>History</td>
<td>how, why</td>
<td>no</td>
<td>no</td>
<td>x</td>
</tr>
<tr>
<td>Case study</td>
<td>how, why</td>
<td>no</td>
<td>yes</td>
<td>x</td>
</tr>
</tbody>
</table>

Table 3.5 – Relevant situations for research methods: Application for the research question Q6.
<table>
<thead>
<tr>
<th>Research question</th>
<th>Relevant methods and techniques used in addressing the research question</th>
<th>Description of the use of methods and techniques used in answering the research question and reference to chapters and sections of the thesis addressing these methods and techniques</th>
<th>Chapters/sections of the thesis reporting the findings that are relevant to the research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. What are the major sustainability criteria that should be addressed by UK public clients in developing a procurement strategy?</td>
<td>Delphi method</td>
<td>Section 3.3.1 introduces the Delphi method which was used in developing answers to this research question (Round 1 of Delphi) and validating them (Rounds 2 and 3 of Delphi)</td>
<td>Chapters 4, 5 and 6 report the findings that are relevant to this research question, as follows:</td>
</tr>
<tr>
<td></td>
<td>Questionnaire survey</td>
<td>Section 3.3.3 reports methodological issues associated with the questionnaire survey. The questionnaire survey was used indirectly as a validating instrument in relation to this research question through providing respondents with the opportunity to comment on the items included in the questionnaire survey and which involved social, economic and environmental sustainability criteria (see Appendix D)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Semi-structured interviews</td>
<td>Section 3.3.2 reports methodological issues associated with the interviews conducted. The interviews were used indirectly as a validating instrument in relation to this research question through providing respondents with the opportunity to comment on the items included in the interview guide and which involved social, economic and environmental sustainability criteria (see Appendix B)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Case studies</td>
<td>Section 3.3.4 reports methodological issues associated with the case studies conducted. The case studies were used as a validating instrument in relation to this research question through asking interviewees to identify any other major social, economic and environmental sustainability criteria that were not listed (see the interview guide used in the interviews conducted within the case studies (Appendix C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Semi-structured interviews/Case studies</td>
<td>Sections 3.3.2 and 3.3.4 report methodological issues associated with the interviews and the case studies conducted. The interviews/case studies were used as an instrument to develop answers to the research question and also as a validating instrument in relation to the answers to this research question which were obtained through the Delphi Exercise (triangulation). This was achieved through including this research question in the interview guide (see Appendix B) and the in interview guide used in the interviews conducted within the case studies (see Appendix C)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.6 – Use of the different research methods and techniques in addressing the research questions and reference to relevant chapters and sections of the thesis.
<table>
<thead>
<tr>
<th>Research question</th>
<th>Relevant methods and techniques used in addressing the research question</th>
<th>Description of the use of methods and techniques used in answering the research question and reference to chapters and sections of the thesis addressing these methods and techniques</th>
<th>Chapters/sections of the thesis reporting the findings that are relevant to the research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2. What factors are important for UK public clients to better address sustainable construction in developing a procurement strategy?</td>
<td>Delphi method</td>
<td>Section 3.3.1 introduces the Delphi method which was used in developing and validating answers to this research question (Rounds 1, 2 and 3 of Delphi). The results of Round 3 of Delphi were also used in validating the answers to this research question that were developed through using the semi-structured interviews (triangulation).</td>
<td>Chapter 7 reports the findings that are relevant to this research question</td>
</tr>
<tr>
<td>Q3. What are the barriers to better addressing sustainable construction in developing a procurement strategy by UK public clients?</td>
<td>Semi-structured interviews/case studies</td>
<td>Sections 3.3.2 and 3.3.4 report methodological issues associated with the interviews and the case studies conducted. The interviews/case studies were used as an instrument to develop answers to the research question and also as a validating instrument in relation to the answers to this research question which were obtained through the Delphi Exercise (triangulation). This was achieved through including this research question in the interview guide (see Appendix B) and in the interview guide used in the interviews conducted within the case studies (see Appendix C)</td>
<td>Chapter 8 reports the findings that are relevant to this research question</td>
</tr>
</tbody>
</table>

Continue Table 3.6 – Use of the different research methods and techniques in addressing the research questions and reference to relevant chapters and sections of the thesis
<table>
<thead>
<tr>
<th>Research question</th>
<th>Relevant methods and techniques used in addressing the research question</th>
<th>Description of the use of methods and techniques used in answering the research question and reference to chapters and sections of the thesis addressing these methods and techniques</th>
<th>Chapters/sections of the thesis reporting the findings that are relevant to the research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4. Which parties are most capable of removing the barriers to better addressing sustainable construction in developing a procurement strategy by UK public clients?</td>
<td>Semi-structured interviews/case studies</td>
<td>Sections 3.3.2 and 3.3.4 report methodological issues associated with the interviews and the case studies conducted. The interviews/case studies were used as an instrument to develop answers to this research question (triangulation). This was achieved through including this research question in the interview guide (see Appendix B) and in the interview guide used in the interviews conducted within the case studies (see Appendix C)</td>
<td>Sections 3.3.2 and 3.3.4 report methodological issues associated with the interviews and the case studies conducted. The interviews/case studies were used as an instrument to develop answers to this research question (triangulation). This was achieved through including this research question in the interview guide (see Appendix B) and in the interview guide used in the interviews conducted within the case studies (see Appendix C)</td>
</tr>
<tr>
<td>Research question</td>
<td>Relevant methods and techniques used in addressing the research question</td>
<td>Description of the use of methods and techniques used in answering the research question and reference to chapters and sections of the thesis addressing these methods and techniques</td>
<td>Chapters/sections of the thesis reporting the findings that are relevant to the research question</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Q5. To what extent are local authorities in the UK following/planning to follow policies, guidelines or procedures which indicate the need to have sustainability criteria addressed in construction projects’ procurement strategies or contracts?</td>
<td>Questionnaire survey</td>
<td>Section 3.3.3 reports methodological issues associated with the questionnaire survey. The questionnaire survey was used as an instrument to develop answers to this research question (see Appendix D)</td>
<td>Chapter 9 reports the findings that are relevant to this research question</td>
</tr>
</tbody>
</table>
### Research question

<table>
<thead>
<tr>
<th>Question</th>
<th>Delphi method</th>
<th>Questionnaire survey</th>
<th>Semi-structured interviews</th>
<th>Case studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 What are the major sustainability criteria that should be addressed by UK public clients in developing a procurement strategy?</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Q2 What factors are important for UK public clients to better address sustainable construction in developing a procurement strategy?</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Q3 What are the barriers to better addressing sustainable construction in developing a procurement strategy by UK public clients?</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Q4 Which parties are most capable of removing the barriers to better addressing sustainable construction in developing a procurement strategy by UK public clients?</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Q5 To what extent are local authorities in the UK, as a major sector of public clients' organisations, following/planning to follow policies, guidelines or procedures which indicate the need to have sustainability criteria addressed in construction projects' procurement strategies or contracts?</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Q6 How are local authorities in the UK addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures?</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

✓ = the method/technique was used directly and specifically to address the research question

* = the method/technique was used – but indirectly/not specifically - to address the research question (usually through providing respondents with the opportunity to comment on the items included when the method was used)

x = the method/technique was not used in any way to address the question

Table 3.7 – A summary of the use of different methods and techniques in addressing research questions
Figure 3.2 – The research process that led to achieving the objectives of this research
<table>
<thead>
<tr>
<th>Research method/technique</th>
<th>Main issues involved</th>
</tr>
</thead>
</table>
| Delphi Exercise                   | - conducted through questionnaires that were administered by e-mail and post  
- involved 3 rounds  
- 17 experts participated in the first round, 15 experts participated in the second round and 13 experts participated in the third round  
- the panel of experts involved experts from the public sector, from professional/consultancy organisations, from major contractors organisations in addition to academics |
| Semi-structure interviews         | - 9 interviews were conducted with key informants  
- key informants involved experts and professionals working on sustainability issues in a variety of professional and public sector organisations  
- the interviews involved both face to face and telephone interviews |
| Questionnaire survey              | - questionnaire was administered to almost all local authorities in the UK  
- 132 responses were received  
- Response rate attained was 29% |
| Case studies                      | - involved 2 case studies: Nottinghamshire County Council and London Borough of Camden  
- evidence was collected through interviews and document analysis  
- the interviews conducted within the case studies were conducted with practitioners and professionals working in both Nottinghamshire County Council and London Borough of Camden. In total, three face to face interviews were conducted within the case studies. |

Table 3.8 – A summary of the main issues involved in the research methods and techniques adopted

3.2.3 Type of investigation

An investigation may be of causal type or correlational type (Sekaran, 2003). A causal study is carried out to establish a cause and effect relationship. When a study aims to identify the factors associated with, or influencing the problem rather than to establish a cause and effect relationship, then it can be described as a correlational study. Clearly, this research is a correlational study, as it focuses on identifying issues
influencing the problem rather than on establishing a cause and effect relationship.

### 3.2.4 Extent of researcher interference

In correlational studies, the disruption caused to the natural setting (e.g. through conducting interviews or administrating questionnaires) is relatively small and the researcher interference is therefore minimal. However, in causal studies, variables in the natural settings may be intentionally controlled and artificial settings may need to be created as in laboratory. The extent of the researcher interference, therefore, can be large. This research involves correlational investigation, the methods and techniques used involve little disruption and the extent of the researcher interference is small.

### 3.2.5 Study setting

To describe a study setting as contrived or non-contrived depends on whether the research is undertaken in a natural (real life) or an artificial environment. Three types of studies can be differentiated: field studies, field experiments and lab experiments. Field studies refer to correlational studies undertaken to consider certain factors in a natural environment and involve a non-contrived setting with minimal researcher interference. On the other hand, field experiments refer to causal studies conducted in natural environment with some researcher interference and involve a non-contrived setting with moderate researcher interference (Sekaran, 2003). Finally, lab experiments refer to causal studies conducted in an artificial environment with high degree of control and involve contrived setting with extreme researcher interference. Obviously, this research is a field study and involves a non-contrived setting.

### 3.2.6 Unit of analysis

Unit of analysis, according to Sekaran (2003, p. 132), refers to "the level of aggregation of the data collected during the subsequent data analysis stage." It is determined by research questions and can be individuals, groups, departments, organisations, etc. Some research designs utilise samples combining different levels of analysis such as organisations and departments (Bryman and Bell, 2003), Unit of analysis has an impact on different aspects of research, such as the variables within a framework, data collection techniques and sample size. Data needs to be aggregated at the level of the unit of analysis although such data may be collected from individuals comprising this unit. For example, the unit of analysis in a study may be the organisation, although data may be collected from individuals within the organisation.

This research involves different units of analysis. In both the Delphi Exercise and the
semi structured interviews, the unit of analysis is the individual (i.e. the expert in the case of the Delphi Exercise and the interviewee in the case of the interviews). In the questionnaire survey, the unit of analysis is the organisation (i.e. the local authority) but data would be collected from individuals representing the organisations (each respondent to the questionnaire survey represented one local authority). In the case studies, the unit of analysis is the organisation but the data was collected through individuals (i.e. people interviewed within the case study) and document analysis.

3.2.7 Time horizon

Based on the number of points in time at which data is collected, a study can be classified as a cross-sectional study or a longitudinal study. In cross-sectional studies (such as most field studies), data is collected once, allowing therefore the comparison between data obtained from two or more groups at one point in time (Burton, 2000; Sekaran, 2003). However, in longitudinal studies, data is collected at more than one point in time, facilitating therefore the study of the effect of certain change). In this research, which is a field study, the data was collected through a Delphi Exercise, interviews, case studies and a questionnaire survey; no method/technique was used at more than one point in time. Hence, the study is a cross-sectional one. A point to note is that although the Delphi questionnaires were distributed in different rounds and hence at different points of time, these questionnaires were different questionnaires distributed at different points of time within the same study. The Delphi method remains therefore a cross-sectional study.

3.2.8 Measurement and measures

Four scales can be applied to the measurement of variables (Sekaran, 2003):

- Nominal: This is where subjects are assigned to certain categories or groups.
- Ordinal: This is where subjects are assigned to certain rank-ordered categories.
- Interval: This is where subjects are assigned to certain categories or groups with the magnitude of differences among these categories or groups can be measured.
- Ratio scales: This is where subjects are assigned to certain categories or groups with the proportion of differences among these categories or groups can be measured and where there is an absolute zero point.

With the move from nominal to ratio scale, there is an increased precision in quantifying the data and more flexibility in performing additional statistical tests
(Sekaran, 2003). However, adopting an appropriate scale depends on the type of the data that needs to be collected.

In this research, scales were used in both the questionnaire survey and the Delphi Exercise. In part two of the questionnaire distributed in the questionnaire survey, a nominal scale was used while in part three, an ordinal scale was utilised (see Appendix D). Scales used in the Delphi Exercise are introduced in Section 3.3.1.

3.2.9 Sampling

The issue of how sampling was carried out will be introduced when each of the methods and techniques used is introduced. The issue of how experts were selected in the Delphi method is discussed in Section 3.3.1.6. In relation to the questionnaire survey, sampling is introduced in Chapter 9. As for the interviews, the composition of the respondents is presented in Section 3.3.2.4. Finally, Section 3.3.4.6 introduces the documents analysed and the people interviewed in the case studies.

3.2.10 Data analysis

It was seen more appropriate to introduce data analysis when introducing the findings obtained from employing the various methods and techniques.

3.3 Discussion of the adopted methods and techniques

3.3.1 The Delphi method

3.3.1.1 Background on Delphi

The Delphi method is a systematic procedure to evoke expert opinion. Its intended outcome is to achieve a reliable consensus of opinion among a selected panel of experts. Usually, Delphi is conducted through a series of questionnaires. The panel members remain unknown to each other and their interaction is managed in a totally anonymous way (Robinson, 1991; Martino, 1983). Following each round, the responses are analysed, and based on the analysis, a new questionnaire is developed and sent to the members in the next round. The iterative nature of the method enables providing the members with feedback involving new information in each round. They, therefore, are able to reconsider the information they provided in previous rounds in the light of the overall results (Procter and Hunt, 1994). Such a process continues for a pre-determined number of rounds or until some pre-determined criterion has been met e.g. reaching consensus (Mullen, 2003; Robinson, 1991), as shown in Figure 3.3.
Figure 3.3 – The Delphi Procedure

3.3.1.2 The use of Delphi

In essence, Delphi group is a committee. However, the main characteristics of Delphi (anonymity, iteration with controlled feedback and statistical response) can turn Delphi into a method that maximises the advantages and minimises the disadvantages of using committees (see Table 3.9). This will be further discussed in Section 3.3.1.3.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sum of information available to a group is at least equal to the information available to one individual member.</td>
<td>The sum of misinformation available to a group is at least equal to the misinformation available to one individual member.</td>
</tr>
<tr>
<td>The number of factors that can be considered by the group is greater than or equal to the factors that can be considered by one member.</td>
<td>The majority of a group can exert social pressure over one or more of its members to agree with the majority’s opinion when such member(s) feel that this opinion is wrong.</td>
</tr>
<tr>
<td></td>
<td>The goal may become to reach a least common dominator that does not offend anyone but that is not strongly supported by anyone either.</td>
</tr>
<tr>
<td>Although an argument adopted by group minority could lack sufficient objectivity, this minority may be able to overpower the majority through vigorous presentation of that argument.</td>
<td>Although an argument adopted by group minority could lack sufficient objectivity, this minority may be able to overpower the majority through vigorous presentation of that argument.</td>
</tr>
<tr>
<td>A member with a persuasive personality or with an ability to develop a rigor argument can have excessive power over the group discussions and thoughts.</td>
<td>A member with a persuasive personality or with an ability to develop a rigor argument can have excessive power over the group discussions and thoughts.</td>
</tr>
<tr>
<td>Members may be interested in certain views so that the goal of reaching a valid conclusion may be compromised in seeking to win the group’s support of these views.</td>
<td>Members may be interested in certain views so that the goal of reaching a valid conclusion may be compromised in seeking to win the group’s support of these views.</td>
</tr>
<tr>
<td>Common bias in the group often results from sharing a common culture between the group members (this may be related to the field in which the members have expertise).</td>
<td>Common bias in the group often results from sharing a common culture between the group members (this may be related to the field in which the members have expertise).</td>
</tr>
</tbody>
</table>

Table 3.9 – Advantages and disadvantages of using committees (the information provided in the table are explained in detail Martino (1983)).
In broad terms, Delphi can be used for any purpose requiring the use of committees (Martino, 1983). In particular, Delphi can be useful to employ when there is a need to (Linstone and Turoff, 1975; Bradley and Stewart, 2002; Hinks and McNay, 1999; Robinson, 1991; Padel and Midmore, 2005):

- obtain accurate information that is unavailable or expensive to obtain
- handle complex problems that require more judgemental analysis
- study or define areas where there is considerable uncertainty and/or a lack of agreed knowledge or disagreement
- combine fragmentary perspectives into a larger collective understanding, or
- model a real world phenomena involving a range of viewpoints and for which there is little established quantitative evidence.

3.3.1.3 Characteristics of Delphi

Anonymity

Delphi participants remain unknown to each other and their interaction is managed in a totally anonymous way (Martino, 1983). This facilitates the examination of any considerations based on their value, without interference of any personal issues. Anonymity minimises the disadvantages of using committees such as group pressure, status, dominancy of powerful personalities and argument repetition (Martino, 1983; Mullen, 2003). Moreover, anonymity provides little chance for any participant to win the panel’s support to certain views at the expense of reaching a valid conclusion.

But anonymity has its drawbacks. These can include lack of accountability for views expressed by Delphi members where their names are not disclosed, limiting the boundaries of exploratory thinking and eliminating the stimulation and generation of ideas (Sackman, 1975; Bowles, 1999; Rudy, 1996; all cited by Mullen, 2003).

Iteration with controlled feedback

Normally, Delphi is conducted through a series of questionnaires spreading over consecutive rounds. In each round, participants are provided with feedback that involves new information and expresses the group collective opinion. A controlled feedback contributes to minimising the disadvantages of using committees through focusing on objectives of Delphi rather than concentrating on winning the argument by certain participants (Martino, 1983). Furthermore, it reduces the tendency of participants to reach an agreement at the expense of producing a useful opinion.
**Statistical group response**

Statistical group response commonly represents the group opinion (e.g. the mean) and may indicate the opinion variation within the group (e.g. standard deviation).

### 3.3.1.4 The position of Delphi in the qualitative/quantitative debate

Despite sharing some features with traditional quantitative techniques such as questionnaire surveys, Delphi has rather been viewed as a qualitative tool by many authors. Examples include Padel and Midmore (2005), McCarthy and Atthirawong (2003), Henchion and McIntyre (2005), Feret and Marcinek (1999). However, Delphi has the potential to produce quantitative or semi-quantitative data. Critcher and Gladstone (1998, cited by Mullen, 2003) clearly indicate this issue. They entail that Delphi occupies a position that is close to a constructionist approach but has also the potential to generate quantified results within a positivist tradition. This shows the "hybrid" status of Delphi which extends across the boundary between qualitative and quantitative approaches.

It is probably this position of Delphi that could limit the extent to which the method can be exploited if a quantitative approach is followed. Understanding such a position may be crucial if Delphi is to be criticised for not following procedures conventionally adopted in a quantitative approach. The views of Helmer (1977, cited by Mullen, 2003; p. 40), McCarthy and Atthirawong (2003) and Mullen (2003) seem to be useful in clarifying such a position. According to Helmer, Delphi "cannot legitimately be attacked ... for using mere opinions and for violating the rules of random sampling in the 'polling' of experts". The criticisms "... rest on a gross misunderstanding of what Delphi is ... it should be pointed out that a Delphi inquiry is not an opinion poll" (Helmer, 1977; cited by Mullen, 2003). McCarthy and Atthirawong (2003, p. 815) claim that Delphi is "primarily a qualitative knowledge elicitation approach that focuses on using an expert panel to arrive at a consensus of opinion. It is not designed for advanced statistical analysis and does not, in itself, show relationships or interactions between factors". Mullen argue that "it is apparent that many relatively recent criticisms of Delphi and attempts to prescribe the correct approach stem from the positivist critique." (Mullen, 2003; p. 40). It is also this position of Delphi however which provides the technique with advantages over other quantitative approaches. Compared to questionnaire surveys, Delphi offers better interaction with respondents and has the potential to provide more understanding of
complex problems.

3.3.1.5 The impact of the position of Delphi in the qualitative/quantitative debate on the level of structure adopted on commencing Delphi

Many Delphi studies commence with a structure that is consistent with the position of Delphi within the qualitative/quantitative debate (discussed in Section 3.3.1.4). According to Linstone and Turoff (1975, p. 5), the first phase in Delphi is characterised by an "exploration of the subject under discussion wherein each individual contributes additional information he feels is pertinent to the issue". In line with the "exploratory" nature of the first round is the argument made by several Delphi authors (e.g. Mullen (2003)) concerning the need to have open ended questions in the first round, or, at least, to provide the respondents with the opportunity to identify issues that are important or relevant to the study.

In consistency with the argument concerning the need to commence Delphi with open-ended questions, many Delphi studies have been found using this type of questions in the first round. Examples include Shon and Swatman (1998), Feret and Marcinek (1999), Padel and Midmore (2005) and Scholl et al (2004). In some cases, authors have been found accompanying the open-ended questions with a list of issues found in previous research to assist the respondents in answering the questions without preventing them from generating ideas and forming views (e.g. Chan et al (2001) and Shon and Swatman (1998)). Some authors however have been found commencing their Delphi studies with a more structured way in designing the first round questionnaire. In such cases, the questionnaire may involve closed-ended questions and may, or may not, involve open-ended questions. Examples include McCarthy and Wthirawong (2003) and Bradley and Stewart (2002).

3.3.1.6 Selecting the experts' panel

Defining the expert

Experts are expected to know more about the subject of study than do others. However, there is no obvious method to define an expert and it is almost impossible to find current psychometric or social science literature on experts (Dietz, 1987; Sackman, 1975; cited by Mullen, 2003). In broad terms however, an expert may be defined as "someone who has a special knowledge about specific subject" (Martino, 1983; p. 27) or as anyone with a relevant input (Phil, 1971; cited by Mullen, 2003).
Criteria for selecting experts

Knowledge is perhaps the key criterion for selecting an expert to participate in a Delphi panel. Criteria such as willingness and availability are also important criteria but may be considered secondary to knowledge: "Degree of expertness, as determined by the initial search, is probably the most important single consideration.....After that considerations such as likely availability and probable willingness to serve can be taken into account" (Martino, 1983; p. 29).

But how can someone be identified knowledgeable to the extent of being regarded as an expert? Some authors highlighted indicators of such knowledge. Among these are (Martino, 1983; Mitchell, 1992, cited by Henchion and McIntyre, 2005; Khosrow-Pour and Herman, 2001; Cabanis, 2002 cited by Adnan and Morledge, 2003; Henchion and McIntyre, 2005; Sholl et al, 2004; Shon and Swatman, 1998; Marr and Prendergast, 1993, cited by Henchion and McIntyre, 2005):

- publications in the field
- signs of professionals eminence such as leadership, membership, or holding office in a professional society or organisation
- peer judgment and recommendations
- honours by professional societies
- self rating of the expertise in the relevant area
- presentations made at national conventions
- relevant years of experience
- selection for comment by national or regional media on relevant issues, and
- the number and the importance of patents held.

Sample size and type

The size of panel used in Delphi studies can vary widely (Robinson, 1991). However, it has been observed that a minimum appropriate size would be seven or eight experts (Mitchell and McGoldrick, 1994; Mullen, 2003). Some authors seem reluctant to specify a minimum appropriate size. Rather, they tend to link the size to criteria such as purpose of investigation, standards used to select panel members and willingness to participate e.g. Robinson (1991) and Cantrill et al (1996; cited by Mullen, 2003).

Whether there is a relationship between group size and group performance in Delphi
seems to be arguable. Many Delphi authors argue that Delphi should not be confused with conventional survey techniques (McCarthy and Wthirawong, 2003; Mullen, 2003). Hence, there is a reluctance to employ random sampling in Delphi (see Dietz (1987), Procter and Hunt (1994) and Mullen (2003)). Such views seem to be consistent with epistemological positions considering Delphi as a rather qualitative approach. Many Delphi authors found it more appropriate to apply measures such as knowledge, availability and willingness to participate in the selection process and to choose experts from a variety of backgrounds and positions so that the key views points of the subject under consideration are represented (Robinson, 1991; Hinks and McNay, 1999; Chan et al, 2001; Sholl et al, 2004; Henchion and McIntyre, 2005).

The experts selected to participate

The selection of experts participating in the Delphi Exercise conducted accommodated the elements discussed in this section under the headings “criteria for selecting experts” and “sample size and type”. The selected experts represented a wide range of views and sectors; they involved experts from the public sector, from professional/consultancy organisations, from major contracting organisations, in addition to academics. A list of the participating experts is available in Appendix A.

Problems encountered in selecting experts

Experts are usually busy people (Martino, 1983). Their workload may inhibit them form participating in a Delphi panel or may inhibit them from responding at times set by the investigator. Such a problem may be tackled by taking measures such as providing the experts with complete clarification about the exercise, setting appropriate but realistic time scales for response, adopting appropriate procedures for reminding experts with the need to respond and obtaining the experts’ commitment to participate before they become actually engaged in the exercise. All these measures were applied in the Delphi Exercise conducted as will be shown in Section 3.3.1.8.

Another problem that could be encountered in selecting experts is related to the possibility of experiencing common bias among experts as a result of sharing a common culture by these experts (see Table 3.9). One way to minimise such a problem could be to choose the experts from a variety of institutions and major schools of thoughts. This was accommodated in the Delphi Exercise conducted as the selected experts represented a wide range of views and sectors.
3.3.1.7 The rationale for using Delphi in this research

The type of information sought to achieve objectives 1 and 2 (in relation to sustainability criteria that should be addressed by UK public clients in developing a procurement strategy and the factors that are important to better address sustainability) demands the use of experts. It was evident that "normal" practitioners were not in a position to provide the information sought for different reasons. Among these are reasons related to the novelty of the subject of sustainability, the expected difficulty that normal practitioners would find in interpreting the subject in general and the additional difficulty arising from requesting them to provide the information which are relevant to the development of procurement strategies in the context of the UK public sector. The final reason for using Delphi in this research is related to the "hybrid" position of Delphi within the qualitative/quantitative debate which places it in an ideal situation for use. Delphi is primarily a qualitative tool that provides a rich context-based knowledge. Moreover, the interaction facilitated by Delphi enables the attainment of better understanding of complex problems. On the other hand, the potential of the technique to provide quantitative results indicates whether consensus can be achieved. Delphi is ideal to use in situations which involve little established quantitative data and which are specific to certain context.

3.3.1.8 Conducting Delphi in this research

Round 1

Format and content of questions

The first round questionnaire involved questions in an open-ended format. This approach facilitates the exploration of the subject under discussion and assists in developing more representative answers of the participants' thinking; an open-ended first round Delphi has been used as a criterion for judging whether a study is well-conducted (Rieger, 1986; cited by Mullen, 2003). Furthermore, the views of the experts participated in the pilot study supported using this approach.

In Part 1 of the questionnaire, respondents were asked to identify five major criteria representing the social dimension of sustainable construction that should be addressed by UK public clients in developing a procurement strategy. The same question was repeated but with reference to economic and environmental sustainability. Respondents were notified that they were welcome to provide more than five criteria. In Part 2, the respondents were invited to identify the ways through which such clients
can better address sustainable construction in developing a procurement strategy.

**Distribution and follow up**

The questionnaire was sent electronically to the experts in November/December 2004. It was accompanied with a list of definitions and clarifications in addition to an invitation letter which included a background about the research, explained the objectives of the Exercise, clarified the Delphi procedure, showed the time expected to complete the questionnaires and assured the experts that their responses would be treated in strict confidence. Due to the expected high demand on the experts’ time, no deadline was set for responding. However, experts were notified that a reply within two weeks would be helpful.

Follow up was undertaken, using postal, e-mail and telephone reminders. It was revealed that non-response was mainly due to the amount of workload the experts had. Similar difficulty was reported in other Delphi studies e.g. Chan et al (2001).

**Response**

Seventeen replies were received by April 2005 (representing a response rate of 81%). These were widely distributed among the groups participating in the panel; thus provided a balanced view and an appropriate presentation of these groups (Chan et al, 2001; Robinson, 1991). The responses received included 5 responses from the professionals/consultants group, 4 responses from public sector experts, 4 responses from academics and 4 responses from major contractors.

**Analysis of Round I results**

The responses to the questions in Round 1 provided a rich material for analysis. The procedure followed in analysing the responses of the open ended questions included the following major steps:

- reading and re-reading the responses received
- establishing preliminary categories within which the responses can be classified. Such categories emerged from key words used in the responses and from the words or phrases that were frequently used in the responses. In establishing the categories, it was also taken into account the need to use the best exemplifying phrases. This approach was considered by Scholl et al (2004) who showed the need to present the categories obtained from analysing open ended questions with best exemplifying phrases from Round 1. Each category formulated
included responses from at least two experts.

- coding the responses within the established categories
- reviewing the categories formulated and the responses classified to ensure that the responses were classified appropriately and to identify the possibility of modifying the categories formulated e.g. by merging similar categories, and
- reviewing the modified categories to ensure the appropriateness of the coding undertaken.

While every effort was made to ensure that an appropriate coding was used and that the categories formulated provided an appropriate representation of the responses, it is important to note that other classifications of the responses received may exist. This was also experienced in other Delphi studies e.g. Feret and Marcinek (1999).

As a result of the analysis of Part I of the questionnaire, three sets of social, economic and environmental sustainability criteria were identified. These were suggested as criteria that should be addressed by UK public clients in developing a procurement strategy. Some of the findings are similar to the findings of other publications which presented either generic criteria (i.e. criteria that are not specific to certain stage in the project life cycle) or specific criteria (i.e. criteria that are relevant to certain stages in the project life cycle e.g. design). This was expected as the stage of developing a procurement strategy (which the Delphi Exercise focuses upon) involves making important decisions that are relevant to different stages in the project life cycle (including the phases of design, construction and operation). In total, it was possible to identify 14 criteria representing the social dimension (see Chapter 4, Table 4.1), 9 criteria representing the economic dimension (see Chapter 5, Table 5.1) and 12 criteria representing the environmental dimension (see Chapter 6, Table 6.1).

The analysis of the responses to Part 2 led to the identification of 36 factors that could be potentially important for UK public clients to better address sustainable construction in developing a procurement strategy (see Chapter 7, Table 7.1).

**Round 2**

**Format and content of questions**

Based on the analysis of the results obtained from Round 1, the second round questionnaire was developed. The first part of the questionnaire included three sections addressing social, economic and environmental sustainability. Each section
included criteria identified in Round 1 and other criteria suggested by the literature, if any. In the second part of the questionnaire, the factors identified from the analysis of the first round questionnaire were included. Respondents were asked to assess the level of importance of the criteria and the factors included using a 5-point Likert Scale ranging from 0 denoting "not important" to 5 denoting "extremely important". In addition, respondents were invited to add any other unlisted criteria or factors, to identify their level of importance and to add comments.

**Distribution and follow up**

The questionnaire was sent electronically to experts in May 2005. As in Round 1, follow up was undertaken in Round 2, using postal, e-mail and telephone reminders.

**Response**

Fifteen replies were received in this round. Two experts were not able to respond due to the workload they had. The experts dropped out included one expert from the public sector experts group and another expert from the professionals/consultants group; hence the overall balanced composition of the panel was maintained.

**Analysis of Round 2 results**

For each criterion included in Part 1 of the second round questionnaire, the mean (average) and the standard deviation of the scores provided by the experts regarding the level of importance of the criterion were calculated. This facilitated the ranking of the criteria according to their mean values. In a small number of cases, experts identified new criteria which were not listed. In such cases, an analysis was conducted in a similar way to the analysis of the answers to the open ended questions in Round 1. The analysis of Part 2 results was conducted in a similar way to the analysis conducted for the results obtained in Part 1.

In relation to **Part 1**, Table 4.2 (Chapter 4), Table 5.2 (Chapter 5) and Table 6.2 (Chapter 6) show the mean values, the standard deviation values and the rankings corresponding to the social, economic and environmental sustainability criteria respectively as well as the criteria identified in Round 2. In relation to **Part 2**, for each factor, the mean and the standard deviation values of the scores provided were calculated and the factors were then ranked. Only one new factor was identified in this round. Table 7.2 (Chapter 7) shows the mean value, the standard deviation value and the ranking corresponding to each factor and also shows the new factor identified in Round 2.
Round 3

Format and content of questions

Based on the analysis of the results obtained from Round 2, the third round questionnaire was developed. This provided experts with feedback that involved presenting each item in the questionnaire with two scores indicating its level of importance. The first score was named “Your Score” and represented the score that the expert provided in Round 2 regarding the level of importance. The second score was named the “Mean Score” and represented the mean of the scores provided by all the experts participated in Round 2 regarding the level of importance. In the third round, experts had the opportunity to reconsider the scores they provided in Round 2 using the same 5-point Likert Scale used in Round 2.

Each expert was invited either to provide a “Reconsidered Score” if it was different from “Your Score” (i.e. to indicate new level of importance from the level provided in Round 2), or to indicate that the “Reconsidered Score” was the same as “Your Score” (i.e. to indicate no change to the level of importance provided). Experts were also invited to provide their scores for the criteria that were identified in Round 2.

Distribution and follow up

The questionnaire was sent electronically to experts in September 2005. They were notified that the third round was expected to be the final round. Again, follow-up was undertaken, using postal, e-mail and telephone reminders.

Responses

Thirteen replies were received in this round. Due to the amount of workload, two experts were not able to respond and dropped out. They included one expert from the academics group and another expert from the professionals/consultants group. This has not affected the overall balanced composition of the panel.

Analysis of Round 3 results

Based on the responses to the third round questionnaire, the values for the mean and the standard deviation of the scores assigned to each criterion included in Part 1 were calculated and the criteria were then ranked. The analysis of Part 2 results was conducted in a similar way to the analysis conducted for the results obtained in Part 1.

In relation to Part 1 of the third round questionnaire, Table 4.3 (Chapter 4), Table 5.3 (Chapter 5) and Table 6.3 (Chapter 6) show the mean values, the standard
deviation values and the rankings corresponding to the social, economic and environmental sustainability criteria respectively. As for Part 2 of the third round questionnaire, Table 7.3 (Chapter 7) shows the mean value, the standard deviation value and the ranking corresponding to each factor included in that part.

Developing agreement

The major objective for conducting Delphi is to obtain a reliable consensus among participating experts. According to Jones and Hunter (1995, p. 376), the aim of consensus methods is "to determine the extent to which experts or lay people agree about a given issue". In this Delphi Exercise, the objective was to develop consensus regarding the major social, economic and environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy and regarding the important factors for UK public clients to better address sustainable construction in developing a procurement strategy. However, according to Mitchell and McGoldrick (1994), there was little agreement on what exactly constitutes consensus, and according to Kilner (2004), the literature offered little guidance on the level of agreement required to claim consensus from Delphi. From a review of a wide range of Delphi studies, it was noticed that consensus was measured using different indicators. Common among these are the percentage of respondents agreeing on certain answers (examples include Green and Price (2000), Hughes (2003), Reetoo et al (2004) and Padel and Midmore (2005)) and standard deviation values (examples include Scholl et al (2004), Feret and Marcinek (1999), Miller (2001) and Outhred (2001)). The analysis and the discussion of the results will be based on both indicators.

3.3.2 Interviews

3.3.2.1 Use of interviews

Interviews can be unstructured, semi-structured or structured. They can be conducted face to face, by telephone, or online. The term "qualitative interviews" refers to wide range of interviews, from totally non-directive interviews to those interviews where the researcher asks certain questions according to a pre-established list of them (Easterby-Smith et al, 2002). The main purpose of undertaking qualitative interviews is to understand "how individuals construct the reality of their situation formed from the complex personal framework of beliefs and values, which they have developed over their lives in order to help explain and predict events in their world." (Jones,
3.3.2.2 Advantages and disadvantages of interviews

Interviews are particularly an attractive choice to researchers due to the flexibility they offer (Bryman and Bell, 2003; Sekaran, 2003). Among the advantages that the interview has over the questionnaire is that the researcher would be able to present him/her-self, and would be in a better position to magnify the meaning of the items and clarify the meaning and the objectives of the questions (Jankowicz, 1991). Interviews however have certain disadvantages. These are associated in particular with the significant time consumed in conducting, transcribing and analysing them (Bryman and Bell, 2003).

3.3.2.3 Types of interviews according to structure

Interviews can be unstructured, semi-structured or structured. These are discussed below.

Unstructured interviews aim at determining the variables that require more in-depth investigation (Sekaran, 2003). According to Fontana and Frey (2000; p. 653), unstructured interviews try to "understand the complex behavior of members of society without imposing any a priori categorization that may limit the field of inquiry". The general area is defined but without intervening to "direct the subject's remarks" (Ibert et al, 2001; p. 180). The interviews can vary as to whether a setting exists or not, the availability and accessibility of identified informants and the extent to which the respondents are clearly discernible. In this type of interviews, there is no pre-established list of questions that follow a certain sequence to be asked. Only broad and open-ended questions are asked first and their replies would enlighten the perceptions of the interviewees. Questions might vary in the different interviews depending on issues such as job level and type of work done (Sekaran, 2003). Compared to other types, unstructured interviews can provide a broad range of data (Fontana and Frey, 2000). Undertaking sufficient number of unstructured interviews would facilitate the identification of the important variables and assist in the preparation of more structured interviews.

In structured interviews, sometimes referred to as "standardised interviews" (Bryman and Bell, 2003), the same set of pre-established questions are asked to the different interviewees in the same manner, sequence and tone (Bryman and Bell, 2003; Fontana and Frey, 2000; Sekaran, 2003; Easterby-Smith et al, 2002). The set of questions
should be carefully planned, piloted and refined until a convenient level of validity is obtained (Easterby-Smith et al, 2002). Usually, the questions being asked are very clear and specific and very often, a range of fixed answers is offered (Bryman and Bell, 2003). A written interview guide, similar to a questionnaire, is followed in such interviews to ensure that the different interviews are dealt with in the same way (Jankowicz, 1991). While structured interviews facilitate the reliable aggregation of replies when such replies respond to identical cues (Bryman and Bell, 2003), there is very little flexibility offered by this type of interviews on how questions are asked or answered (Fontana and Frey, 2000).

A semi-structured interview is a type of qualitative interviewing. Semi-structured techniques involve questions with content and sequence that are not "fully specified in advance" (Jankowicz, 1991; p. 178). According to Fellows and Liu (1997), semi-structured interviews lie on the spectrum between the two extremes, unstructured and structured interviews, and differ in form widely. Ibert et al (2001) argue that both unstructured and semi-structured interviews share common principles except that a structured guide is used in the later. Such a guide, often referred to as the interview guide, is a list of questions prepared on fairly specific topics (Bryman and Bell, 2003). As the interview proceeds, certain issues may be raised by interviewee and questions which are not originally included in the list may need to be asked. According to Bryman and Bell (2003; p. 343), emphasis should be placed on obtaining "what the interviewee views as important in explaining and understanding events, patterns and forms of behaviour". Therefore, semi-structured interviews may, therefore, provide the opportunity to obtain new information and to explore new areas beyond those outlined in the pre-established questions list. The form of questions used in semi-structured techniques is open-ended, where the interviewees are encouraged to use their own words in the answers they provide (Jankowicz, 1991). Such form is helpful in this type of interviews as it tends to create a "verbose, argued response to a question" (Stroh, 2000; p. 200). Questions asked during the different interviews use the same wording. However, a great extent of flexibility is offered in how to reply, as Bryman and Bell (2003) argue. Flexibility can also be extended to the way the questions are outlined.

3.3.2.4 The interviews conducted in this research

Unstructured and semi-structured interviews can be considered as two extremes and
most qualitative interviewing can be close to one type or another, as Bryman and Bell (2003) argue. They point out that the choice of the type of the interview is influenced by a range of factors. One of these factors is how the researcher perceives the use of even the most simple interview guide in allowing "genuine access to the world views of members of social setting or of people sharing common attributes", as with such a concern it is likely that unstructured interviews would be adopted. A second factor is the clarity of focus at the beginning the investigation. It is likely that semi-structured interviews would be undertaken when the researcher begins the investigation with a fairly clear focus and when he/she has a clear idea of how to analyse the data. Another factor highlighted by Bryman and Bell (2003) is the number of people conducting the interviews. When more than one person undertake the interviews, it is likely that such interviews would be of semi-structured nature for comparability purposes. The last factor to be taken into account is whether multiple case studies are conducted. Conducting such a type of case studies would indicate the need to use semi-structured interviews in order to undertake cross-case comparability.

Among the different types of interviews, the semi-structured type was probably the most appropriate to use in this research, based on the issues discussed above. At the time of taking a decision about using semi-structured interviews, certain variables in the proposed research were fairly determined. A list of possible questions was already established but the content and sequence were not fully specified in advance. Issues such as obtaining the respondents' views concerning what was important in explaining and understanding the problem and the provision of flexibility to achieve this were important considerations when selecting the type of interview to be adopted. A fairly clear focus on the issues to be addressed was available. Multiple case studies were proposed to be conducted. All such indications showed that semi-structured interviews were the most appropriate type of interviews to adopt.

In total, 9 interviews were conducted in November and December 2005 with experts and professionals working on sustainability issues in a variety of professional and public sector organisations. A list of the people interviewed, in addition to the interview guide, are available in Appendix B. The number of the interviewees conducted may be seen limited. However, this can be attributed to two main reasons. The first reason is related to the type of information needed which required special expertise in sustainable construction procurement within the public sector. In the light of this, it was difficult to find many experts in the field of study, taking into account
that many other experts had already participated in the Delphi Exercise conducted within this research. The second reason is related to the role of interviews within this research. This role, in part, focused on confirming the results obtained through the Delphi Exercise and the case studies (which also involved some other interviews). Hence, to some extent, the interviews have a complementary role within a research design that involved the use of several methods and techniques.

The interviews conducted were a mixture of two types: personal (face to face) and telephone interviews. The findings of the interviews conducted confirmed the majority of the factors obtained from the Delphi Exercise and enabled the identification of another number of factors that were not obtainable through Delphi. The qualitative nature of the interviews facilitated the attainment of in-depth information about the factors obtained and the barriers identified.

### 3.3.3 Questionnaire survey

**3.3.3.1 Use of questionnaires**

Questionnaires can be used efficiently when what is required is exactly known (Sekaran, 2003). Using questionnaires offer several advantages. One advantage is the cheap cost of administration. This is particularly advantageous where respondents are distributed over a wide geographical area. A second advantage is related to the convenience of the respondents; a questionnaire can be completed at any time and place convenient to the respondents. Another advantage is that the use of questionnaires involves minimum researcher interference. Therefore, effects resulting from this interference are minimised and bias is reduced. Moreover, with the use of questionnaires, particular order in asking questions would be followed and this eliminates the investigator’s variability in asking the questions.

Despite the advantages that the use of questionnaires offers, certain limitations are associated with their use. For example, with the absence of the investigator, respondents to a questionnaire are denied from help when completing it and there is no opportunity to probe the respondents to elaborate the answers or to ask many questions, as this can lead to respondent fatigue. Using questionnaires also involve significant risks of obtaining low response rate and missing data, as respondents can easily ignore answering certain questions. Another disadvantage of using questionnaires is that an investigator cannot be sure about who answers the questions as a questionnaire addressed to a particular person may be passed to another person...
working in the organisation. Finally, certain data, such as data about the organisation, can be difficult to obtain with the use of questionnaires.

### 3.3.3.2 Questionnaire administration

Questionnaires may be personally administered. They can also be sent by mail or administered by telephone. Personally administered questionnaires can be appropriate to use when a survey is undertaken in a local area and the targeted organisation is prepared to bring together groups of employees at the work place to respond to the questionnaire (Sekaran, 2003). Personally administered questionnaires enable the researcher to introduce the research topic, explain the questions and collect the responses within a short period of time. Organisations however are not often prepared to use work hours in responding to personally administered questionnaires, restricting therefore the potential to use them.

Mail questionnaires cover a wide geographic area. They can be completed at the respondent's own convenience. Certain disadvantages however are associated with their use (Sekaran, 2003). One disadvantage is related to obtaining low response rates. To minimise such a problem, certain steps could be followed as shown in Section 3.3.3.5. Another disadvantage is related to whether the sample remains representative in the light of having low a response rate. A further disadvantage is the difficulty of providing help to respondents. Such a problem may be minimised by providing the respondents with clear instructions and appropriate clarifications.

Questionnaires can also be administered by telephone. A major drawback associated with the use of this type of questionnaires is the difficulty to choose between “personalising the relationship and maintaining the subject's anonymity as much as is possible” (Ibert et al, 2001; p, 178).

In this research, a large geographical area had to be covered, as the questionnaire was distributed to almost all local authorities in the UK. Therefore, from a practical point of view, it was impossible to use personally administered questionnaire. Questionnaires administered by telephone were also difficult to use due to practical considerations (such a method would be extremely exhaustive in terms of resources) and due to the difficulty of making a compromise between personalising the relationship and maintaining anonymity.

It was possible to overcome such problems with the use of mail questionnaires, which were adopted in this research. Mail questionnaires are usually sent to the respondents
who can complete them at their convenience. Moreover, they can facilitate covering a large geographical area, which was the case in this research. In mail questionnaires however response rate is expected to be low, clarification of the questions is difficult to obtain and representation is difficult to establish (Sekaran, 2003). Certain actions were taken in this research to improve response, as will be discussed in Section 3.3.3.5.

3.3.3.3 Sampling

The questionnaire survey was directed to the people who were responsible for, or involved in, construction procurement in local authorities in the UK. In seeking to identify the positions of such people, correspondence was made with some key people who have knowledge about construction or procurement in local authorities (e.g. people working with the Local Authority Sustainable Construction Network at BRE or with IDeA). The results of the correspondence indicated that the responsibility for procuring construction services varied from one authority to another (Ceeney, 2005a). They also showed that not all local authorities had procurement manager (Murray, 2005). Moreover, although procurement managers in local authorities would usually advise on the tendering process and could be responsible for addressing sustainable development criteria in corporate contracts and procurement strategies, they did not always deal with construction (Ceeney, 2005b; Waller, 2005).

More than one method was used to obtain the contact details of the appropriate people. The first method depended on placing an advertisement about participation in the questionnaire survey in both the Constructing Excellence/Local Government Task Force website and the Local Government Task Force Newsletter (August 2005). The advertisement included background about the study, its objectives, the time needed to complete the questionnaire and assurance of confidence in relation to treating the responses. The advertisement also showed that respondents would be sent a report of the findings. However, such a method was not effective in attracting respondents.

The other method that was used to obtain the contact details of the people targeted depended on sending individual e-mails to every authority in the UK to ask about the person responsible for construction procurement. Through using this method, it was possible to identify a number of respondents. From the responses to the e-mails sent, it was noticed that the two main positions taking the responsibility for construction procurement within local authorities were the Property Services Manager and the
Procurement Manager. In cases where authorities did not respond to the e-mail asking about the appropriate person responsible for construction procurement, the local government directory was used to identify the right person. The right person was assumed to be either the Manager of Property Services or the Manager of Procurement. IDeA (2002) shows that the Head of Procurement or Procurement Manager in a smaller authority is expected to have knowledge of the key issues in construction and engineering procurement and their implications for client department. They are also expected to promote design quality and sustainability issues in construction. A further measure was taken to ensure that the questionnaire was directed to the right person in the organisation. People who received the questionnaire were asked in the invitation letter accompanying it to pass the questionnaire to the person responsible for construction procurement in case they were not responsible for it.

The total number of local authorities in the UK is 468. It was estimated that in case of attaining an expected response rate of 20% (see Section 3.3.3.7 regarding response rate), the total number of the responses would be 93 (which would be a reasonable number of responses for the purpose of analysis). Adopting sampling would have led to reducing the total number of respondents and may have resulted in an insufficient number of responses to undertake a meaningful analysis. Due to this, it was seen more appropriate to send the questionnaire to almost all local authorities.

3.3.3.4 Unit of Analysis

The unit of analysis adopted in the questionnaire survey is the organisation (i.e. the local authority). To ensure that the organisation remains as the unit of analysis, only one individual within each organisation was sent a copy of the questionnaire (so that this individual becomes representative of the organisation for which he/she works). When undertaking follow up of non-respondents, another measure was taken to ensure that only one response is received from each organisation. In the reminder letter, each respondent was asked not to respond to the questionnaire if he/she had already responded to the copy that was sent before or if that copy had been passed to another colleague (as there was a possibility that such a colleague had already responded). Taking such measures can ensure that only one response is received from each organisation and therefore helps in maintaining the organisation as the unit of analysis.
3.3.3.5 Questionnaire development

General questionnaire design

In questionnaire design, there is a need to focus on three major areas (Sekaran, 2003): Principles of wording, principles of measurement and general appearance of the questionnaire. It should be noted that these major areas are applicable to the questionnaire included within the questionnaire survey and to the questionnaires included in the Delphi Exercise (obviously, Delphi is conducted through questionnaires and therefore the same discussion regarding these three major areas is applicable in the case of Delphi).

Appropriate principles of wording should be applied when designing questionnaires. These principles, which were accommodated in the design of the questionnaire survey conducted in this research, involve the following (Sekaran, 2003; Fink, 2003b):

- using a language that can be understood by the respondents
- including mutually exclusive and collectively exhaustive alternative answers for closed-ended questions
- adding an open-ended question at the end of questionnaires including closed-ended questions to enable the respondents to put their own comments
- avoiding negative questions, as some respondents find it difficult to understand negatively questions or may fail in reading the negative word
- avoiding double-barrelled or ambiguous questions
- avoiding the use of questions that draw out socially desirable responses
- avoiding the use of recall-dependent questions as the respondents would need to recall vague experiences from the past to answer such questions
- avoiding the use of leading questions as these are phrased in a way that leads the respondents to give responses which are desirable by the researcher
- avoiding the use of loaded questions
- ensuring that questions are of appropriate length
- allowing a funnel approach in designing questions to ensure a smooth and logical progression from general and easy questions to specific and more difficult ones
• reviewing the questions by experts and by potential respondents
• adapting or adopting questions which were used successfully in other surveys, and
• gathering personal data in a way that considers the sensitivity of the respondents' feelings and privacy.

Principles of measurement refer to scales and scaling related to the measurement of concepts as well as reliability and validity of the measures. These are discussed in Sections 3.2.8 and 3.4.1.

General appearance of the questionnaire is of particular importance in mail questionnaires (Jankowicz, 1991; Burton, 2000; Gillham, 2000; Ibert et al, 2001; Gill and Johnson, 2002; Sekaran, 2003), as this would motivate the respondents to complete it. This can involve preparing a proper introduction or a covering letter, providing appropriate instructions to complete the sections, using open-ended questions at the end of the questionnaire, allowing sufficient space for the answers provided and ensuring that the questionnaire is not lengthy. These elements were accommodated in the questionnaire survey conducted in this research, as shown in Appendix D.

**Improving response rate**

Certain techniques could be used to increase the response rate. These could include (Gill and Johnson, 2002; Bryman and Bell, 2003; Sekaran, 2003): Sending follow up letters, informing the respondents in advance about the study, administering the questionnaire through a reputable research organisation, considering the quality and overall presentation of the questionnaire, considering the conciseness and the attractiveness of the design, providing a suitable covering letter, providing clear instructions, ensuring that the questionnaire is unnecessarily bulky, starting the questionnaire with questions that are interesting to the respondent, considering the personalisation of the covering letter and using open-ended questions as little as possible. Such techniques were implemented in the questionnaires survey carried out in this research (see Appendix D).

**Contents of the questionnaire**

As shown in Appendix D, The questionnaire consisted of four main parts. In Part 1,
the respondents were asked to provide general information about themselves and their organisations (e.g. occupation of the respondent and the respondent’s years of experience in construction procurement and allied fields). Part 2 provided the respondents with the three sets of sustainability considerations that emerged from the Delphi Exercise (i.e. the social, economic and environmental criteria presented in Chapters 4, 5 and 6). Each respondent was asked about whether or not his/her authority follows (or plans to follow) policies, strategies, guidelines, or procedures which indicate the need to have the considerations addressed in its construction projects’ procurement strategies or contracts. The questions included in this part were closed ended questions utilising an ordinal scale which involved three choices:

1 = Yes (i.e. the authority either follows or plans to follow policies, strategies, guidelines, or procedures which indicate the need to have the consideration addressed in its construction projects’ procurement strategies or contracts).

2 = No (i.e. the authority neither follows nor plans to follow policies, strategies, guidelines, or procedures which indicate the need to have the consideration addressed in its construction projects’ procurement strategies or contracts).

3 = Don’t Know/No Opinion.

Similar scales i.e. scales consisting of “yes”, “no”, “don’t know/no opinion” were mentioned and used in many occasions by different authors (e.g. Fink (2003b)).

A point to note is that although the sustainability consideration “creating employment opportunities” has an economic side as well as a social side (see Chapters 4 and 5), there was no point in including it twice (i.e. including it in both the social and economic considerations’ sections of part 2 of the questionnaire). Therefore, it was included only once in the social considerations’ section. The same logic applies to the consideration “waste minimisation and management” which has economic and environmental sides (see Chapters 5 and 6) and was included in the environmental considerations’ section.

Part 3 of the questionnaire aimed to identify the extent of the respondents’ agreement/disagreement with certain statements in the context of sustainable construction and procurement using a Likert Scale ranging from 1 denoting “strongly disagree” to 5 denoting “strongly agree”. Finally, Part 4 allowed the respondents to add any comments they would like to make.
**Pilot testing**

Prior to sending the questionnaire, it was successfully piloted with a number of professionals working in local authorities. These were asked to respond to the questions and give their comments regarding the questionnaire, the invitation letter and the sheet of definitions and clarifications (see Appendix D). These comments were accommodated in the final version of the questionnaire.

### 3.3.3.6 Questionnaire distribution

The questionnaire, accompanied with an invitation letter, a sheet of definitions and clarifications, and a stamped addressed envelope for returning the completed questionnaire, were sent to the respondents in October 2005. The invitation letter introduced a brief background about the research and the aim of the questionnaire survey. No deadline was set for response but the invitation letter informed them that a reply within two weeks would be helpful. The respondents were notified that completing the questionnaire was expected to take 10-15 minutes. They were assured that all responses would be treated in strict confidence and that the information provided would only be used for the research purposes. They were informed that neither individuals nor their organisations would be identified in any results produced. A reminder letter accompanied with a further copy of the questionnaire was sent to non-respondents two weeks later.

### 3.3.3.7 Response

**Response rate**

Following the distribution of the questionnaire and the follow up of non-respondents, a total of 132 questionnaires were received. This presented a response rate of 29%. This response rate can be considered good, particularly if compared to other response rates reported in some studies that involved questionnaire surveys targeting local authorities. For example, in a survey conducted by the Specialist Engineering Contractors (SEC) in 2003 about the use of retentions in local authority construction procurement (Specialist Engineering Contractors’ Group, 2004), 77 responses were obtained out of 420 questionnaires distributed (representing a response rate of 18.3%). A point to note is that the response in the survey conducted by SEC was attained in the light of the presence of many factors that can contribute to obtaining a good response rate (e.g. the questionnaire was very short and was conducted by a SEC,
which included many reputable member organisations representing a total of 8,000 companies within the specialist-engineering sector. In another study by Holt et al (2001) that focused on public sector procurement in England, 32 responses were attained out of 120 questionnaires sent to local authorities (representing a response rate of 26.7%). In addition, discussions with professionals indicated that high response is not normally expected from local authorities and that response rates in surveys targeting them could be in the range of 10-15%. In the light of the above, the response rate which was achieved in this survey (29%) can be deemed acceptable.

**Respondents’ characteristics**

The analysis of Part 1 of the questionnaire shows that more than 95% of those who responded to the question about their experience indicated that they have between 5 and 44 years of experience with an average of 23.7 years. The respondents' positions varied widely and included procurement managers, property managers, architects, quantity surveyors, building surveyors, sustainability officers, sustainability managers, contracts managers, strategic officers and other positions. The responses received included responses from all types of authorities (e.g. county councils, city councils, borough councils, district councils, etc.).

Among the 132 responses received, 105 responses were received from England, 11 responses were received from Scotland, 11 responses were received from Wales, 3 responses were received from Northern Ireland, and 2 responses did not indicate where they were based. The complete analysis and discussion of the results of the questionnaire survey is reported in Chapter 9.

### 3.3.4 Case Studies

#### 3.3.4.1 The aim of conducting the case studies

The main aim of conducting the case studies was to address objective 6 (i.e. to identify and demonstrate how public client are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures). Two case studies were conducted about London Borough of Camden and Nottinghamshire County Council. In each case study, the researcher introduced sustainable construction criteria which emerged from the Delphi Exercise (Chapters 4, 5 and 6). The researcher sought to identify whether or not these criteria were addressed by the organisation in its procurement strategies, policies, guidelines or procedures. Where the answer to this
query was positive, the investigator sought to identify "how" the organisation addressed such criteria. The researcher also sought to identify if there were any other major sustainability criteria which did not emerge among the results of the Delphi Exercise but which were perceived by the organisation as sustainable construction criteria that should be addressed in its procurement strategies, policies, guidelines or procedures. Again, the investigator sought to identify "how" the organisation addressed such criteria.

In addition to providing demonstrations, the case studies also addressed objectives 2, 3 and 4 (i.e. the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy, the barriers and the parties most capable of removing the barriers).

3.3.4.2 Use of the case study as a research method

According to Yin (1994, p. 13), a case study is "an empirical enquiry that
- investigates a contemporary phenomenon within its real life context, especially when
- the boundaries between phenomenon and context are not clearly evident."

This means that case studies would be used because the investigator wishes to cover contextual conditions. This is consistent with the objective of conducting the case studies in this research as they focus on UK public client organisations and how they address addressing sustainable construction in their procurement strategies, policies, guidelines or procedures.

According to Yin (1994), the case study enquiry relies on multiple sources of evidence and benefits from prior development of theoretical propositions to guide data collection and analysis. The case studies conducted relied on multiples sources of evidence (interviews and documentation) and benefited from prior development of theoretical propositions that emerged from the Delphi Exercise and the semi-structured interviews to guide data collection and analysis.

3.3.4.3 Components of case study research design

Research design is "the logic that links the data to be collected (and the conclusions to be drawn) to the initial questions of the study" Yin (1994, p. 19). Five components of research design are particularly important (Yin, 1994): Study's questions, its propositions (if any), its unit(s) of analysis, the logic linking the data to the
propositions and the criteria for interpreting the findings. These are introduced below.

The issue of study questions is about the form of the questions and its relationship with the appropriate research strategy (e.g. a "how" question indicates the appropriateness of using case studies). This issue was discussed in Section 3.2.2.

The second component of case study design is study’s propositions. A study’s proposition “directs attention to something that should be examined within the scope of the study” (Yin, 1994, p. 21). However, some studies (where the topic is the subject of exploration) may have a legitimate reason for not having any prepositions. In the case studies conducted in this research, the case study questions (see Appendix C) provide the basis of formulating such propositions. For example, in relation to the criterion “improving health and safety performance”, a proposition for examination would be: “the organisation addresses the criterion ‘improving health and safety performance’ in its construction procurement strategies or contracts by emphasising its importance in tender evaluation and selection procedures”. This would direct the attention to examining how the organisation addressed such a criterion (for example by emphasising the importance of the criterion in tender evaluation and selection procedures, or by other means). By applying the same logic illustrated above, similar prepositions could be formed to guide data collection and analysis.

Unit of analysis is related to what the case is: “...the definition of the unit of analysis and therefore the case is related to the way the initial research questions have been defined” Yin (1994, p. 22). Accurately specifying the primary research questions will lead to selecting the appropriate unit of analysis. The unit of analysis in the case studies conducted was the public client organisation.

The final component of case study design is the logic linking data to propositions and the criteria for interpreting the findings. In the case studies conducted, the logic linking the data to the propositions were established by looking at the evidence (e.g. interviews, documentation, etc.), examining and interpreting words, and making comparisons so that the data can be linked to the propositions.

3.3.4.4 Tests for quality of case study research design

Tests for quality of case study research design include: construct validity, internal validity, external validity and reliability. These are examined in Section 3.4.2.
### 3.3.4.5 Type of design

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<td>embedded (multiple units of analysis)</td>
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Table 3.10 - Basic types of design for case studies (source: Yin (1994))

**Single case design**

A single case design can be appropriate under certain situations. These include:

*Critical case in testing a well formulated theory:* Such a situation is relevant when a case meets all the conditions of testing the theory and when the theory has clear set of propositions and circumstances within which the propositions are believed to be true.

In relation to the situation in this research, even if it is suggested that the theory (the propositions that can be drawn from the Delphi Exercise) is well formulated, it is difficult to establish that a certain case meets all the conditions of testing the theory.

*Extreme or unique case:* The London Borough of Camden has been recognised as one of the leading organisations in adopting a sustainable procurement approach. However, it would be difficult to argue that no other cases have similar standards.

*Revelatory case:* This is when there is an opportunity to observe and analyse a phenomenon that was previously inaccessible to scientific investigation. This situation is not relevant to the case studies conducted.

*Case conducted prelude to a further study:* This is when case studies are used as exploratory devices or when a pilot case study is conducted. In the case studies conducted, there is an element of exploratory work in the sense that there is little information available about how UK public organisations are addressing sustainable construction in their procurement strategies, policies, guidelines or procedures. However, the case studies conducted were not undertaken with the aim of serving as an introduction for further enquiry (although further studies can be conducted). Even if the single case design is relevant to this research (which is not the case), a major concern is the possibility of ending up with a case that is different from the case that was originally anticipated. For this reason and the other reasons discussed above, single case design was not seen as a preferable choice to adopt.
Multiple-case designs

Multiple-case designs are relevant when the study involves more than one case. With multiple-case design, more convincing evidence and a more robust study can be obtained. However, conducting multiple cases may require extensive time and resources that are beyond the capacity of a single student. The cases may predict similar results (literal replication) or contrasting results for predictable reasons (theoretical replication). In the case studies conducted, the replication is of a literal nature. The selection of the number of cases depends on the degree of certainty needed about the results (the higher the number of cases the greater the degree of certainty). Where the degree of certainty required is not excessive, one may go for two or three literal replications. This was the case in this research as the main aim behind conducting the case studies was to provide demonstrations regarding how sustainability criteria were addressed. Two case studies were therefore conducted.

Holistic and embedded case studies

Embedded case studies are case studies involving more than one unit of analysis (e.g. subunits). An important problem related to the use of embedded design is when the case study focuses on the subunit level and fails to return to the larger unit of analysis.

Holistic case studies involve only one unit of analysis. They can be used when no logical subunits can be identified and when the relevant theory underlying the case study is of a holistic nature. One problem associated with holistic design is avoiding the examination of specific phenomenon in operational details. Another problem is conducting the study at an abstract level that lacks any clear measures or data. A third problem may arise from the possibility that the orientation may change as the case study proceeds and the evidence begins to address different questions.

In the case studies conducted, an embedded design was adopted. While the unit of analysis was identified as the organisation (the local authority), it was noticed that the investigation might involve other units of analysis (e.g. individual departments within the organisation, programmes of projects, etc.). Moreover, adopting an embedded design enables the avoidance of the problems associated with the use of holistic design.

3.3.4.6 Collecting the evidence

Mainly, there are six sources of evidence for case studies. These include: documents,
archival records, interviews, direct observation, participant-observation and artefacts. The sources are highly complementary and it is desirable to use as many sources as possible (Yin, 1994). These sources are introduced below.

Documentation is relevant to every case study topic (except studies of preliterate societies) (Yin, 1994). The most important use of documents is to corroborate evidence from other sources. In the case studies conducted, documents were seen as very important source of data as the main aim of conducting the case studies was to identify how public clients were addressing sustainable construction criteria in their procurement strategies, policies, guidelines or procedures. The documents that were seen most relevant documents to examine included the organisation’s environmental policy, corporate procurement strategy, conditions and specifications of contacts, prequalification questionnaires, and any other policies, guidelines, codes or procedures guiding the development of construction projects’ procurement strategies.

Interviews are one of the most important sources of evidence in case study research. As shown in the interview guide (see Appendix C), the interviews which were carried out within the case studies conducted were of semi-structured nature. Although certain set of questions was followed, such questions were open ended. The interviews conducted within the case studies were undertaken with professionals working in both Nottinghamshire County Council and London Borough of Camden. A list of the people interviewed in these case studies is available in Appendix C.

In addition to documentation and interviews, other sources of information include archival records, direct observation, participant-observation and physical artefacts. These were not used as sources of evidence in this research. Archival records were not expected to be highly relevant to the case studies conducted. Direct observation (e.g. through observation of meetings) was expected to be difficult to carry out in public client organisations. This was mainly due to the problem of gaining access. Participant observation, where the observer may assume certain roles such as the role of a staff member, was difficult to carry out. This was also due to the problem of gaining access within the organisation to assume the role. Physical artefacts may be collected or observed in field visit. However, they have less relevance in typical kinds of case studies. This was applicable to the case studies conducted in this research.

3.3.4.7 Overriding principles in data collection

Three overriding principles need to be considered in data collection (Yin, 1994).
These include using multiple sources of evidence, creating a case study data base and maintaining a chain of evidence. These principles can be used to deal with the problems of construct validity and reliability and are discussed below.

The need to use multiple sources of evidence is much greater in case studies than in other research methods, such as surveys (Yin, 1994). The most important advantage of using multiple sources is developing convergent lines of enquiry (triangulation). This helps to deal with construct validity as multiple sources of evidence provide multiple measures of the same phenomenon. Two main sources were used in the case studies conducted. These included interviews and documentation.

The importance of case study data base is that other investigators can review the evidence directly. Such data base noticeably increases the case study reliability (Yin, 1994). Components of case study data base include: Case study notes (these could be the result of the interviews, observation or document analysis), case study documents, tabular materials, and narratives (which involve composing open-ended answers to the questions of the case study through integrating the available evidence). In the case studies conducted, a case study database, with the components mentioned above, was created. Appendix C shows the case study documents. Narratives were not included in this thesis for confidentiality reasons.

Maintaining a chain of evidence helps to increase reliability and to deal with the problem of construct validity. The aim is to allow an external investigator "to follow the derivation of any evidence from initial research questions to ultimate case study conclusions" (Yin, 1994; p. 98). According to Yin (1994), the report should make citation to the relevant parts of the case study database e.g. documents, interviews or observations). This was accommodated in the case studies conducted, as shown throughout Chapter 10. Moreover, according to Yin (1004), the database needs to show the actual evidence and the conditions of collecting it (e.g. time and place of the interview). This was also accommodated in the case studies conducted and is partly shown in Appendix C (e.g. time and place of interview, interviews guide and documents analysed). Minutes of the interviews were not included for confidentiality reasons.

3.3.4.8 Analysing the evidence in case studies

According to Yin (1994), analysing case studies' evidence is particularly difficult for reasons related to the lack of well defined strategies and techniques. Yin shows that
unlike statistical analysis, there are few fixed formulas to guide the beginners and that much depends on “an investigator’s own style of rigorous thinking, along with the sufficient presentation of evidence and careful consideration of alternative interpretations” (Yin, 1994; pp. 102-103).

Yin suggests two approaches to successful analysis. One approach is to make case study data conductive to statistical analysis through coding events into numerical events. Another approach is using analytic techniques such as putting information into different arrays, making a matrix of categories and placing the evidence within these categories. Considering the rationale behind conducting the case studies in this research, the later approach was seen more appropriate to adopt. A point to note though is that regardless of the technique adopted, manipulation of data using such approaches should be done with care to avoid biasing the results (Yin, 1994).

Yin (1994) highlights the importance of having a general strategy for case study analysis. Two strategies are described by Yin (1994). The first strategy is the strategy of relying on theoretical propositions. Such propositions reflect research questions, review of the literature and new insights and are the basis of the original objectives and the design of the case study. They can provide guidance in relation to which data should be considered and which data could be ignored. Propositions addressing answers to “how” and “why” questions can be very useful in guiding the analysis.

The second strategy is the strategy of developing a case description. It involves developing a descriptive framework for organising the case study. This strategy is less preferable in comparison with the first strategy which depends on theoretical propositions. However, when such propositions are absent, using the second strategy can be an alternative.

In the case studies conducted, the propositions were available and were also addressing “how” questions (see Sections 3.2.2 and 3.3.4.3). Therefore, it was evident that the first strategy was the appropriate strategy to adopt in the analysis.

3.3.4.9 Selecting the case studies

When selecting a case study, several factors need to be taken into account. Among these are the research purpose, questions, propositions and theoretical context, accessibility, resources, and time available (Rowley, 2002). These factors were taken into account when selecting the case studies conducted in this research. For example,
in relation to theoretical factors (such as the research purpose, questions, propositions and theoretical context), both Camden Council and Nottinghamshire County Council represent public client organisations that can provide demonstrations of good practice in sustainable procurement. This conclusion was reached after undertaking a series of consultations and discussions with experts and professionals and after reviewing the available literature. The practical side (accessibility, resources and time available) however played a role in selecting these cases. Contacts were successfully made with professionals within both organisations. Problems of accessibility were overcome by obtaining consents from professionals in these organisations to conduct case studies about their organisations. The limited time and resources available in this research were also among the considerations that were taken into account when selecting the case studies.

3.4 Assessing the quality of research

This section introduces a background on the criteria used to assess the quality of both qualitative and quantitative research. It also shows how each of these criteria was considered in the context of this research.

3.4.1 Assessing the quality of quantitative research

3.4.1.1 Reliability

According to Bryman and Bell (2003, p. 33), reliability is about "the question of whether the results of a study are repeatable". The issue of reliability has been largely developed in the context of quantitative research. Several types of reliability which are relevant to this context exist. These include stability (or test re-test), internal consistency, alternative form reliability, and inter-observer reliability (Bryman and Bell, 2003; Litwin, 1995; Drucker-Godard, 2001). These are discussed below.

*Stability (or test re-test reliability)*

Stability is about whether a measure is stable over time (Bryman and Bell, 2003). The test re-test reliability is the most common way of testing stability. In this method, the same set of respondents complete the study at two different points in time to enable the identification of the stability of their responses (Litwin, 1995). The two sets of results are then compared through identifying the level of correlation between them.

The test re-test reliability is not relevant to the Delphi Exercise as Delphi already
involves distributing different questionnaires to panel members in the consecutive rounds. The test re-test reliability was only relevant to one of the methods used in this research; the questionnaire survey directed to local authorities. However, the test was not used as it would be extremely unusual to send the questionnaire to the same respondents again. It was highly unlikely that the respondents would respond to the same questionnaire again.

**Internal consistency reliability**

Internal consistency reliability is not used with single items. Rather, it is used with groups of items measuring different aspects of the same concept (Litwin, 1995). Internal consistency reliability tests the consistency of respondents’ answers to all the items in a measure (Sekaran, 2003). According to Bryman and Bell (2003), it indicates whether the respondents’ scores on any one indicator tend to be related to their scores on other indicators. Commonly, internal consistency reliability is indicated by values of the Cronbach’s coefficient alpha, ranging from 0 and 1. A high value of the coefficient indicates a stronger internal cohesion and a better measuring instrument (Sekaran, 2003; Drucker-Godard et al, 2001). Generally, coefficient values equal to or grater than 0.7 are acceptable (Drucker-Godard et al, 2001)

Internal consistency reliability was relevant to the Delphi Exercise. As shown in Appendix A, assessment of Cronbach’s coefficient alpha (α) using SPSS shows that: α = 0.763 for the items constituting social sustainability, α = 0.713 for the items constituting economic sustainability and α = 0.873 for the items constituting environmental sustainability. All α values are greater than 0.7 and are therefore acceptable. In the case of the questionnaire survey, it was not appropriate to conduct the internal consistency reliability test. The items within each of the social, economic, and environmental components which were included in Part 2 of the questionnaire survey were not about the same concept, as each respondent was asked about his/her organisation in particular (see Appendix D). The items included in Part 3 were single items and, clearly, they were not measuring different aspects of the same concept.

**Alternative form reliability**

Alternative form involves rewording or changing the order of the questions and responses without changing the meaning in order to produce similar but not identical
items. This needs to maintain the same level of vocabulary and difficulty (Litwin, 1995). The items are administered to the same population at two different points of time. The higher the correlation between the results of the two studies the greater the alternative form reliability.

Alternative form reliability was not relevant to assess neither in relation to the Delphi Exercise nor in relation to the questionnaire survey, for the same reasons of not establishing test re-test reliability (discussed before in this section).

**Inter-observer reliability**

This can be used when there is a considerable amount of subjective judgment in recording observations or translating data into categories and when there is more than one observer involved in these activities (Bryman and Bell, 2003). This research involved only one observer (i.e. the research student) and therefore assessing inter-observer reliability was not relevant.

### 3.4.1.2 Validity

**Internal validity**

Internal validity is related to causality. It is concerned with the level of confidence that "the independent variable is at least in part responsible for the variation that has been identified in the dependent variable” (Bryman and Bell, 2003; p. 34).

Neither the Delphi Exercise nor the questionnaire survey aimed at establishing causal relationships. Therefore, establishing this type of validity was not relevant.

**External validity**

External validity is about "whether the results of a study can be generalised beyond the specific research context” (Bryman and Bell, 2003; p. 34). One main objective of generating representative samples is seeking external validity.

In the Delphi Exercise, the selection of experts adheres to principles that are different from the principles of selecting samples in normal questionnaire surveys (see Section 3.3.1.6). In the questionnaire survey conducted in this research, external validity was established as full representativeness was ensured through targeting almost all local authorities in the UK.
Ecological validity

Ecological validity is about whether "social scientific findings are applicable to people's everyday, natural social settings" (Bryman and Bell, 2003; p. 34). With more intervention in social settings (as in a laboratory environment), there is a greater probability for the study to be ecologically invalid. As both the Delphi Exercise and the questionnaire survey were based on questionnaires sent to respondents, there was a minimum intervention in the social settings. Therefore, the criterion of ecological validity was accommodated.

Measurement validity

Measurement validity is about "whether a measure that is devised of a concept really does reflect the concept that it is supposed to be denoting" (Bryman and Bell, 2003; p. 33). Measurement validity is connected to reliability; if a measure of a concept is unstable and therefore unreliable, it will not present a valid measure of that concept. Measurement validity is particularly relevant to quantitative research and to the search for measures of social scientific concepts. It can be established in several ways, including face validity, criterion validity, construct validity and convergent validity.

Face validity is about whether "the measure seems to be getting at the concept that is the focus of attention" (Bryman and Bell, 2003; p. 77). This involves asking other people, who could be experienced or untrained, about whether the measures seem on the face measuring the concept under consideration (Litwin, 1995; Bryman and Bell, 2003; Sekaran, 2003). This criterion was accommodated through pilot testing and informal discussions with experts, professionals and colleagues about the items included in the questionnaire survey and the three rounds of the Delphi Exercise.

Criterion validity measures how well one instrument performs against another one (Litwin, 1995). It has two components: concurrent validity and predictive validity.

Concurrent validity involves judging the survey instrument against another method that is recognised as a good standard of measuring the same variable/concept (Litwin, 1995). The standard should be relevant, well known, and accepted as a good measure of the variable/concept. A correlation coefficient is then calculated to indicate this type of validity. The accommodation of concurrent validity in this research was limited to considering of the wording and the scales utilised in other questionnaire surveys and Delphi exercises and adapting these, where appropriate.
Predictive validity measures "how well the item or scale predicts expected future observations" (Litwin, 1995; p. 45). As with concurrent validity, predictive validity is indicated by a coefficient of correlation between the initial test and the secondary outcome (Litwin, 1995). Clearly, predictive validity is not relevant neither to the Delphi Exercise nor to the questionnaire survey conducted in this research.

Convergent validity addresses the issue of whether the employment of different methods to obtain the same information would produce similar results (Litwin, 1995). It is established when the results obtained through using such methods are highly correlated (Sekaran, 2003). Convergent validity was accommodated in this research through triangulation (see Section 3.4.3).

3.4.2 Assessing the quality of qualitative research

Bryman and Bell (2003) introduce two main positions taken by writers in relation to the relevance of reliability and validity as criteria for assessing the quality of qualitative research. These positions, in addition to a position that can be considered as a midpoint between them, are introduced below.

3.4.2.1 Position 1: Integration of validity and reliability into qualitative research with little change

The first position promotes the integration of validity and reliability into qualitative research with little change of meaning. However, as Bryman and Bell (2003) argue, even the writers who adopt the view that validity and reliability are relevant to qualitative research recognise the need for altering some of the terms (such as measurement).

External reliability

Among those who take the first position, there are writers who argue that the criterion of external reliability (i.e. the extent to which a study can be replicated) can be difficult to meet in qualitative research, for reasons related to the difficulty of freezing the social setting and the circumstances of the initial study (Bryman and Bell, 2003). Further discussion in relation to reliability is provided within the discussion of dependability in Section 3.4.2.2. The issue of accommodating reliability in the context of the Delphi Exercise, the semi-structured interviews and the case studies conducted in this research is presented within the discussion of dependability (see Section 3.4.2.2).
Internal reliability

In relation to internal reliability, writers taking the first position view internal reliability as a question of whether members of the research team agree about their observations (in case there is more than one observer). Clearly, in this research, the research student was the only observer involved and therefore assessing internal reliability was not relevant.

Internal validity

Internal validity, which is interpreted by writers taking the first position as whether there is a good match between the observations of the researchers and their theoretical ideas, is viewed by these writers as an area of strength for qualitative research (Bryman and Bell, 2003).

In this research, internal validity was assessed through triangulation (see Section 3.4.3). This involved a matching between the theoretical ideas which emerged from the Delphi Exercise about the factors that are important for public clients to better address sustainable construction in developing a procurement strategy on one side and the evidence obtained through the case studies and the semi-structured interviews on the other side. It also involved considering the social, economic and environmental sustainability criteria which emerged from the Delphi Exercise as a baseline to search for similar criteria addressed by the organisations representing the case studies and to identify any other criteria which were not listed within the criteria which emerged from Delphi Exercise (see Appendix C).

External validity

Unlike internal validity, writers taking the first position view external validity as a problem in qualitative research. This is because researchers adopting such an approach tend to employ case studies and small samples (Bryman and Bell, 2003).

Although the above argument is relevant to the semi-structured interviews conducted in this research, efforts were made to make the sample of the interviewees as representative as possible through including a wide range of professionals and experts. In relation to the Delphi Exercise, the basis of selecting the experts is described in Section 3.3.1.6. As for the case studies, the aim of external validity, according to Yin (1994), should be analytic generalisation (where the findings are
generalised to theory) rather than statistical generalisation. The theoretical propositions in the case studies conducted were discussed above and are also indicated by the interview guide which was used in the interviews conducted within the case studies (see Appendix C). The theory must be tested through replication of findings on second and third cases where the theory has specified that the same results would occur. Two case studies were conducted in this research and therefore the replication of the findings was facilitated.

3.4.2.2 Position 2: Specifying alternative criteria to the criteria of reliability and validity

The second position highlights the need to specify alternative criteria to reliability and validity (which are used in quantitative research) in order to assess the quality of qualitative research. Two main criteria were suggested as alternatives (Bryman and Bell, 2003): Trustworthiness and authenticity. These are discussed below.

Trustworthiness

Trustworthiness involves the issues of credibility, transferability, dependability and confirmability. These are discussed below.

Credibility can be considered as a parallel to internal validity. It involves techniques such as triangulation, which was adopted in this research and discussed in Section 3.4.3.

Transferability can be considered as a parallel to external validity. Qualitative researchers are therefore advised to produce thick description involving rich accounts of the details, in order to use it as a data base for making judgments about whether transferability of the findings to other contexts is possible (Bryman and Bell, 2003). The production of accounts of details was accommodated in this research. For example, the forms of the questionnaires used in the three rounds of the Delphi Exercise and other related documents are included in Appendix A. The interview guide used in the semi-structured interviews and other related documents used in these interviews are included in Appendix B. As for the case studies, the interview guide used in the interviews conducted within the case studies and the reference details of the documents used in document analysis are included in Appendix C.

Confirmability parallels objectivity. Confirmability is about ensuring that personal values or theoretical inclinations were not explicitly allowed to have an impact on the research and its findings. Establishing confirmability should be an objective for
auditors (Guba and Lincoln, 1994; cited by Bryman and Bell, 2003). The wording of
the questions used in the different rounds of the Delphi Exercise and in the interview
guides reflected the accommodation of confirmability (See appendices A, B and C).

Dependability is suggested as a parallel to reliability. It entails the adoption of an
auditing approach by the researchers. This involves keeping, in an accessible manner,
complete records about each phase of the research process, including problem
formulation, selection of research participants, fieldwork notes, interview transcripts,
data analysis decisions, etc. (Bryman and Bell, 2003). This would enable auditors to
identify the appropriateness of the procedures. In the context of case studies, the aim
would be to ensure that if another investigator follows the same procedures in the
same case, then this investigator should arrive to the same findings (Yin, 1994). This
requires documenting all the procedures followed in conducting the case study.

In this research, the criterion of dependability was accommodated. For example,
Chapter 1 showed how the problem was formulated. Sections 3.3.1.6, 3.3.2.4 and
3.3.4.6 showed how participants in the Delphi Exercise, the semi-structured
interviews, and the interviews conducted within the case studies were selected. Data
analysis decisions are discussed throughout the following chapters. In relation to
documentation, the questionnaires and other related documents used in the Delphi
Exercise, the interview guide used in the semi-structured interviews, and parts of the
case study protocol were shown in Appendices A, B, C and D. Some documents, such
as interviews’ transcripts, were not included in this thesis, for confidentiality reasons.

**Authenticity**

Authenticity involves the issues of fairness, ontological authenticity, educative
authenticity, catalytic authenticity and tactical authenticity (Bryman and Bell, 2003).
These are outlined below.

Fairness addresses the question of whether the different viewpoints of members of the
social setting are fairly represented in the research. Efforts were made to make the
sample of the respondents interviewed in the semi-structured interviews as
representatives as possible, through including a wide range of professionals and
experts within this sample (see Section 3.3.2.4). The basis for selecting experts in the
Delphi Exercise was described in Section 3.3.1.6.

Ontological authenticity addresses the question of whether the research helps
members in the social context in attaining a better understanding of this context. This
was accommodated in this research as it was expected that the results of this research would help public client procurers in particular in moving towards better addressing of sustainable construction in procurement strategies.

Educative authenticity addresses the question of whether the research helps members in the social context to better appreciate the perspectives of other members in the context. Catalytic authenticity is about whether the research promoted members to engage in action to change their circumstances. Tactical authenticity is about whether the research promoted members to take steps for engaging in action. According to Bryman and Bell (2003), authenticity criteria have "certain points of affinity" with action research, which focuses on practical outcomes. Educative authenticity, catalytic authenticity and tactical authenticity seem to be more relevant to action research, which was not the type of research adopted in this research. Hence, such criteria were not accommodated in this project.

3.4.2.3 Position 3: Midpoint between the first and the second positions

A third position lies midway between the first and the second positions introduced above. According to this position, validity means that "an empirical account must be plausible and credible and should take into account the amount and kind of evidence use in relation to an account" (Bryman and Bell, 2003; p. 292). Relevance was also suggested as another important criterion, and is assessed based on the importance of the topic and its contribution to the literature.

The positions taken by the different writers regarding the appropriateness of investigating validity and reliability in qualitative research are not limited to the three positions outlined above. However, it is recognised that "a simple application of the quantitative researcher's criteria or reliability and validity to qualitative research is not desirable, but writers vary in the degree to which they propose a complete overhaul of those criteria" (Bryman and Bell, 2003; p. 292). The third position, which lies midway between the first and second positions, is also a midpoint between realism and anti-realism. Most qualitative researchers conduct their research around this point. This involves treating their findings as one possible representations and also using strategies such as thick descriptors and triangulation. Such strategies were adopted in this research, as discussed throughout this chapter.

3.4.3 Triangulation

Triangulation has often been referred to as an approach that entails the use of multiple
research methods and/or measures of a phenomenon with the aim of overcoming the problems of bias and validity (Love et al., 2002; citing Black, 1993). In broad terms there are several types of triangulation, including (Love et al., 2002; citing Denzin, 1978): data triangulation (collecting data at different times or from different sources), methodological triangulation (collecting and analysing data using multiple methods), investigator triangulation (collecting and analysing data by different investigators), and interdisciplinary triangulation (informing the research process by different disciplines). As the emphasis has tended to be on the first two types, triangulation has commonly been conceived as a process involving the use of more than one method or source of data (Bryman and Bell, 2003).

In its original development, triangulation was greatly associated with quantitative methods. However, it can also be used within qualitative research (Bryman and Bell, 2003). For example, the findings of observations can be used to corroborate the findings of interviews.

Triangulation operates within the same method. It also operates across methods and techniques. It can be viewed as one of the ways through which quantitative and qualitative research methods and techniques are combined. Through triangulation, quantitative research findings can be used to corroborate the findings of qualitative research or vice versa (Bryman and Bell, 2003). For example, Bryman and Bell (2003) made reference to a study that used survey, interviews and observational data in order to combine specificity and accuracy of quantitative data with the ability to interpret idiosyncrasies and complex perceptions provided by qualitative analysis.

Adopting a triangulated approach can significantly contribute to improving the overall quality of the research. Triangulation can be viewed as a means of validating or testing research outcomes (Love et al., 2002; citing Nesan, 1997). It offers the opportunity to cancel the limitations of one method by using another in order to cross-check the findings (Bryman and Bell, 2003). Convergent findings can allow greater confidence in reliability and/or validity of the results (Love et al., 2002). Moreover, through combining qualitative and quantitative methods and techniques, triangulation also allows the access to different levels of reality.

Love et al. (2003) argue that triangulation is an appropriate research approach for extending the scope of theory in construction management research. As discussed above, triangulation can facilitate the attainment of convergence in findings and
therefore can improve the reliability and the validity of the results. Indeed, as Love et al (2003) put it, convergence equates robustness in terms of knowledge acquisition and after all, this is what construction management research tries to achieve. Despite this, and despite the benefits offered by adopting a triangulated approach, there has been reluctance in construction management research to mix methodologies (Love et al, 2002). This reluctance however may be seen as part of a problem threatening the rigour of management research in general. Although Bryman and Bell (2003) argue that the use of triangulation is common in business and management research, they make reference to an article that showed a decline in this usage. The article, which reported the analysis of all articles published in three top ranking American journals over two time periods (1995-7 and 1985-7), showed that management researchers were compromising triangulations and that internal, external and construct validity declined.

This research employs a triangulated approach as more than one method and technique were used to achieve the project objectives. This approach was utilised within and across the methods adopted. The factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy (objective 4) were established using Delphi Exercise, semi-structured interviews and case studies. The barriers to better addressing sustainable construction by UK public clients (objective 5) were developed using semi-structured interviews and case studies. The parties that are most capable of removing these barriers were also identified through semi-structured interviews and case studies.

A final point to note though is that trials to corroborate the findings through triangulation may fail. Bryman and Bell (2003) show that one approach to be taken in such a case is to take one set of results as definitive. However, simply and often arbitrarily favouring one set of findings over the other is not the ideal approach to take when dealing with conflicting findings obtained from a triangulation exercise. Despite their criticism to such an approach, Bryman and Bell (2003) have not defined what approach needs to be followed. From the point of view of the author of this thesis, it would be more appropriate to report all findings and attribute them to the method(s) used in obtaining them. Expectedly, the degree of confidence in the findings obtained from using more than one method would be greater than that obtained from using one method only. Therefore, for example, reporting the findings about the factors that are important for UK public clients to better address sustainable construction in
developing a procurement strategy would involve:

- the findings obtained from both the Delphi Exercise and the interviews/case studies
- the findings obtained from the Delphi Exercise only, and
- the findings obtained from the interviews/case studies only.

However, as discussed before, the findings obtained from both the Delphi Exercise and the interviews/case studies should be treated with more confidence than the findings obtained from Delphi Exercise only or the findings obtained from the interviews/case studies only.
Chapter 4: Developing an agreed set of the major social sustainability criteria

4.1 Introduction

This chapter discusses and presents the findings of the Delphi Exercise in relation to developing an agreed set of the major social sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (sub-objective 1a of the research). The analysis of the results, as will be shown in Section 4.2, led ultimately to the development an agreed set of 16 social sustainability criteria. These will be presented and discussed throughout this chapter. As shown in Figure 4.1, further validation in relation to these findings was obtained through the interviews, case studies and questionnaire survey (as will be described in Section 4.2.4).

4.2 The process of developing the agreed set of major social sustainability criteria

The Delphi Method, which was used in developing the agreed set of social sustainability criteria, was described in detail in Section 3.3.1. This section describes the process of identifying and validating these criteria through Rounds 1, 2 and 3 of Delphi. The final results (which were obtained from Round 3) will be discussed in detail in Section 4.3. Further validation through other methods and strategies will be presented in Section 4.2.4.

4.2.1 Round 1

As discussed in Section 3.3.1.8, the first round of the Delphi Exercise began with an open-ended format. Respondents were invited to identify five major sustainability criteria representing the social dimension of sustainable construction that they believe should be addressed by UK public clients in developing a procurement strategy (they were also informed that they were welcome to identify more than five criteria).

All issues related to selection of experts, development of the first round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in Section 3.3.1. As shown in Section 3.3.1.8, seventeen responses were received in the first round.
Objective 1: To develop a set of sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Sub-objective 1a: To develop an agreed set of the major social sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Figure 4.1 - Towards achieving objective 1: Achieving sub-objective 1a
Procedures used in analysing the results of Round 1 were discussed in detail in Section 3.3.1.8. The analysis carried out led to the development of 14 social sustainability criteria. These are presented in Table 4.1.

<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Improving health and safety performance</td>
</tr>
<tr>
<td>S2</td>
<td>Participation of stakeholders (including community involvement)</td>
</tr>
<tr>
<td>S3</td>
<td>Social inclusion (including tackling poverty and social exclusion)</td>
</tr>
<tr>
<td>S4</td>
<td>Seeking intergenerational equity by considering cost for future generations</td>
</tr>
<tr>
<td>S5</td>
<td>Consideration of user needs and satisfaction (including accessibility)</td>
</tr>
<tr>
<td>S6</td>
<td>Creating employment opportunities</td>
</tr>
<tr>
<td>S7</td>
<td>Training and development of the workforce</td>
</tr>
<tr>
<td>S8</td>
<td>Equality and diversity in the workplace</td>
</tr>
<tr>
<td>S9</td>
<td>Improving workforce satisfaction</td>
</tr>
<tr>
<td>S10</td>
<td>Improving working environment and conditions</td>
</tr>
<tr>
<td>S11</td>
<td>Creating a positive impact on the local environment (local community, business, infrastructure)</td>
</tr>
<tr>
<td>S12</td>
<td>Promoting ethical practices</td>
</tr>
<tr>
<td>S13</td>
<td>Preservation of culture and heritage</td>
</tr>
<tr>
<td>S14</td>
<td>Minimising the disruptive impacts of construction (e.g. noise)</td>
</tr>
</tbody>
</table>

Table 4.1 – Analysed set of social sustainability criteria based on responses received in Delphi Round 1

4.2.2 Round 2

As discussed in Section 3.3.1.8, the second round questionnaire was developed based on the analysis of the experts’ responses received in the first round. As shown in that section, respondents were asked to assess the level of importance of the 14 social criteria included (S1 to S14 in Table 4.2), using a 5-point Likert Scale ranging from 0 denoting “not important” to 5 denoting “extremely important”. In addition, respondents were invited in each section to assess the level of importance of another criterion (S15), which was suggested by the literature (but not suggested by the experts in the first round). Experts were also asked to add any other criteria which
were not listed, identify their level of importance and add any comments.

Issues related to format and content of questions, distributing the questionnaire, follow up procedures, responses received and their analysis were discussed in Section 3.3.1.8. As shown in that section, fifteen responses were received in the first round.

Procedures used in analysing the results of Round 2 were discussed in Section 3.3.1.8. The analysis carried out led to identifying the level of importance of the 15 social sustainability criteria included in the second round and to identifying 2 new social sustainability criteria. As shown in Section 3.3.1.8, for each of the 15 criteria, the mean and the standard deviation values of the scores provided by the experts were calculated. The 2 newly identified social sustainability criteria were “improving security and reducing crime” and “building and maintaining social capital”. These results are presented in Table 4.2.

4.2.3 Round 3

As discussed in Section 3.3.1.8, the third round questionnaire was developed based on the analysis of the experts’ responses received in the second round. Respondents were given feedback from the second round which involved presenting the social sustainability criteria S1 to S15 with two scores indicating their levels of importance. The first score was named “Your Score” and represented the score that the expert provided in Round 2 regarding the level of importance of the criterion. The second score was named “Mean Score” and represented the mean of the scores provided by all the experts participated in Round 2 regarding the level of importance of the criterion. In the third round, experts had the opportunity to reconsider the scores they provided in the second round using the same 5-point Likert Scale ranging from 0 denoting “not important” to 5 denoting “extremely important” which was used in the second round.

Again, issues related to the development of the third round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in Section 3.3.1.8. As shown in that section, thirteen responses were received in that round.
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Analysed set of criteria based on responses received in Round 1</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>S1  Improving health and safety performance</td>
<td>4.47</td>
<td>0.83</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>S2  Participation of stakeholders (including community involvement)</td>
<td>4.13</td>
<td>0.83</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>S3  Social inclusion (including tackling poverty and social exclusion)</td>
<td>3.80</td>
<td>0.94</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>S4  Seeking intergenerational equity by considering cost for future generations</td>
<td>3.40</td>
<td>0.99</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>S5  Consideration of user needs and satisfaction (including accessibility)</td>
<td>4.47</td>
<td>0.64</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>S6  Creating employment opportunities</td>
<td>3.67</td>
<td>1.05</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>S7  Training and development of the workforce</td>
<td>3.93</td>
<td>0.96</td>
<td>5</td>
</tr>
<tr>
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<td>S8  Equality and diversity in the workplace</td>
<td>3.53</td>
<td>0.99</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>S9  Improving workforce satisfaction</td>
<td>3.33</td>
<td>0.98</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>S10 Improving working environment and conditions</td>
<td>3.79</td>
<td>0.97</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>S11 Creating a positive impact on the local environment (e.g. local community, business, infrastructure)</td>
<td>4.20</td>
<td>1.01</td>
<td>3</td>
</tr>
<tr>
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<td>S12 Promoting ethical practices</td>
<td>3.87</td>
<td>1.13</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>S13 Preservation of culture and heritage</td>
<td>3.40</td>
<td>0.83</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>S14 Minimising the disruptive impacts of construction (e.g. noise)</td>
<td>3.87</td>
<td>0.99</td>
<td>6</td>
</tr>
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<td></td>
<td>Other criteria suggested by the literature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S15 Promoting equitable distribution of costs and benefits (at local, regional and international levels)</td>
<td>2.93</td>
<td>1.07</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Criteria identified in the Round 2 (based on experts' suggestions made in Round 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S16 Improving security and reducing crime</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>S17 Building and maintaining social capital</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
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Table 4.2 – Analysed set of social sustainability criteria based on responses received in Delphi Round 2
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion (social)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
<th>% of experts voting for the criterion as</th>
<th>% of experts voting for the criterion as</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>S1</td>
<td>Improving health and safety performance</td>
<td>4.38</td>
<td>0.87</td>
<td>2</td>
<td>61.54</td>
<td>15.38</td>
</tr>
<tr>
<td>S2</td>
<td>Participation of stakeholders (including community involvement)</td>
<td>4.23</td>
<td>0.83</td>
<td>4</td>
<td>46.15</td>
<td>30.77</td>
</tr>
<tr>
<td>S3</td>
<td>Social inclusion (including tackling poverty and social exclusion)</td>
<td>4.00</td>
<td>1.08</td>
<td>5</td>
<td>30.77</td>
<td>53.85</td>
</tr>
<tr>
<td>S4</td>
<td>Seeking intergenerational equity by considering cost for future generations</td>
<td>3.54</td>
<td>0.88</td>
<td>12</td>
<td>15.38</td>
<td>30.77</td>
</tr>
<tr>
<td>S5</td>
<td>Consideration of user needs and satisfaction (including accessibility)</td>
<td>4.54</td>
<td>0.66</td>
<td>1</td>
<td>61.54</td>
<td>30.77</td>
</tr>
<tr>
<td>S6</td>
<td>Creating employment opportunities</td>
<td>3.62</td>
<td>1.12</td>
<td>11</td>
<td>23.08</td>
<td>30.77</td>
</tr>
<tr>
<td>S7</td>
<td>Training and development of the workforce</td>
<td>3.92</td>
<td>1.04</td>
<td>7</td>
<td>23.08</td>
<td>61.54</td>
</tr>
<tr>
<td>S8</td>
<td>Equality and diversity in the workplace</td>
<td>3.46</td>
<td>1.05</td>
<td>14</td>
<td>15.38</td>
<td>30.77</td>
</tr>
<tr>
<td>S9</td>
<td>Improving workforce satisfaction</td>
<td>3.31</td>
<td>1.03</td>
<td>16</td>
<td>7.69</td>
<td>38.46</td>
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</table>

Table 4.3 – Analysis and development of agreed set of the major social sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (based on results obtained from Round 3 of the Delphi Exercise)
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion (social)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
<th>% of experts voting for the criterion as</th>
<th>% of experts voting for the criterion as</th>
</tr>
</thead>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>S10</td>
<td>Improving working environment and conditions</td>
<td>3.85</td>
<td>0.90</td>
<td>9</td>
<td>23.08</td>
<td>46.15</td>
</tr>
<tr>
<td>S11</td>
<td>Creating a positive impact on the local environment (e.g. local community, business, infrastructure)</td>
<td>4.38</td>
<td>0.87</td>
<td>2</td>
<td>61.54</td>
<td>15.38</td>
</tr>
<tr>
<td>S12</td>
<td>Promoting ethical practices</td>
<td>3.92</td>
<td>1.12</td>
<td>7</td>
<td>30.77</td>
<td>46.15</td>
</tr>
<tr>
<td>S13</td>
<td>Preservation of culture and heritage</td>
<td>3.46</td>
<td>0.78</td>
<td>14</td>
<td>15.38</td>
<td>15.38</td>
</tr>
<tr>
<td>S14</td>
<td>Minimising the disruptive impacts of construction (e.g. noise)</td>
<td>3.85</td>
<td>1.07</td>
<td>9</td>
<td>38.46</td>
<td>15.38</td>
</tr>
<tr>
<td>S15</td>
<td>Promoting equitable distribution of costs and benefits (at local, regional and international levels)</td>
<td>2.92</td>
<td>1.12</td>
<td>17</td>
<td>0</td>
<td>38.46</td>
</tr>
<tr>
<td>S16</td>
<td>Improving security and reducing crime</td>
<td>3.50</td>
<td>1.07</td>
<td>13</td>
<td>12.50</td>
<td>50.00</td>
</tr>
<tr>
<td>S17</td>
<td>Building and maintaining social capital</td>
<td>4.00</td>
<td>0.93</td>
<td>5</td>
<td>25.00</td>
<td>62.50</td>
</tr>
</tbody>
</table>

Continue Table 4.3 – Analysis and development of agreed set of the major social sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (based on results obtained from Round 3 of the Delphi Exercise)

The criteria that will be presented and discussed in this chapter are those criteria
resulting from the analysis of Round 3 of the Delphi Exercise (see Table 4.3). This involved identifying both the level of importance and the extent of agreement among respondents regarding the importance of the criterion. The following values were identified and then assigned to each criterion:

- **Value of mean**: The value of the mean (as shown in Table 4.3 - column 3) indicates the average rating of the importance of the criterion.

- **Standard deviation value**: As discussed in Sections 3.3.1.3 and 3.3.1.8, the value of standard deviation indicates the dispersion and shows the extent to which values differ from the mean i.e. opinion variation. It therefore indicates the extent of agreement on the ranking of the criterion. The values of standard deviation are shown in Table 4.3 - column 4.

- **Percentage of respondents agreeing on ranking the criterion**: The percentage of respondents who agree on the ranking of the criterion (as shown in columns 6 to 12 in Table 4.3) indicates both the importance and the agreement on the ranking of the criterion (as discussed in Section 3.3.1.8).

A criterion with a value of mean that is equal or above 3 can be considered important (based on the Likert Scale ranging from 1 to 5 which was introduced above).

Agreement among respondents that a certain criterion is important can be established based on having 75% or more of the respondents agreeing on giving a ranking that is equal to or more than 3 (i.e. a ranking of 3=moderately important, 4=very important or 5=extremely important). The values shown in column 11 of Table 4.3 show the percentages of respondents agreeing on ranking that is equal to or more than 3.

In relation to standard deviation, compared to what was reported in other Delphi studies such as Feret and Marcinek (1999), the values of standard deviation shown in Table 4.1 can be considered relatively low (therefore indicating agreement).

Criteria which satisfy the above indicators include 16 criteria out of the 17 social sustainability criteria included in Round 3. These criteria scored mean values above 3; were rated by 75% or more of the experts as important; and had relatively low values of standard deviation. Only the criterion "promoting equitable distribution of costs and benefits (at local, regional and international levels)" was omitted. This criterion attained a level of importance of 2.93 (which is less than the level of importance that needs to be attained in order to consider the criterion as an important criterion). Furthermore, only 69.23% of experts gave the criterion a ranking of 5 or 4 or 3 (i.e.
less than 75% of experts agreed that it was important).

4.2.4 Further Validation
A point to note is that in three of the four methods/techniques used in this research (the semi-structured interviews, the interviews included within the case studies, and the questionnaire survey), the opportunity was given to the interviewees (12 interviewees in total), and the respondents to the questionnaire survey (132 respondents in total) to comment on any of the items included within the interview guide or the questionnaire. No negative comments by the interviewees or by the respondents were provided in relation to the social sustainability criteria. No additional social sustainability criteria were suggested.

4.3 Discussion of the results
The following sections present and provide a discussion of the 16 criteria that were agreed as important social sustainability criteria that need to be addressed by UK public clients in developing a procurement strategy (as discussed in Section 4.2).

4.3.1 Improving health and safety performance
The criterion "improving health and safety performance" was ranked second by the experts with a mean of 4.38 and standard deviation of 0.87. It was considered important by 100% of the experts (was considered extremely important by 61.54%, very important by 15.38%, and moderately important by 23.08%).

The need to address health and safety in public procurement processes and procedures and the guidance related to this issue have been well established for a long time. This has been reflected in many governmental publications which have emphasised health and safety as a major concern. For example, GCCP (2000) required, by March 2003, government clients to have procedures for construction procurement which included criteria for evaluating competence, resources and commitment of designers and contractors in relation to health and safety.

More recently, OGC published the guide OGC (2004) which provided a comprehensive advice on how central civil government, as a client of the construction industry, can achieve excellence in health and safety. According to the guide, departments should introduce and demonstrate a corporate commitment to health and safety in construction procurement decision making. The guide shows that the procurement strategy should include submission and tender evaluation strategies and
models through which the bidders capability to meet health and safety specifications is robustly tested.

The guide OGC (2004) provided a number of recommendations for government departments which included, among others, using output performance-based specifications that give appropriate weighting to health and safety; assessing suppliers during the selection process in terms of their commitment to reducing the number of accidents and near-misses, their commitment to continuous health and safety improvement, their compliance with the Construction Skills Certification Scheme or equivalent; auditing suppliers to check their compliance with their stated approach to health and safety; identifying the suppliers’ current health and safety performance and continually setting realistic and increasingly demanding targets; and using the Considerate Constructors Scheme or similar when carrying out all new projects.

Moreover, the guide recommends ensuring that the procurement route specifies whole-life health and safety performance standards. The guide shows that the project brief should include and address key health and safety performance and success criteria (during construction and for the finished asset), key health and safety drivers (such as the intention to achieve excellence as a client), a business case recognising the client’s need for health and safety leadership and commitment, risk management plans addressing health and safety issues, quality plans that measure health and safety performance in the different phases and a list of stakeholders who have a stake in health and safety impact.

4.3.2 Participation of stakeholders

The criterion “participation of stakeholders (including community involvement)” was rated fourth by the experts with a mean of 4.23 and a standard deviation of 0.83. It was considered important by 100% of the experts (was considered extremely important by 46.15%, very important by 30.77%, and moderately important by 23.08%).

Stakeholders include individuals and groups who have an interest in, who are involved in, or who are affected by, the activities and outcomes of a change initiative (OGC, 2005c). Stakeholders need to be identified, prioritised, engaged and responded to in a continuous dialogue (CIRIA, 2006). Their views, interests and requirements should be addressed within the brief, which needs to include provision for future consultations on design, construction and operation of the facility (OGC, 2005a).
The OGC guide entitled "Sustainability" identified stakeholders as a key social sustainability area that should be addressed within the procurement process (OGC, 2005a). Involvement of stakeholders is of particular importance, even from a legal point of view. By law, and in construction projects in particular, consultations need to be carried out as part of the planning process. A key purpose of applying for a planning permission is to demonstrate that local stakeholders have been engaged in the development of the project. The client, who is ultimately responsible for the project, is usually viewed as the best person to lead the stakeholders' consultation process (Addis and Talbot, 2001).

Among the benefits of stakeholders' engagement are allowing the client to manage conflicts and external risks, avoiding unnecessary disputes and delays, improving management decision making, building consensus among widely different views, creating stakeholder buy-in to the outcomes of the organisation's activities and inspiring innovation in decision making through considering the different perspectives (OGC, 2005a; CIRIA, 2006).

4.3.3 Social inclusion

The criterion "social inclusion (including tackling poverty and social exclusion)" was ranked fifth by the experts with a mean of 4.0 and standard deviation of 1.08. It was considered important by 92.31% of the experts (was considered extremely important by 30.77%, very important by 53.85%, and moderately important by 7.69%).

Social exclusion refers to "what can happen when people or areas suffer from a combination of linked problems such as unemployment, poor skills, low incomes, unfair discrimination, poor housing, high crime, bad health and family breakdown" (Social Exclusion Taskforce, 2005). In many governmental publications, social inclusion has been highlighted as a key sustainability area. For example, social inclusion and eradicating poverty were highlighted by OGC as issues covered by the social sustainability pillar (OGC, 2005a). In its document "Securing the Future", the UK government shows that its sustainable development goal will be pursued through a just society that promotes social inclusion, sustainable communities and personal wellbeing (HM Government, 2005).

4.3.4 Seeking intergenerational equity by considering cost for future generations

The criterion "seeking intergenerational equity by considering cost for future
"generations" was ranked twelfth by the experts with a mean of 3.54 and standard deviation of 0.88. It was considered important by 92.31% of the experts (was considered extremely important by 15.38%, very important by 30.77%, and moderately important by 46.15%).

This criterion lies at the core of the sustainability concept as it focuses on the impact of current patterns of development on future generations. A number of publications emphasised such a criterion as a key sustainability area. Examples of these include Hill and Bowen (1997) and Langford et al (1999).

Seeking intergenerational equity demonstrates the linkages between the different dimensions of sustainability and implies that significant social, environmental and financial costs of current construction are not passed on to future generations (Hill and Bowen, 1997). A whole life costing approach is useful to ensure that future costs are considered. The procedures of such an approach do not only take into account the facility's initial cost but also its future costs. This has to take into account operational costs, maintenance costs and replacement/disposal costs (TCPA and WWF, 2003).

4.3.5 Consideration of user needs and satisfaction

The criterion "consideration of user needs and satisfaction (including accessibility)" was ranked first by the experts with a mean of 4.54 and standard deviation of 0.66. It was considered important by 100% of the experts (was considered extremely important by 61.54%, very important by 30.77%, and moderately important by 7.69%).

Meeting users' requirements has been considered for long as a key element within the value for money approach, which provides the basis of UK public procurement. Users typically represent a key group of project stakeholders. Their needs should be identified and accommodated in the specification and the design of the facility.

Recognising users' needs has gained particular attention in many governmental publications. One example is the Sustainability Action Plan which required all government departments, by March 2003, to monitor user satisfaction on each construction project following occupation (GCCP, 2000). Another example is OGC (2005a) which shows that a sustainable building design should provide all users with appropriate mobility and comfort throughout.

A crucial element in identifying and accommodating user needs is considering how an inclusive environment can be created. An inclusive environment is one that can be
used by everyone, regardless of age, gender or disability (Communities and Local Government, 2006a). Ill-conceived environments may lead to leaving many people unnecessarily disabled. As a result, they may not become able to take full responsibility of themselves and may be prevented from contributing to society (Communities and Local Government, 2006a).

Inclusive design is not only beneficial to disabled people. According to Communities and Local Government (2006a), a further 18 million people would benefit from inclusive access to buildings and public spaces either directly or indirectly. Such people include older people, families with children under the age of five as well as carers, friends and relatives who accompany people with disabilities. Inclusive design has other benefits from an economic point of view. According to Communities and Local Government (2006a), it would be more cost effective to consider inclusive access at the early stages (e.g. the design stage) than to make adjustments at the construction or the after occupation phases.

As accessible buildings are sometimes located in inaccessible places, an important point to note is that accessibility and inclusivity issues should be considered not only in relation to the facility but also in relation to its setting. Consideration should be given to how the users will travel to and access the facility and the surrounding amenities. This includes considering the points of access to the site for vehicles and pedestrians, as well as the integration of the development with the surrounding area (Rethinking Construction, 2003a; Communities and Local Government, 2006a).

4.3.6 Creating employment opportunities

The criterion “creating employment opportunities” was ranked eleventh by the experts with a mean of 3.62 and standard deviation of 1.12. It was considered important by 92.31% of the experts (was considered extremely important by 23.08%, very important by 30.77%, and moderately important by 38.46%).

Employment issues were emphasised in the 1999 UK strategy on sustainable development. One of the four major aims of the strategy was “maintenance of high and stable levels of economic growth and employment”. The strategy therefore has given public clients the opportunity to advance the employment agenda.

The National Procurement Strategy for Local Government asked local authorities to build employment considerations into procurement processes and contracts, where relevant, and in compliance with the associated acts and codes of practice (ODPM,
2003). The Strategy also asked local authorities to invite bidders for partnerships to include in their offers optional and priced proposals which are relevant to the contract and which add benefits (such as employment) to the council's community plan (ODPM, 2003).

According to IDeA (2003), contracting authorities can use their procurement policies as tools to combat unemployment. This can be achieved by requiring successful tenderers to recruit unemployed persons (particularly long-term unemployed persons) or to arrange training programmes for the unemployed or for young people during the performance of the contract.

IDeA (2003) also shows that social considerations such as combating unemployment can be taken into account when awarding a contract. For example, it may be possible to use a condition related to the combating of unemployment, as an additional criterion for comparing economically equivalent tenders (provided that it complies with the fundamental principles of Community law).

It is expected, in the light of such an emphasis on employment issues, that a considerable attention would be given to such issues in the literature focusing on sustainable construction in the UK context. However, it seems that this attention is less than what would be expected, particularly in relation to employment creation. This is consistent with the observation of Bartholomew (2003), who noticed that the objective of maintaining of high and stable levels of economic growth and employment appeared to be under represented in research and innovation (R&I) projects, with the exception of some projects arising from the Egan agenda. It can be noticed that the focus of most publications that discussed employment issues in the context of sustainable construction in the UK was on issues such as providing equal employment opportunities, employing local people and improving employees' satisfaction and conditions rather than on creating employment.

4.3.7 Training and development of the workforce

The criterion "training and development of the workforce" was ranked seventh by the experts with a mean of 3.92 and standard deviation of 1.04. It was considered important by 92.31% of the experts (was considered extremely important by 23.08%, very important by 61.54%, and moderately important by 7.69%).

Training issues are among the major subjects within the Respect for People agenda, which has been highlighted in many publications, such as OGC (2005a), as a major
area within the social sustainability pillar. According to the Construction Task Force (1998), there has been a decline by half in the proportion of trainees in the workforce since the 1970s. The Construction Task Force (1998) reported concerns about skills shortage in the industry and showed that too few people were trained to replace the old skilled workforce. The Task Force showed that too few were gaining the technical and the managerial skills needed to fully realise the value from new techniques and technologies. Furthermore, the Task Force showed that construction suffered from lack of appropriate career structure to develop both supervisory and management grades.

Public clients have a role to play in resolving the training crisis of the construction industry. According to the Movement for Innovation's Working Group on Respect for People (2000), client's demand for a skilled workforce with a demonstrable commitment to training is potentially the most influential factor in driving lifelong and career development. The requirements and the suggestions highlighted by GCCP (2000) and IDeA (2003) can be helpful in establishing how public clients can contribute to resolving training problems through their procurement. For example, GCCP (2000) required government departments to have procedures for construction procurement which include criteria for the evaluation of competence, resources and commitment of designers and contractors in relation to training, where relevant. IDeA (2003) highlighted the potential of encouraging suppliers to consider issues such as employee training. It also highlighted the potential of including a specific requirement in the contract to operate a construction training scheme for local unemployed people, in reflection to the community strategy objectives.

4.3.8 Equality and diversity in the workplace

The criterion "equality and diversity in the workplace" was ranked fourteenth by the experts with a mean of 3.46 and standard deviation of 1.05. It was considered important by 92.3% of the experts (was considered extremely important by 15.38%, very important by 30.77%, and moderately important by 46.15%).

The issue of equality and diversity in the workplace is among the major themes within the Respect for People agenda, which, as discussed before, has been identified as a major area within the social sustainability pillar. Equality and diversity issues involve acknowledging and appreciating the ways in which people differ and encompass issues such as gender, ethnicity, disability, age, background, personality
and work style (Constructing Excellence, 2004b).

Firms' tendency to respond to legislation is greater than their tendency to take a pro-active approach. Therefore, one of the main reasons for taking action in relation to equality and diversity issues was the demand created by clients or by legislation. The potential benefits of equality and diversity issues and the way to deal with them were not clearly understood and most managers did not understand the relevance of diversity and equality theme in case there was enough labour to meet their urgent needs (Rethinking Construction's Respect for People Working Group, 2002). The Commission for Racial Equality shows that contractors must not discriminate; however, they do not have the same legal obligation as public authorities with regards to promoting equality of opportunity.

Both legislation and advisory codes have called for public authorities to address equality and diversity issues and to incorporate them into their procurement. The Race Relations Act gives local councils legal duty to eliminate unlawful discrimination and to promote equality of opportunity and good relations between people of different racial groups (ODPM, 2003). This duty applies to procurement and functions delivered by private or voluntary sector firms through contractual arrangements. The Commission for Racial Equality emphasises that public authorities should build relevant race equality considerations into the procurement process in order to ensure that all the functions meet the requirements of the Race Relations Act, regardless of who is carrying them out (The Commission for Racial Equality, 2006). According to OGC (2005a), clients should look to appoint suppliers who are fully supporting the values of Respect for People, which, as discussed above, involve diversity and equality issues. The National Procurement Strategy for Local Government called on local authorities to build diversity and equality considerations into procurement processes and contracts, where relevant to the contract (ODPM, 2003). According to the strategy, all corporate procurement strategies for local authorities should address, by 2004, the relationship of procurement to equality and diversity. They should address, by that time, how the authorities would promote a diverse and competitive supply market that include small firms, social enterprises, ethnic minority businesses as well as voluntary and community sector suppliers. The strategy also urged authorities to invite bidders for partnerships to include in their offers, optional and priced proposals, into which equality issues may be incorporated (if relevant to the contract).
4.3.9 Improving workforce satisfaction

The criterion "improving workforce satisfaction" was ranked sixteenth by the experts with a mean of 3.31 and standard deviation of 1.03. It was considered important by 84.61% of the experts (was considered extremely important by 7.69%, very important by 38.46%, and moderately important by 38.46%).

As with equality and diversity issues and training issues, the issue of workforce satisfaction is one the major values within the Respect for People agenda, which, as discussed before, has been identified as a major area within the social sustainability pillar.

According to OGC (2005a), the client should consider appointing suppliers who fully support the values of Respect for People. According to Rethinking Construction’s Respect for People Working Group (2002), employee satisfaction is concerned with how satisfied direct employees are with the amount of influence they have over their jobs, the amount of pay they receive, the sense of achievement they get from their work and the respect they get from line managers or supervisors. The Rethinking Construction’s Respect for People Working Group recommends that all employers and project teams should measure the satisfaction of their whole workforce in relation to working conditions and environment, at least annually (Rethinking Construction’s Respect for People Working Group, 2002).

4.3.10 Improving working environment and conditions

The criterion "improving working environment and conditions" was ranked ninth by the experts with a mean of 3.85 and standard deviation of 0.9. It was considered important by 92.31% of the experts (was considered extremely important by 23.08%, very important by 46.15%, and moderately important by 23.08%).

The criterion "improving working environment and conditions" is closely related to the criterion "improving workforce satisfaction". Working environment and conditions are among the major values within the Respect for People agenda. The construction industry, particularly in small and medium projects, requires a shift in performance in the working environment and site facilities (the Movement for Innovation’s Working Group on Respect for People, 2000).

Improving working environment and conditions contribute to the image of the industry (Rethinking Construction’s Respect for People Working Group, 2002) and has a positive impact on staff turnover, absence and motivation. This consequently
leads to improved service and quality, more willingness to contribute to the team and better programme and financial performance (Rethinking Construction’s Respect for People Working Group, 2002). In addition, as shown by the Movement for Innovation’s Working Group on Respect for People (2000), following guidelines for interaction with the public, such as the Considerate Constructors Scheme’s Code of Practice, would help clients in achieving publicity, in building public trust and better respect and in improving the image of the industry.

As discussed before, the recommendations of the Rethinking Construction’s Respect for People Working Group urge all employers and project teams to measure the satisfaction of their whole workforce in relation to working conditions and environment, at least annually (Rethinking Construction’s Respect for People Working Group, 2002). Public clients however have a key role in advancing the agenda. For example, according to the Movement for Innovation’s Working Group on Respect for People (2000), clients can play a major role in enabling and requiring their suppliers to improve site welfare. OGC (2005a) recommends that the client should consider appointing suppliers who fully support the values of Respect for People, which involve the issue of working environment and conditions.

4.3.11 Creating a positive impact on the local environment

The criterion “creating a positive impact on the local environment (e.g. local community, business, infrastructure)” was ranked second by the experts with a mean of 4.38 and standard deviation of 0.87. It was considered important by 100% of the experts (was considered extremely important by 61.54%, very important by 15.38%, and moderately important by 23.08%).

Local communities are typically among the key stakeholders of construction projects. Bringing benefits to the local community is usually among the issues that public clients, and in particular local authorities, consider in their procurement. This may be seen as a kind of compensation for the disruption caused to the local community during construction, and as a means of improving relations between the client and the project team and the local community (Addis and Talbot, 2001).

However, in the wider view, bringing such benefits can promote the whole sustainability agenda. For example, the community strategies of local authorities set out how local authorities and their partners suggest promoting the social, economic and environmental well-being of the community and contribute to the sustainable
development of the UK.

Bringing community benefits may involve, particularly in large construction projects, employing and training local people as well as improving enterprise opportunities in the locality and local multiplier effects (ODPM, 2006; Addis and Talbot, 2001). Achieving any community benefits however should be consistent with best value and EC procurement rules. According to EC procurement law, local authorities cannot impose on their suppliers utilising local labour, local sourcing or local subcontracting as this will contradict EC treaty (IDeA, 2003). Though, as IDeA (2003) shows, local authorities can integrate into their contracts and specifications requirements, which relate to community benefits, to be delivered in a locality (provided that this does not involve any discrimination against non-UK suppliers or workers and that the other requirements EC law are observed). For example, a local authority can enclose its community strategy with the invitation to tender/negotiation and ask bidders for partnerships to include in their offers optional and priced proposals which are relevant to the contract and add benefits, such as the benefits outlined above, to the council's community strategy. A local authority can also include a specific requirement to operate a construction training scheme for local unemployed people (ODPM, 2006; IDeA, 2003).

4.3.12 Promoting ethical practices

The criterion “promoting ethical practices” was ranked seventh by the experts with a mean of 3.92 and standard deviation of 1.12. It was considered important by 92.3% of the experts (was considered extremely important by 30.77%, very important by 46.15%, and moderately important by 15.38%).

Some publications have mentioned ethical issues as one of the sustainability criteria (e.g. Addis and Talbot, 2001; CIB, 1999). Despite this, there has been little guidance in relation to what ethical issues and practices involve.

Promoting ethical procurement is not limited to encouraging fair trade and ethical investment. The statement offered by IDeA (2005) refers to several issues related to ethics and fraud prevention in the context of procurement in local authorities. These include minimising opportunities for fraud and corruption, behaving in a professional and honest manner (including adherence to rules on the acceptance of gifts and hospitality), treating all suppliers equally, and reporting any conflicts of interest and any breaches of procurement procedures.
Such issues should be integrated in the local authority procurement policies and procedures (IDeA, 2005). This can help in ensuring fairness, honesty, efficiency and professionalism of conduct, in ensuring that value for money provides the basis of decision making and in ensuring that a good reputation for the authority is maintained within the market. According to IDeA (2005), an authority with poor procurement ethics would attract suppliers with similarly poor ethics, with reduced opportunity for productive working relationships.

4.3.13 Preservation of culture and heritage

The criterion “preservation of culture and heritage” was ranked fourteenth by the experts with a mean of 3.46 and standard deviation of 0.78. It was considered important by 100% of the experts (was considered extremely important by 15.38%, very important by 15.38%, and moderately important by 69.23%). The criterion has been highlighted as a sustainability area by several publications. Examples of these include Langford et al (1999), Addis and Talbot (2001), TCPA and WWF (2003) and OGC (2005a).

As Addis and Talbot (2001) argue, archaeological remains are more unique and irreplaceable than other aspects of the environment. Construction projects should preserve and enhance existing cultural areas and heritage and should minimise negative visual impact (OGC, 2005a). Where a project involves refurbishment of historical sites, highest standards of conservation should be followed. If the project includes new developments, then these need to be consistent with the local culture and heritage. Client’s commitment to achieving such objectives has to be fully reflected in the project brief (OGC, 2005a).

4.3.14 Minimising the disruptive impacts of construction

The criterion “minimising the disruptive impacts of construction (e.g. noise)” was ranked ninth by the experts with a mean of 3.85 and standard deviation of 1.07. It was considered important by 92.3% of the experts (was considered extremely important by 38.46%, very important by 15.38%, and moderately important by 38.46%).

Construction projects usually have negative impacts in terms of causing disruption to the local community. Construction sites may cause noise, dust, and other types of pollution, leading to inconvenience of the community. In addition, such impacts may contribute negatively to the image of the industry.

Minimising the disruptive impacts of construction has also a legal dimension. The
Noise and Statutory Nuisance Act 1993 allows for regulating noisy activities that take place in or are audible in a street (Addis and Talbot, 2001). These activities, which include construction processes, plant and vehicles may be judged to be a statutory nuisance and be prohibited. Activities that may be prohibited can include those activities which are very noisy or which are causing excessive vibration due to proximity to sensitive locations such as hospitals. In case such activities are inevitable, there may be a need to move out local residents, provide them with double glazing, or compensate them (Addis and Talbot, 2001).

Measures should be taken to reduce the disruptive impacts of construction. For example, risks of pollution need to identified and actions to mitigate them need to be accommodated in a plan that can be stated in the brief (OGC, 2005a). In addition, as Addis and Talbot (2001) argue, tender documentation needs to incorporate any commitments about noise made in an environmental statement. Contractors may also be asked to register with the Considerate Constructors Scheme. The Scheme helps site operators to be socially responsible and to act as good neighbours. Participating sites commit to a code of practice that makes reference to issues such as keeping noise, dirt and dust to a minimum. The Government has taken clear actions in this regard by asking for all new projects to be carried out under the Considerate Constructors Scheme or similar. The Local Government Association recommended that local authorities should ask all contractors working for them to participate in the Scheme (Considerate Constructors Scheme, 2006; DETR, 2000; GCCP, 2000).

4.3.15 Improving security and reducing crime

The criterion "improving security and reducing crime" was ranked thirteenth by the experts with a mean of 3.50 and standard deviation of 1.07. It was considered important by 75% of the experts (was considered extremely important by 12.5%, very important by 50%, and moderately important by 12.5%).

Security and crime issues have been reported within the social dimension of sustainability by Addis and Talbot (2001), OGC (2005a) and TCPA and WWF (2003). TCPA and WWF (2003) shows that crime and dereliction have caused the deterioration of many urban environments (in particular inner city) and has led to the degeneration of these communities. The avoidance of this, according to TCPA and WWF, is a key issue that should be tackled when considering sustainable development.
The quality of the built environment has a role to play in dealing with such problems. Crime levels are higher and people feel less safe in areas where the quality of the built environment is poor (Rethinking Construction, 2003a). In addition, a poor quality of the built environment may lead to poor public perception and consequently, this may lead to low occupancy levels, which in turn tend to lead to higher levels of vandalism. Particular attention therefore needs to be paid when designing, putting the specification, and managing the facility so that crime risks are minimised. In the housing sector, for example, this could involve design of housing to “Secured by Design” standards, use of police advice in estate layout, provision of security lighting and cameras, and provision of public telephones and visible (overlooked) parking and walkway areas (TCPA and WWF, 2003).

4.3.16 Building and maintaining social capital

The criterion “building and maintaining social capital” was ranked fifth by the experts with a mean of 4.0 and standard deviation of 0.93. It was considered important by 87.5% of the experts (was considered extremely important by 25% and very important by 62.5%).

Social capital is one of five capitals in the five capitals model (Addis and Talbot, 2001). According to the Department of Trade and Industry (DTI), social capital involves “the structures that help maintain & develop human capital in partnership eg families, communities, businesses, trade unions, schools & voluntary organisations” (DTI, 2004). Social capital refers to the institutions, networks, norms, values, trust, rules and relationships that shape both the quality and quantity of a society’s social interaction and is the glue that holds societies together (Rethinking Construction, 2003a; the World Bank Group, 2006a; the World Bank Group, 2006b; Putnam, 2000; cited by Wallace, 2005).

Social capital is closely allied with social cohesion and civic engagement and is an important factor for community development (Putnam, 2000; cited by Wallace, 2005). According to the Centre for Public Services and the Nuffield Institute for Health (2004; citing Putnam, 1995), research indicates that higher levels of social capital bring higher rates of economic growth, lower crime, better health and better government. One way through which public clients can contribute to increasing social capital is by creating partnerships, which do not only promote good relationships and build trust but also contribute to reduced contract prices.
Revaluing Construction (2006) shows that research has indicated that the cost of not having trust is between 8-20% of the total contract price and that the role of longer-term perspectives and relationships is vital in such a case. Encouraging local participation and engagement can also create social capital (Somers, 2005; East of England Development Agency, 2004), and public clients, therefore, need to consider the ways through which such participation and engagement can be encouraged. For example, as discussed before, a local authority may ask bidders for partnerships to include in their offers optional and priced proposals which are relevant to the contract and which add community benefits, such as employing and training local people (ODPM, 2006; IDeA, 2003).

4.4 Summary

This chapter presented and discussed the findings in relation to developing an agreed set of the major social sustainability criteria that should be addressed by UK public clients in developing a procurement strategy. This involved applying indicators for identifying importance and agreement (including mean values, standard deviation values, and percentages of respondents agreeing on ranking the criterion). Finally, a set of 16 social sustainability criteria was developed. These criteria included:

- improving health and safety performance
- participation of stakeholders (including community involvement)
- social inclusion (including tackling poverty and social exclusion)
- seeking intergenerational equity by considering cost for future generations
- consideration of user needs and satisfaction (including accessibility)
- creating employment opportunities
- training and development of the workforce
- equality and diversity in the workplace
- improving workforce satisfaction
- improving working environment and conditions
- creating a positive impact on the local environment (e.g. local community, business, infrastructure)
- promoting ethical practices
- preservation of culture and heritage
- minimising the disruptive impacts of construction (e.g. noise)
- improving security and reducing crime
- building and maintaining social capital

These criteria were presented and discussed throughout the chapter. The development of this set represented the achievement of sub-objective 1a of this research.

The results reported in this chapter were incorporated in the framework that was developed in this thesis and which is shown Figure 11.1. The part of the framework which involves the results reported in this chapter is clearly shown in Figure 4.2 (presented in black font colour).
Figure 4.2 – Incorporating the results obtained in Chapter 4 in the framework that was developed in this thesis and which shown in Figure 11.1
Chapter 5: Developing an agreed set of the major economic sustainability criteria

5.1 Introduction

This chapter discusses and presents the findings of the Delphi Exercise in relation to developing an agreed set of the major economic sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (sub-objective 1b of this research). The analysis of the results, as will be shown in Section 5.2, led ultimately to the development an agreed set of 12 economic sustainability criteria. These will be presented and discussed throughout this chapter. As shown in Figure 5.1, further validation in relation to these findings was obtained through the interviews, case studies and questionnaire survey (as will be described in Section 5.2.4).

5.2 The process of developing the agreed set of major economic sustainability criteria

The Delphi Method, which was used in developing the agreed set of economic sustainability criteria, was described in detail in Section 3.3.1. This section describes the process of identifying and validating these criteria through Rounds 1, 2 and 3 of Delphi. The final results (which were obtained from Round 3) will be discussed in detail in Section 5.3. Further validation through other methods and strategies will be presented in Section 5.2.4.

5.2.1 Round 1

As discussed in Section 3.3.1.8, the first round of the Delphi Exercise began with open-ended format. Respondents were invited to identify five major sustainability criteria representing the economic dimension of sustainable construction that they believe should be addressed by UK public clients in developing a procurement strategy (they were also informed that they were welcome to identify more than five criteria).

All issues related to selection of experts, development of the first round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in Section 3.3.1. As shown in Section 3.3.1.8, seventeen responses were received in the first round.
Objective 1: To develop agreed sets of the major social (sub-objective 1a), economic (sub-objective 1b), and environmental (sub-objective 1c) sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Sub-objective 1b: To develop an agreed set of the major economic sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Objective 2: To develop the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy.

Objective 3: To identify the barriers to better addressing sustainable construction in developing a procurement strategy.

Objective 4: To identify the parties which are most capable of removing such barriers.

Objective 5: To identify whether or not local authorities in the UK, as a major sector of public clients (organisations), are following / planning to follow policies or guidelines which indicate the need to have sustainability considerations addressed in construction project procurement strategies (Objective 5 met).

Objective 6: To identify and demonstrate how local authorities in the UK are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures (Objective 6 met).

Figure 5.1 – Towards achieving objective 1: Achieving sub-objective 1b
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Clear establishment of need and evaluation of alternative options</td>
</tr>
<tr>
<td>E2</td>
<td>Whole life value for money</td>
</tr>
<tr>
<td>E3</td>
<td>Supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)</td>
</tr>
<tr>
<td>E4</td>
<td>Creating employment opportunities</td>
</tr>
<tr>
<td>E5</td>
<td>Fitness for purpose (including consideration of long term flexibility)</td>
</tr>
<tr>
<td>E6</td>
<td>Consideration of whole life costing</td>
</tr>
<tr>
<td>E7</td>
<td>Economic Key Performance Indicators (KPIs)</td>
</tr>
<tr>
<td>E8</td>
<td>Waste minimisation and management</td>
</tr>
<tr>
<td>E9</td>
<td>Improving the efficiency of the supply side</td>
</tr>
</tbody>
</table>

Table 5.1 – Analysed set of economic sustainability criteria based on responses received in Delphi Round 1

Procedures used in analysing the results of Round 1 were discussed in detail in Section 3.3.1.8. The analysis carried out led to the development of 9 economic sustainability criteria. These are presented in Table 5.1.

### 5.2.2 Round 2

As discussed in Section 3.3.1.8, the second round questionnaire was developed based on the analysis of the experts' responses received in the first round. As shown in that section, respondents were asked to assess the level of importance of the 9 economic criteria included (E1 to E9 in Table 5.2), using a 5-point Likert Scale ranging from 0 denoting “not important” to 5 denoting “extremely important”. In addition, respondents were invited in each section to assess the level of importance of another two criteria (E10 and E11), which were suggested by the literature (but not suggested by the experts in the first round). Experts were also asked to add any other criteria which were not listed, identify their level of importance and add any comments.

Issues related to format and content of questions, distributing the questionnaire, follow up procedures, responses received and their analysis were discussed in Section 3.3.1.8. As shown in that section, fifteen responses were received in the second round.

Procedures used in analysing the results of Round 2 were discussed in Section 3.3.1.8.
The analysis carried out led to identifying the level of importance of the 11 economic sustainability criteria included in the second round and to the identification of 1 new economic sustainability criterion. As shown in Section 3.3.1.8, for each of the 11 criteria, the mean and the standard deviation values of the scores provided by the experts were calculated. The newly identified economic sustainability criterion was "consideration of effective logistics strategies". These results are presented in Table 5.2.

<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Analysed set of criteria based on responses received in Round 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>Clear establishment of need and evaluation of alternative options</td>
<td>4.67</td>
<td>0.62</td>
<td>1</td>
</tr>
<tr>
<td>E2</td>
<td>Whole life value for money</td>
<td>4.67</td>
<td>0.49</td>
<td>1</td>
</tr>
<tr>
<td>E3</td>
<td>Supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)</td>
<td>3.87</td>
<td>1.13</td>
<td>6</td>
</tr>
<tr>
<td>E4</td>
<td>Creating employment opportunities</td>
<td>3.67</td>
<td>1.05</td>
<td>8</td>
</tr>
<tr>
<td>E5</td>
<td>Fitness for purpose (including consideration of long term flexibility)</td>
<td>4.57</td>
<td>0.51</td>
<td>3</td>
</tr>
<tr>
<td>E6</td>
<td>Consideration of whole life costing</td>
<td>4.53</td>
<td>0.74</td>
<td>4</td>
</tr>
<tr>
<td>E7</td>
<td>Economic Key Performance Indicators (KPIs)</td>
<td>3.53</td>
<td>0.92</td>
<td>9</td>
</tr>
<tr>
<td>E8</td>
<td>Waste minimisation and management</td>
<td>3.93</td>
<td>0.59</td>
<td>5</td>
</tr>
<tr>
<td>E9</td>
<td>Improving the efficiency of the supply side</td>
<td>3.53</td>
<td>0.99</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Other criteria suggested by the literature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E10</td>
<td>Financial affordability for intended beneficiaries</td>
<td>3.79</td>
<td>1.25</td>
<td>7</td>
</tr>
<tr>
<td>E11</td>
<td>Competitiveness</td>
<td>3.50</td>
<td>0.85</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Criteria identified in the Round 2 (based on experts' suggestions made in Round 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E12</td>
<td>Consideration of effective logistics strategies</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 5.2 – Analysed set of economic sustainability criteria based on responses received in Delphi Round 2

5.2.3 Round 3

As discussed in Section 3.3.1.8, the third round questionnaire was developed based on the analysis of the experts' responses received in the second round. Respondents were
given feedback from the second round which involved presenting the economic sustainability criteria E1 to E11 with two scores indicating their level of importance. The first score was named "Your Score" and represented the score that the expert provided in Round 2 regarding the level of importance of the criterion while the second score was named "Mean Score" and represented the mean of the scores provided by all the experts participated in Round 2 regarding the level of importance of the criterion. In the third round, experts had the opportunity to reconsider the scores they provided in the second round using the same 5-point Likert Scale ranging from 0 denoting "not important" to 5 denoting "extremely important" which was used in the second round.

Again, issues related to the development of the third round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in Section 3.3.1.8. As shown in that section, thirteen responses were received in that round.

The criteria that will be presented and discussed in this chapter are those criteria resulting from the analysis of Round 3 of the Delphi Exercise (see Table 5.3). The development of this set of economic sustainability criteria was based on applying the same procedures and indicators used in developing the set of social sustainability criteria (as presented in Chapter 4). This involved identifying and assigning, for each criterion, the mean value, standard deviation value, and percentage of respondents agreeing on ranking the criterion.

A criterion with a value of mean that is equal or above 3 can be considered important (based on the Likert Scale ranging from 1 to 5 which was introduced above).

Agreement among respondents that a certain criterion is important can be established based on having 75% or more of the respondents agreeing on giving a ranking that is equal to or more than 3. The values shown in column 11 of Table 5.3 show the percentages of respondents agreeing on ranking that is equal to or more than 3. The values of standard deviation shown in Table 5.3 can be considered relatively low (therefore indicating agreement).

Criteria which satisfy the above indicators include the 12 economic sustainability criteria included in Round 3. These criteria (which will be discussed below) scored mean values above 3, were rated by at least 75% of the experts as important and had relatively low values of standard deviation.
5.2.4 Further validation

A point to note is that in three of the four methods/techniques used in this research (the semi-structured interviews, the interviews included within the case studies and the questionnaire survey), the opportunity was given to the interviewees (12 interviewees in total), and the respondents to the questionnaire survey (132 respondents in total) to comment on any of the items included within the interview guide or the questionnaire. No negative comments by the interviewees or by the respondents were provided in relation to the economic sustainability criteria. No additional economic sustainability criteria were suggested.

5.3 Discussion of the results

The following sections present and provide a discussion of the 12 criteria that were agreed as important economic sustainability criteria that need to be addressed by UK public clients in developing a procurement strategy (as discussed in Section 5.2).

5.3.1 Clear establishment of need and evaluation of alternative options

The criterion “clear establishment of need and evaluation of alternative options” was ranked first by the experts with a mean of 4.69 and standard deviation of 0.63. It was considered important by 100% of the experts (was considered extremely important by 76.92%, very important by 15.38%, and moderately important by 7.69%).

Establishing the need and evaluating alternative options is a process that starts in the very early stages of the project. It involves identifying what needs to be delivered as well as appraising and evaluating the different options available to meet the need. For example, rather than undertaking new development, the need may be met through refurbishing or reusing an existing building. Such a concept has generally been emphasised through the principle “re-use existing built assets”, which represents one of ten themes included within the 1999 strategy for more sustainable construction “Building a better Quality of Life”.

129
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion (economic)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
<th>% of experts voting for the criterion as</th>
<th>% of experts voting for the criterion as</th>
<th>Total Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clear establishment of need and evaluation of alternative options</td>
<td>4.69</td>
<td>0.63</td>
<td>1</td>
<td>76.92 15.38 7.69 0 0</td>
<td>100.00 0</td>
<td>100</td>
</tr>
<tr>
<td>E2</td>
<td>Whole life value for money</td>
<td>4.69</td>
<td>0.48</td>
<td>1</td>
<td>69.23 30.77 0 0 0</td>
<td>100.00 0</td>
<td>100</td>
</tr>
<tr>
<td>E3</td>
<td>Supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)</td>
<td>3.85</td>
<td>1.14</td>
<td>6</td>
<td>30.77 38.46 23.08 0 7.69</td>
<td>92.31 7.69</td>
<td>100</td>
</tr>
<tr>
<td>E4</td>
<td>Creating employment opportunities</td>
<td>3.69</td>
<td>1.11</td>
<td>8</td>
<td>23.08 38.46 30.77 0 7.69</td>
<td>92.31 7.69</td>
<td>100</td>
</tr>
<tr>
<td>E5</td>
<td>Fitness for purpose (including consideration of long term flexibility)</td>
<td>4.50</td>
<td>0.52</td>
<td>4</td>
<td>50.00 50.00 0 0 0</td>
<td>100.00 0</td>
<td>100</td>
</tr>
<tr>
<td>E6</td>
<td>Consideration of whole life costing</td>
<td>4.69</td>
<td>0.63</td>
<td>1</td>
<td>76.92 15.38 7.69 0 0</td>
<td>100.00 0</td>
<td>100</td>
</tr>
<tr>
<td>E7</td>
<td>Economic Key Performance Indicators (KPIs)</td>
<td>3.62</td>
<td>0.87</td>
<td>11</td>
<td>23.08 15.38 61.54 0 0</td>
<td>100.00 0</td>
<td>100</td>
</tr>
<tr>
<td>E8</td>
<td>Waste minimisation and management</td>
<td>4.08</td>
<td>0.49</td>
<td>5</td>
<td>15.38 76.92 7.69 0 0</td>
<td>100.00 0</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5.3 — Analysis and development of agreed set of the major economic sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (based on results obtained from Round 3 of the Delphi Exercise)
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion (economic)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
<th>% of experts voting for the criterion as</th>
<th>% of experts voting for the criterion as</th>
<th>Total Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>E9</td>
<td>Improving the efficiency of the supply side</td>
<td>3.54</td>
<td>1.05</td>
<td>12</td>
<td>23.08</td>
<td>23.08</td>
<td>38.46</td>
</tr>
<tr>
<td>E10</td>
<td>Financial affordability for intended beneficiaries</td>
<td>3.75</td>
<td>1.06</td>
<td>7</td>
<td>33.33</td>
<td>16.67</td>
<td>41.67</td>
</tr>
<tr>
<td>E11</td>
<td>Competitiveness</td>
<td>3.67</td>
<td>0.78</td>
<td>9</td>
<td>16.67</td>
<td>33.33</td>
<td>50.00</td>
</tr>
<tr>
<td>E12</td>
<td>Consideration of effective logistics strategies</td>
<td>3.67</td>
<td>0.87</td>
<td>9</td>
<td>11.11</td>
<td>55.56</td>
<td>22.22</td>
</tr>
</tbody>
</table>

Continue Table 5.3 – Analysis and development of agreed set of the major economic sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (based on results obtained from Round 3 of the Delphi Exercise)

Assessments, based on whole life costing, should be undertaken when appraising the different options to achieve the need (OGC, 2005a; GCCP, 2000). Regardless of the option chosen for meeting the need, the project brief should include a clear statement defining the purpose of the project as well as the whole life objectives (OGC, 2005a).

### 5.3.2 Whole life value for money

The criterion “whole life value for money” was rated first by the experts with a mean of 4.69 and a standard deviation of 0.48. It was considered important by 100% of the experts (was considered extremely important by 69.23%, very important by 30.77%, and moderately important by 0%).

NAO (2005a) considers that procurement of construction should be on the basis of whole-life value for money (OGC, 2005a). Value for money refers to “the optimum combination of whole-life cost and quality (or fitness for purpose) to meet the user’s requirement” (DEFRA, 2005). The component “user requirement” of the above definition was examined within the discussion provided in Section 4.3.5. The other two components of the definition (i.e. “whole-life cost” and “fitness for purpose”) will be examined in Sections 5.3.5 and 5.3.6.
5.3.3 Supporting the regional/local economy

The criterion "supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)" was ranked sixth by the experts with a mean of 3.85 and standard deviation of 1.14. It was considered important by 92.31% of the experts (was considered extremely important by 30.77%, very important by 38.46%, and moderately important by 23.08%). A number of publications has emphasised supporting local or regional economies as a key area within the economic pillar of sustainability (e.g. OGC, 2005a; Rethinking Construction, 2003a).

Boon and Gashe (2001), in a review of sustainability of economic development, describe the ingredients of a successful local economy as: Balance of competition and collaboration between local businesses; land availability and skills training; partnership/networking between businesses and between stakeholders and the local business community. Construction projects can contribute to attaining these ingredients through creating jobs, training of local people, increasing demand on local materials, sourcing local suppliers, encouraging new businesses, improving access to services and attracting people to live and work in the local area (OGC, 2005a; Thirdwave Scotland, 2004).

Public clients have a role in enabling their construction projects make such a contribution. Local authorities can use their procurement activity to support social and community enterprise and to recycle funding in the local economy (Thirdwave Scotland, 2004). However, local benefits need to be consistent with best value and EC procurement rules. As shown before, local authorities cannot enforce suppliers to utilise local labour, local sourcing or local subcontracting. As discussed before, their contribution would generally lie in integrating into their contracts and specifications requirements relating to community benefits to be delivered in a locality (provided that this does not involve any discrimination against non-UK suppliers or workers and that other requirements EC law are observed). Alternatively, these authorities may ask the bidders in the invitation for bidders for partnerships, to submit with their offers optional and priced proposals which are relevant to the contract and which add benefits to the local community.

5.3.4 Creating employment opportunities

The criterion "creating employment opportunities" was ranked eighth by the experts
with a mean of 3.69 and standard deviation of 1.11. It was considered important by 92.31% of the experts (was considered extremely important by 23.08%, very important by 38.46%, and moderately important by 30.77%). The criterion represents one of the areas where social and economic sustainability are clearly interlinked. This criterion was discussed in detail in Section 4.3.6.

5.3.5 Fitness for purpose

The criterion “fitness for purpose (including consideration of long term flexibility)” was ranked first by the experts with a mean of 4.50 and standard deviation of 0.52. It was considered important by 100% of the experts (was considered extremely important by 50% and very important by 50%).

Fitness for purpose, functionality and flexibility issues have been highlighted within the economic pillar of sustainability by a number of publications (e.g. TCPA and WWF, 2003; Rethinking Construction, 2003a; OGC, 2005a). It represents one of the essential components within the value for money approach, which is the basis of all UK public procurement. The notion about quality (or fitness for purpose) to meet the user's requirement within the value for money definition (see Section 5.3.2) enables government departments to specify their needs in terms of meeting their operational and policy objectives and at the same time contributing to the achievement of the government objectives towards sustainable development (Addis and Talbot, 2001).

Fitness for purpose involves not only ensuring that the scheme achieves its functional objectives and that it is responsive to the requirements of the user, but also ensuring that thought has been given to long term flexibility and adaptability. Throughout the life of the facility, a change in use conditions may take place. As most buildings can be reused (OGC, 2005a), attention needs to be given to how the facility can be reused without incurring significant costs to adapt the facility for the new conditions of use. Therefore, public clients should aim to produce specifications which promote future flexibility and adaptability and articulate such objectives within the design brief. However, consideration should also be given to the consequences of introducing excessive flexibility requirements on the capital cost (Addis and Talbot, 2001). Hence, bringing in such requirements should be balanced against the costs that would be incurred as a result of introducing them. The Design Quality Indicator (DQI) can be a helpful tool in this regard, as it can be used to ensure that appropriate levels of functionality and flexibility are developed (Rethinking Construction, 2003a).
5.3.6 Consideration of whole life costing

The criterion "consideration of whole life costing" was ranked first by the experts with a mean of 4.69 and standard deviation of 0.63. It was considered important by 100% of the experts (was considered extremely important by 76.92%, very important by 15.38%, and moderately important by 7.69%).

Whole life costing is probably the criterion within that pillar which most, if not all, publications about sustainability have agreed upon as a key economic sustainability criterion (e.g. OGC, 2005a; TCPA and WWF, 2003; Rethinking Construction, 2003a).

Whole life costing is central to the value for money approach, which is the basis for all UK public procurement. There is an increasing acknowledgment that procurement decision making, including selection of contractors and award of public sector contracts, should move away from the lowest bid consideration towards a broader direction that emphasis the value obtained over the asset life cycle. This has been reflected in many publications that showed government commitment towards adopting such an approach (e.g. OGC, 2003b; OGC, 2005a; GCCP, 2000).

The whole life costs of a built asset facility include: The acquisition costs, including consultancy, design, construction and equipment; the operating costs, including utilities, renovation, and repairs and maintenance through to disposal; and internal resources and overheads, risk allowances, predicted alterations for known changes in business requirements, refurbishment costs and the costs associated with sustainability and health and safety aspects (NAO, 2005a).

A whole life costing approach is useful in ensuring that future costs are considered and that the impact on future generations is assessed. In utilising such an approach, all future costs and benefits are discounted to present values using discounting techniques (Addis and Talbot, 2001). Public clients need to ensure that tender documents emphasise whole life costing and that the brief includes a clear statement defining whole life objectives (OGC, 2005a).

5.3.7 Economic Key Performance Indicators (KPIs)

The criterion "Economic Key Performance Indicators (KPIs)" was ranked eleventh by the experts with a mean of 3.62 and standard deviation of 0.87. It was considered important by 100% of the experts (was considered extremely important by 23.08%, very important by 15.38%, and moderately important by 61.54%). Economic Key Performance Indicators (KPIs) were reported within the economic pillar of
The indicators include client satisfaction (product), client satisfaction (service), defects, safety, predictability (cost - design and construction), predictability (time - design and construction), construction cost, construction time, profitability and productivity (Constructing Excellence 2005a; Constructing Excellence 2005b). The KPIs are used to monitor and improve ongoing performance and procurement processes and can help, along with other indicators, such as Environmental Performance Indicators, Respect for People Indicators and Design Quality Indicators, in moving towards more sustainable construction (Rethinking Construction, 2003a; Tookey et al, 2001).

Clients may set original targets within the project brief and require measuring performance on projects against the KPIs and reporting such data so that benchmarking can be carried out. The commitment to measuring and improving performance through the use of KPIs has become even more important, especially in the light of the agreement of Ministers in December 2002 on the new Achieving Excellence targets (which require projects to demonstrate a significant improvement in performance against quality, cost and time targets) and the requirement for all departments to use the KPIs by March 2002 (OGC, 2003a; OGC, 2003c).

Clients may also need to consider whether the adoption of certain procurement route (e.g. traditional, design and build, etc.) would assist in achieving better results on certain indicators. Procurement routes may have different potential to meet certain criteria assessed by these indicators such as time predictability or construction time (see Chan et al (2001) and OGC (2003a)).

5.3.8 Waste minimisation and management

The criterion "waste minimisation and management" was ranked fifth by the experts with a mean of 4.08 and standard deviation of 0.49. It was considered important by 100% of the experts (was considered extremely important by 15.38%, very important by 76.92%, and moderately important by 7.69%).

Waste minimisation and management has been emphasised, particularly within the environmental pillar of sustainability, in several publications (e.g. Rethinking Construction, 2003a; OGC, 2005a). Waste minimisation and management is amongst the areas showing how the economic and the environmental pillars of sustainability are interlinked; it does not only lead to achieve savings but also leads to reducing
pollution and minimising negative environmental impact.

Figures introduced by Addis and Talbot (2001) show that the development undertaken by the construction industry generates about 70 million tonnes of waste every year. The government clearly set out its commitment to reducing waste in the 2000 strategy for more sustainable construction through introducing the principle “design for minimum waste” as one of the main ten themes for action in that strategy. The strategy required all government departments to have plans that meet targets for waste in construction in line with the cross-government targets agreed by Green Ministers (GCCP, 2000).

Public clients need to contribute to waste minimisation and management through their procurement processes. For example, OGC (2005a) shows that a requirement for the contractor or the supplier to provide a waste management plan, which helps putting construction waste to a positive use and reduces costs of transport and disposal, should be set within the project brief. The project brief should also introduce waste reduction targets and set out how performance will be measured (OGC, 2005a). Design and specification may include provisions for segregation and storage of waste during the operation phase. Contribution can also be made through specifying standardised products and pre-assembled parts and through promoting the adoption of lean construction techniques. These can play an important role in reducing waste through achieving better quality and improving efficiency in the use of resources, including time, energy, water and materials (Rethinking Construction, 2003a; Highways Agency, 2003; Constructing Excellence, 2003c). Reuse, recycling, improved selection and use of materials and improved logistics strategies should all contribute to better waste management. These will be discussed throughout this chapter and the following chapter.

5.3.9 Improving the efficiency of the supply side

The criterion “improving the efficiency of the supply side” was ranked twelfth by the experts with a mean of 3.54 and standard deviation of 1.05. It was considered important by 84.62% of the experts (was considered extremely important by 23.08%, very important by 23.08%, and moderately important by 38.46%).

CRISP Sustainable Construction Theme Group (1999) highlighted efficiency and productivity of the industry as one of the main issues within the economic sustainability agenda. Improving efficiency in the supply side is related, to a great
extent, to the creation of integrated supply chains and integrated supply and project teams. A supply chain is made up of all the parties responsible for delivering a product or service. An integrated supply chain is typically responsible for the delivery of the whole project or a whole programme of projects and usually focuses on the processes associated with the reduction of the total cost through analysing the processes of the supply chain (such as storage, logistics, installation, information systems, etc.) and eliminating redundancy of effort and cost (Strategic Forum for Construction, 2002; NAO, 2005a).

Quite often, an integrated supply chain moves from project to project and therefore its members can bring the knowledge, experiences, skills, learning and mutual understanding to new projects which the integrated chain is responsible for (NAO, 2005a). Construction projects may involve specialised supply chains that are responsible for delivering different services such as design and construction. An integrated supply team brings together all the supply chains responsible for delivering the project. This team, together with the client project team, forms the integrated project team (OGC, 2003d). As the integrated project team includes all those involved in asset development, designing, manufacturing, assembling and constructing, proving, operating and maintaining the facility, it will be able to add maximum value through integration around common objectives, processes, culture, values, reward and risk (Strategic Forum for Construction, 2002). According to the Strategic Forum for Construction (2002), achieving the maximum integration of the team at the optimum time is essential to better utilisation of the expertise available, to the delivery of whole life performance, and to maximising value for the benefit of the client.

Constructing Excellence (2003) have also illustrated the benefits of involving the whole supply chain as it showed that such an involvement led to better design and cost efficiencies. Clients have a leading role in facilitating the attainment of these economic benefits through specifying and facilitating the use of integrated supply chains and teams (Constructing Excellence, 2003). Such a role has been recognised by the Strategic Forum for Construction (2002) which identified the need for integrated teams and supply chains as one of the three main drivers for accelerating change and securing a culture of continuous improvement. The Forum made it clear that clients should require the use of integrated teams and long term supply chains and should actively participate in their creation and set targets in this regard. For example, by the end of 2007, 50% of construction projects by value should be carried out by integrated
teams and supply chains (Strategic Forum for Construction, 2002).

5.3.10 Financial affordability for intended beneficiaries

The criterion "financial affordability for intended beneficiaries" was ranked seventh by the experts with a mean of 3.75 and standard deviation of 1.06. It was considered important by 91.67% of the experts (was considered extremely important by 33.33%, very important by 16.67%, and moderately important by 41.67%).

This criterion was introduced by Hill and Bowen (1997) as one of the principles within the economic pillar of sustainable construction. They show that financial affordability for intended beneficiaries could be achieved by reducing emphasis on technical sustainability. This could involve, for example, setting appropriate minimum standards for housing and related services to promote the acquisition of affordable formal housing.

While affordability of the client in the UK context was mentioned as one of the normal tests for public sector expenditure and as a constraint that needs to be considered within the value for money approach (OGC and DEFRA, 2003; Rintala, 2004), affordability for intended beneficiaries is generally an area that has not been given sufficient attention in the literature addressing sustainable construction in the UK context. Even the article by Hill and Bowen (1997), which mentioned such a criterion, did not focus on the developed countries context and in some cases the principles introduced by that article were more relevant to the context of developing countries. This was noticed by Ofori (1998) who argued that the principle of financial affordability for intended beneficiaries was particularly relevant to the needs of developing countries. More attention should be given to this principle even within the context of developed countries. Developing better standards of living and higher levels of income in developed countries does not imply that the issue of affordability of beneficiaries is no longer relevant. For example, in the context of the housing sector in the UK, there are growing concerns about peoples' affordability of housing in the light of rapid increase in houses' prices over the years (Environmental Audit Committee, 2005a). Moreover, any contribution to achieving sustainability objectives should clearly examine the affordability of intended beneficiaries. Such an issue is obviously related to the ability of future generations to pay for the use, operation and maintenance of the constructed facilities. This supports the views of McIntosh and Fourie (2000) who argue that sustainability is critically linked to affordability not only
in terms of capital cost, but also in terms of long maintenance and cost recovery from users.

5.3.11 Competitiveness

The criterion "competitiveness" was ranked ninth by the experts with a mean of 3.67 and standard deviation of 0.78. It was considered important by 100% of the experts (was considered extremely important by 16.67%, very important by 33.33%, and moderately important by 50%).

Competitiveness relates to maintaining the element of competition and motivating the industry to become more productive, efficient and successful. In the context of construction procurement, competitive tendering has the potential to motivate firms to search for ways to reduce their production costs and become more efficient and more productive (production costs involves the efficient transformation of inputs to outputs (Winch, 2002)). Without doing so, they will not be capable of achieving acceptable profits out of contracts involving procedures for selection and award characterised by tough competition with rivals.

However, competitive tendering that is based on lowest cost as the sole criterion for selection and award may be at the expense of the client's benefit. It has often failed in achieving best value. Quite often, this approach led to lengthy disputes, adversarial relations and an increase in the transaction costs (transaction costs are the costs of co-ordinating any complex production process (Winch, 2002)). This, consequently, led to an increase in the total cost and to a decrease in total value attained by the client. If the element of competition is to be maintained in a way that achieves best value and contributes to the attainment of sustainability objectives, then public clients should not only rely on the lowest price as the sole criterion for selection and award. They should also take into account the competitors' performance on other criteria that enhance value, such as financial soundness, technical capability and experience, quality performance, health and safety performance and environmental performance.

5.3.12 Consideration of effective logistics strategies

The criterion "consideration of effective logistics strategies" was ranked ninth by the experts with a mean of 3.67 and standard deviation of 0.87. It was considered important by 88.89% of the experts (was considered extremely important by 11.11%, very important by 55.56%, and moderately important by 22.22%).

Logistics issues have been mentioned within the economic pillar of sustainability by
The Strategic Forum for Construction (2002) shows that poor logistics results in a considerable amount of waste in the industry and stresses the need for supply chain management and logistics to facilitate integrated working. Logistics strategies focus on managing the flow of goods, materials, equipment and people from their point of origin direct to the point of use and on ensuring that the right products reach the right place in the right quantity at the right time to satisfy customer demand (OGC, 2005a). This could involve, for example, using central delivery-handling centre, such as the Logistics Consolidation Centre at Heathrow Airport. The Centre, which won a BAA award for Sustainability in Construction and attracted the interest of central and local government departments, operates using established warehouse management techniques that enable receiving all but the bulk deliveries and re-delivering them to the site during night time. As a result, safe and efficient flow of construction materials and equipment is facilitated. The same processes used can be applied successfully on smaller sites (Constructing Excellence 2006a; Constructing Excellence, 2006b; Constructing Excellence, 2006c).

Adopting effective logistics strategies can lead to achieving important economic benefits such as reducing costs and time, cutting waste, and encouraging integration of supply chain teams (OGC, 2005a). In addition to delivering such economic benefits, adopting effective logistics strategies can lead to the attainment of social and environmental benefits, such as reduced storage on site thus reducing the risk of accidents, reducing congestion and reducing noise impact and carbon emissions of delivery vehicles (Constructing Excellence, 2006d).

Logistics issues can be managed more effectively in cases involving collaborative working patterns and integrated supply chains and when such issues are considered at an early stage of the project life cycle, such as the design stage (Constructing Excellence, 2006b). Creating partnerships between local authorities, retailers and logistics suppliers can contribute to logistics issues. Such partnerships can help in providing consolidation centres, improving recycling, reducing transportation by bringing the supply chain together and reducing waste through minimising packaging (Mayor of London, 2006). According to Chen and Paulraj (2004), the current trend of using strategic partnerships and cooperative agreements among firms forces the logistics integration to expand beyond the boundaries of the individual firm.
5.4 Summary

This chapter presented and discussed the findings of the Delphi Exercise in relation to developing an agreed set of the major economic sustainability criteria that should be addressed by UK public clients in developing a procurement strategy. This involved applying indicators for identifying importance and agreement (including mean values, standard deviation values and percentages of respondents agreeing on ranking the criterion). Finally, a set of 12 economic sustainability criteria was developed. These criteria included:

- clear establishment of need and evaluation of alternative options
- whole life value for money
- supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)
- creating employment opportunities
- fitness for purpose (including consideration of long term flexibility)
- consideration of whole life costing
- economic Key Performance Indicators (KPIs)
- waste minimisation and management
- improving the efficiency of the supply side
- financial affordability for intended beneficiaries
- competitiveness
- consideration of effective logistics strategies.

These criteria were presented and discussed throughout the chapter. The development of this set represented the achievement of sub-objective 1b of this research.

The results reported in this chapter were incorporated in the framework that was developed in this thesis and which is shown Figure 11.1. The part of the framework which involves the results reported in this chapter is clearly shown in Figure 5.2 (presented in black font colour).
Chapter 6: Developing an agreed set of the major environmental sustainability criteria

6.1 Introduction

Towards realisation of sustainable construction through procurement strategies

Sustainability criteria need to be addressed in procurement strategies

- Improving health and safety, project quality, productivity (1)
- Addressing the environmental impacts of construction processes (2)
- Ensuring social responsibility (3)
- Ensuring economic sustainability (4)

Organisational management

- Developing a common understanding of sustainable procurement (5)
- Ensuring compatibility between sustainability targets and organisational goals (6)
- Establishing the sustainability management system within the organisation (7)

Contractual factors

- Choosing the most sustainable option or supplier (8)
- Ensuring suitability of the project team as a primary criterion (9)
- Ensuring socio-economic sustainability (10)

Instrumental factors

- Choosing the sustainability criteria for sustainability assessment and reporting (11)

Economic

- Clear understanding of need and evaluation of alternative options (1)
- Costing life cycle value for money (2)
- Ensuring the project meets social and economic needs (3)
- Ensuring social responsibility (4)
- Ensuring economic sustainability (5)

Environmental

- Clear understanding of need and evaluation of alternative options (1)
- Costing life cycle value for money (2)
- Ensuring the project is within environmental regulations (3)
- Ensuring social responsibility (4)
- Ensuring economic sustainability (5)

Towards realisation of sustainable construction through procurement strategies

Figure 5.2 – Incorporating the results obtained in Chapter 5 in the framework that was developed in this thesis and which shown in Figure 11.1
Chapter 6: Developing an agreed set of the major environmental sustainability criteria

6.1 Introduction

This chapter discusses and presents the findings of the Delphi Exercise in relation to developing an agreed set of the major environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (sub-objective 1c of this research). The analysis of the results, as will be shown in Section 6.2 led ultimately to the development an agreed set of 13 environmental sustainability criteria. These will be presented and discussed throughout this chapter. As shown in Figure 6.1, further validation in relation to these findings was obtained through the interviews, case studies and questionnaire survey (as will be described in Section 6.2.4).

6.2 The process of developing the agreed set of major environmental sustainability criteria

The Delphi Method, which was used in developing and validating the agreed set of environmental sustainability criteria, was described in detail in Section 3.3.1. This section describes the process of identifying and validating these criteria through the first, the second and the third rounds of Delphi. The final results (which were obtained from Round 3) will be discussed in detail in Section 6.3. Further validation through other methods and strategies will be presented in Section 6.2.4.

6.2.1 Round 1

As discussed in Section 3.3.1.8, the first round of the Delphi Exercise began with open-ended format. Respondents were invited to identify five major sustainability criteria representing the environmental dimension of sustainable construction that they believe should be addressed by UK public clients in developing a procurement strategy (they were also informed that they were welcome to identify more than five criteria).
Objective 1: To develop agreed sets of the major social (sub-objective 1a), economic (sub-objective 1b), and environmental (sub-objective 1c) sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Sub-objective 1c: To develop an agreed set of the major environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Objective 2: To develop the factors that are important to UK public clients in better addressing sustainable construction in developing a procurement strategy.

Objective 3: To identify the barriers to better addressing sustainable construction in developing a procurement strategy.

Objective 4: To identify the parties which are most capable of removing such barriers.

Objective 5: To identify whether or not local authorities in the UK, as a major sector of public clients, are following planning to follow policies or guidelines which indicate the need to have sustainability considerations addressed in construction projects' procurement strategies (Objective 4 met).

Objective 6: To identify and demonstrate how local authorities in the UK are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures.

Figure 6.1 – Towards achieving objective 1: Achieving sub-objective 1c
All issues related to selection of experts, development of the first round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in Section 3.3.1. As shown in Section 3.3.1.8, seventeen responses were received in the first round.

Procedures used in analysing the results of Round 1 were discussed in detail in Section 3.3.1.8. The analysis carried out led to the development of 12 environmental sustainability criteria. These are presented in Table 6.1.

6.2.2 Round 2
As discussed in Section 3.3.1.8, the second round questionnaire was developed based on the analysis of the experts' responses received in the first round. As shown in that section, respondents were asked to assess the level of importance of the 12 environmental criteria included (N1 to N12 in Table 6.2), using a 5-point Likert Scale ranging from 0 denoting "not important" to 5 denoting "extremely important". In addition, respondents were invited in each section to assess the level of importance of another one criterion (N13), which was suggested by the literature (but not suggested by the experts in the first round). Experts were also asked to add any other criteria which were not listed, to identify their level of importance and to add any comments.

Issues related to format and content of questions, distributing the questionnaire, follow up procedures, responses received and their analysis were discussed in Section 3.3.1. As shown in Section 3.3.1.8, fifteen responses were received in the second round.

Procedures used in analysing the results of Round 2 were discussed in Section 3.3.1.8. The analysis carried out led to identifying the level of importance of the 13 environmental sustainability criteria included in the second round. No new environmental sustainability criteria were identified in this round. As shown in Section 3.3.1.8, for each of the 13 criteria, the mean and the standard deviation values of the scores provided by the experts were calculated. These results are presented in Table 6.2.
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)</td>
</tr>
<tr>
<td>N2</td>
<td>Reducing energy consumption</td>
</tr>
<tr>
<td>N3</td>
<td>Reducing water consumption</td>
</tr>
<tr>
<td>N4</td>
<td>Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)</td>
</tr>
<tr>
<td>N5</td>
<td>Reusing existing built assets</td>
</tr>
<tr>
<td>N6</td>
<td>Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources</td>
</tr>
<tr>
<td>N7</td>
<td>Minimising water, land and air pollution (including noise)</td>
</tr>
<tr>
<td>N8</td>
<td>Preserving and enhancing biodiversity</td>
</tr>
<tr>
<td>N9</td>
<td>Waste minimisation and management</td>
</tr>
<tr>
<td>N10</td>
<td>Minimising negative visual impact</td>
</tr>
<tr>
<td>N11</td>
<td>Creating a healthy, non-toxic environment (e.g. high indoor air quality)</td>
</tr>
<tr>
<td>N12</td>
<td>Considering transport issues (e.g. public transport provision, reducing the need to travel)</td>
</tr>
</tbody>
</table>

Table 6.1 – Analysed set of environmental sustainability criteria based on responses received in Delphi Round 1

6.2.3 Round 3

As discussed in Section 3.3.1.8, the third round questionnaire was developed based on the analysis of the experts’ responses received in the second round. Respondents were given feedback from the second round which involved presenting the environmental sustainability criteria N1 to N13 with two scores indicating their level of importance. The first score was named “Your Score” and represented the score that the expert provided in Round 2 regarding the level of importance of the criterion while the second score was named “Mean Score” and represented the mean of the scores provided by all the experts participated in Round 2 regarding the level of importance of the criterion. In the third round, experts had the opportunity to reconsider the scores they provided in the second round using the same 5-point Likert Scale ranging from 0
denoting “not important” to 5 denoting “extremely important” which was used in the second round.

<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Rank</th>
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</thead>
<tbody>
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<td></td>
<td>Analysed set of criteria based on responses received in Round 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N1</td>
<td>Sustainable land use and re-use (including giving priority to re-</td>
<td>4.13</td>
<td>1.13</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>using previously-developed land and reducing consumption of undeveloped</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>land)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Reducing energy consumption</td>
<td>4.40</td>
<td>0.83</td>
<td>2</td>
</tr>
<tr>
<td>N3</td>
<td>Reducing water consumption</td>
<td>4.20</td>
<td>0.94</td>
<td>8</td>
</tr>
<tr>
<td>N4</td>
<td>Selection and use of materials (including specifying low</td>
<td>4.27</td>
<td>0.59</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>environmental impact materials, re-use and recycling)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N5</td>
<td>Reusing existing built assets</td>
<td>3.80</td>
<td>1.01</td>
<td>12</td>
</tr>
<tr>
<td>N6</td>
<td>Considering the use of renewable resources (e.g. renewable energy) and</td>
<td>4.27</td>
<td>0.59</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>reducing the use of non-renewable resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N7</td>
<td>Minimising water, land and air pollution (including noise)</td>
<td>4.53</td>
<td>0.74</td>
<td>1</td>
</tr>
<tr>
<td>N8</td>
<td>Preserving and enhancing biodiversity</td>
<td>4.20</td>
<td>0.94</td>
<td>8</td>
</tr>
<tr>
<td>N9</td>
<td>Waste minimisation and management</td>
<td>4.36</td>
<td>0.74</td>
<td>3</td>
</tr>
<tr>
<td>N10</td>
<td>Minimising negative visual impact</td>
<td>3.60</td>
<td>1.06</td>
<td>13</td>
</tr>
<tr>
<td>N11</td>
<td>Creating a healthy, non-toxic environment (e.g. high indoor air quality)</td>
<td>4.36</td>
<td>0.74</td>
<td>3</td>
</tr>
<tr>
<td>N12</td>
<td>Considering transport issues (e.g. public transport provision,</td>
<td>4.07</td>
<td>0.80</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>reducing the need to travel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other criteria suggested by the literature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N13</td>
<td>Protecting and enhancing sensitive landscapes (e.g. valuable</td>
<td>4.21</td>
<td>0.58</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>scenic and cultural areas)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N14</td>
<td>Criteria identified in the Round 2 (based on experts' suggestions made</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>in Round 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.2 – Analysed set of environmental sustainability criteria based on responses received in Delphi Round 2
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion (social)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
<th>% of experts voting for the criterion as</th>
<th>% of experts voting for the criterion as</th>
<th>Total Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>N1</td>
<td>Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)</td>
<td>4.08</td>
<td>1.04</td>
<td>11</td>
<td>46.15</td>
<td>23.08</td>
<td>23.08</td>
</tr>
<tr>
<td>N2</td>
<td>Reducing energy consumption</td>
<td>4.46</td>
<td>0.66</td>
<td>2</td>
<td>53.85</td>
<td>38.46</td>
<td>7.69</td>
</tr>
<tr>
<td>N3</td>
<td>Reducing water consumption</td>
<td>4.38</td>
<td>0.77</td>
<td>6</td>
<td>53.85</td>
<td>30.77</td>
<td>15.38</td>
</tr>
<tr>
<td>N4</td>
<td>Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)</td>
<td>4.38</td>
<td>0.65</td>
<td>6</td>
<td>46.15</td>
<td>46.15</td>
<td>7.69</td>
</tr>
<tr>
<td>N5</td>
<td>Reusing existing built assets</td>
<td>4.00</td>
<td>0.82</td>
<td>12</td>
<td>23.08</td>
<td>61.54</td>
<td>7.69</td>
</tr>
<tr>
<td>N6</td>
<td>Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources</td>
<td>4.46</td>
<td>0.52</td>
<td>2</td>
<td>46.15</td>
<td>53.85</td>
<td>0</td>
</tr>
<tr>
<td>N7</td>
<td>Minimising water, land and air pollution (including noise)</td>
<td>4.54</td>
<td>0.66</td>
<td>1</td>
<td>61.54</td>
<td>30.77</td>
<td>7.69</td>
</tr>
</tbody>
</table>

Table 6.3 – Analysis and development of agreed set of the major environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (based on results obtained from Round 3 of the Delphi Exercise)
<table>
<thead>
<tr>
<th>ID</th>
<th>Criterion (social)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N8</td>
<td>Preserving and enhancing biodiversity</td>
</tr>
<tr>
<td>N9</td>
<td>Waste minimisation and management</td>
</tr>
<tr>
<td>N10</td>
<td>Minimising negative visual impact</td>
</tr>
<tr>
<td>N11</td>
<td>Creating a healthy, non-toxic environment (e.g. high indoor air quality)</td>
</tr>
<tr>
<td>N12</td>
<td>Considering transport issues (e.g. public transport provision, reducing the need to travel)</td>
</tr>
<tr>
<td>N13</td>
<td>Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
<th>% of experts voting for the criterion as</th>
<th>% of experts voting for the criterion as</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.31</td>
<td>0.75</td>
<td>9</td>
<td>46.15 38.46 15.38</td>
<td>0 0 100.00 0 100</td>
</tr>
<tr>
<td>4.46</td>
<td>0.66</td>
<td>2</td>
<td>53.85 38.46 7.69</td>
<td>0 0 100.00 0 100</td>
</tr>
<tr>
<td>3.62</td>
<td>0.96</td>
<td>13</td>
<td>23.08 23.08 46.15 7.69</td>
<td>92.31 7.69 100</td>
</tr>
<tr>
<td>4.33</td>
<td>0.65</td>
<td>8</td>
<td>41.67 50.00 8.33</td>
<td>0 0 100.00 0 100</td>
</tr>
<tr>
<td>4.46</td>
<td>0.52</td>
<td>2</td>
<td>46.15 53.85</td>
<td>0 0 100.00 0 100</td>
</tr>
<tr>
<td>4.17</td>
<td>0.72</td>
<td>10</td>
<td>33.33 50.00 16.67</td>
<td>0 0 100.00 0 100</td>
</tr>
</tbody>
</table>

Continue Table 6.3 – Analysis and development of agreed set of the major environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy (based on results obtained from Round 3 of the Delphi Exercise)

Again, issues related to development of the third round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in 3.3.1.8. As shown in that section, thirteen responses were received in that round.

The criteria that will be presented and discussed in this chapter are those criteria resulting from the analysis of Round 3 of the Delphi Exercise (see Table 6.3). The
The development of this set of environmental sustainability criteria was based on applying the same procedures and indicators used in developing the sets of social and economic sustainability criteria (Chapters 4 and 5). This involved identifying and assigning, for each criterion, the mean value, standard deviation value and percentage of respondents agreeing on ranking the criterion.

A criterion with a value of mean that is equal or above 3 can be considered important (based on the Likert Scale ranging from 1 to 5 which was introduced above).

Agreement among respondents that a certain criterion is important can be established based on having 75% or more of the respondents agreeing on giving a ranking that is equal to or more than 3. The values shown in column 11 of Table 6.3 show the percentages of respondents agreeing on ranking that is equal to or more than 3.

The values of standard deviation shown in Table 6.3 can be considered relatively low (therefore indicating agreement).

Criteria which satisfy the above indicators include the 13 environmental sustainability criteria included in Round 3. These criteria scored mean values above 3, were rated by 75% or more of the experts as important and had relatively low values of standard deviation.

6.2.4 Further validation

A point to note is that in three of the four methods/techniques used in this research (the semi-structured interviews, the interviews included within the case studies, and the questionnaire survey), the opportunity was given to the interviewees (12 interviewees in total), and the respondents to the questionnaire survey (132 respondents in total) to comment on any of the items included within the interview guide or the questionnaire. No negative comments by the interviewees or by the respondents were provided in relation to the environmental sustainability criteria. No additional environmental sustainability criteria were suggested.

6.3 Discussion of the results

The following sections present and provide a discussion of the 13 criteria that were agreed as important environmental sustainability criteria that need to be addressed by UK public clients in developing a procurement strategy (as discussed in Section 6.2).

6.3.1 Sustainable land use and re-use

The criterion "sustainable land use and re-use (including giving priority to re-using
previously-developed land and reducing consumption of undeveloped land)" was ranked eleventh by the experts with a mean of 4.08 and standard deviation of 1.04. It was considered important by 92.31% of the experts (was considered extremely important by 46.15%, very important by 23.08%, and moderately important by 23.08%).

The need to use available land in a sustainable way has been emphasised as a key sustainability area in many publications (e.g. GCCP, 2000; DETR, 2000; Rethinking Construction, 2003a; Addis and Talbot, 2001; TCPA and WWF, 2003). Figures show that the UK construction industry converts some 6000 hectares from rural to urban land use and that by the year 2016, about 12 per cent of England could be in urban use compared to 10 to 11 per cent in 1991 (Addis and Talbot, 2001; TCPA and WWF, 2003). In addition, the construction industry, as Addis and Talbot (2001) show, is the most frequent industrial polluter of land.

The UK Government has made it clear that preference should be always given to using brown field sites (whether this involves new build or refurbishment of an existing asset) so that the use of green fields can be minimised. It has emphasised that any decision to use green field should be clearly justified in the business case. The planning system, through which the development of land is regulated and controlled, plays an important role in ensuring that land is appropriately used. This system ensures that development takes place in the most suitable locations and in a way that is consistent with the social, economic and environmental policies and the principles of sustainable development (Addis and Talbot, 2001; DETR, 2000; TCPA and WWF, 2003). The government target is that by 2008, 60% of additional housing in England should be provided on previously-developed land or by re-using existing buildings (Communities and Local Government, 2006b). Adopting a sustainable approach in land use should also take into account intensifying such a use as this would contribute to creating sustainable communities and reducing the need to travel (TCPA and WWF, 2003). However, this should be done with care as densities above certain limits may lead to reduced quality of life. Measures should be taken therefore against loss of green space, urban quality and privacy (TCPA and WWF, 2003).

6.3.2 Reducing energy consumption

The criterion "reducing energy consumption" was rated second by the experts with a mean of 4.46 and a standard deviation of 0.66. It was considered important by 100%
of the experts (was considered extremely important by 53.85%, very important by 38.46%, and moderately important by 7.69%).

Figures show that building operation accounts for 40-50% of energy consumed in the UK (Rethinking Construction, 2003a). Moreover, about 50% of the UK carbon emissions are produced as a result of the energy used for heating, cooling and lighting of buildings (Addis and Talbot, 2001; GCCP, 2000). However, consideration should be given not only to the energy consumed during the operation of the facility. Particular attention needs to be given to the energy consumed during the production and transport of construction products and materials (such as bricks, cement and metals) and during the construction phase, as this accounts for a significant proportion of all UK energy consumption (GCCP, 2000).

The UK government has declared minimising energy in use as one of the ten themes for action in its strategy for more sustainable construction. According to GCCP (2000), government departments should include in the specifications for construction projects relevant performance requirements for energy during both construction and operation. They should also set targets for 'in use' energy consumption which meet at least current best practice for construction and contribute to the cross-government targets agreed. As stated by OGC (2005a), targets for energy consumption during construction and operation should be identified within the project brief. Minimum requirements in relation to the energy performance of the facility in addition to the ways of measuring this performance need to be set out.

Design of the facility can contribute to achieving better energy performance. This could involve, for example, considering passive systems that uses natural light, air movement and thermal mass as well as producing energy from renewable resources (GCCP, 2000).

Attention should also be given to the possibility of specifying materials that can be produced and transported with less energy. Sourcing from local suppliers need to be encouraged as this can reduce the distances over which construction products and materials are transferred and therefore can lead to less congestion and reduced emissions (OGC, 2005a).

6.3.3 Reducing water consumption

The criterion "reducing water consumption" was ranked sixth by the experts with a mean of 4.38 and standard deviation of 0.77. It was considered important by 100% of
the experts (was considered extremely important by 53.85%, very important by 30.77%, and moderately important by 15.38%).

TCPA and WWF (2003) showed that although the population of the UK remained relatively stable since the 1960s, there was an increase by 70% per cent in the used water per person from 40 years ago. Moreover, according to TCPA and WWF (2003), there were predictions of shortages in 5 out of 10 water regions by the year 2009 if current patterns of usage continued. In addition, there were some areas in which demand was close to exceeding supply.

The UK government has already made a commitment to improving patterns of water consumption and has declared conservation of water resources as one of the ten themes for action in its strategy for more sustainable construction. To a great extent, the logic applied to minimising energy consumption is also applicable to reducing water consumption. According to GCCP (2000), government departments should include in the specifications for construction projects performance requirements for water consumption during both construction and operation where relevant. They should also set targets for water consumption which meet at least current best practice for construction and consider any cross-government targets agreed.

According to OGC (2005a), targets for water consumption during construction and operation should be identified in the project brief and ways of measuring performance need to be set out. Consideration should also be given to efficient water systems and features when developing design and specifications. These could include, for example, water efficient taps, low flow showers, dual flush WCs, systems for recycling of rainwater and grey water from showers and hand-basins so that such water can be used for toilets, roof covering with Alpine Sedum to manage rainwater run-off, and systems for collecting rainwater and storing it underground to provide a communal supply for watering gardens (GCCP, 2000; TCPA and WWF, 2003; OGC, 2005a)

6.3.4 Selection and use of materials

The criterion "selection and use of materials (including specifying low environmental impact materials, re-use and recycling)" was ranked sixth by the experts with a mean of 4.38 and standard deviation of 0.65. It was considered important by 100% of the experts (was considered extremely important by 46.15%, very important by 46.15%, and moderately important by 7.69%).
The development undertaken by the UK construction industry extracts about 90% of non-energy minerals extracted in Great Britain for use as aggregates and raw material for construction products. This development accounts for some 10% of the UK carbon emissions as a result of extraction and transportation of materials. Moreover, conventional building materials often consume large amounts of energy during manufacturing. Some conventional building materials and products are not healthy to live with and use. Others are difficult to dispose of safely and where this disposal takes place, negative environmental impacts would be created (TCPA and WWF, 2003).

The need to select and use materials in a more sustainable way, therefore, becomes of paramount importance, and public clients have a leading role in meeting such a need. Through the project brief, for example, a requirement can be set in relation to using materials that contribute to the project sustainability goals (OGC, 2005a). Public clients should encourage the use of products and materials that have low environmental impact and exclude environmentally damaging materials, such as PVC. Specifications should make reference to products and materials that have low embodied energy, recycled and recyclable materials, natural materials, and materials with low maintenance needs (Addis and Talbot, 2001; TCPA and WWF, 2003). According to OGC (2005a), contracting authorities have the right to set minimum requirements in relation to the percentage of recycled or reused content where possible. Such requirements, which can be specified in the project brief, should define such content for the overall project and not per product. Therefore, contractors can themselves identify the way through which they can meet such requirements (OGC, 2005a).

Encouraging the use of local materials is also helpful in attaining a more sustainable outcome. As discussed before, with such a use, less transport would be needed and as a result, smaller amounts of emissions would be produced and less congestion would be encountered (OGC, 2005a; Rethinking Construction, 2003a).

Attention should be also given to obtaining materials from responsible and sustainable sources. For example, the increasing tendency of government departments towards specifying FSC timber or equivalent reflects the move towards ensuring that timber is sourced from renewable and sustainable sources (FSC refers to Forest Stewardship Council, a well recognised and independent international standard).
6.3.5 Reusing existing built assets

The criterion "fitness for purpose (including consideration of long term flexibility)" was ranked twelfth by the experts with a mean of 4.00 and standard deviation of 0.82. It was considered important by 92.31% of the experts (was considered extremely important by 23.08% and very important by 61.54%, and moderately important by 7.69%).

As previously mentioned, most buildings can be re-used. The purpose of the project may be achieved through refurbishing or reusing an existing building rather than undertaking new development. This can create significant environmental benefits by contributing to a more sustainable use of land; reducing the pollution associated with construction processes; reducing the demand on building materials; reducing energy consumption as a result of reduced demand on extracting, manufacturing and transporting building materials; and minimising the waste resulting from demolition of buildings.

The government has clearly set out its commitment to reusing existing built assets through emphasising this principle as one of ten themes for action in the 2000 UK strategy for more sustainable construction. As mentioned in Section 6.3.1, the government target is that by 2008, 60% of additional housing in England should be provided on previously-developed land or by re-using existing buildings (Communities and Local Government, 2006b). For government departments, the decision to build or refurbish/re-use existing assets should always take into account whole life costing assessment (GCCP, 2000).

6.3.6 Considering the use of renewable resources and reducing the use of non-renewable resources

The criterion "considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources" was ranked second by the experts with a mean of 4.46 and standard deviation of 0.52. It was considered important by 100% of the experts (was considered extremely important by 46.15% and very important by 53.85%).

Minerals such as sand, stone, and fossil fuels are not renewable as they cannot be replenished within a human time scale (HM Government, 2005). On the other hand, biomass, including quickly renewable resources (such as agricultural crops) and slowly renewable resources (such as timber) are renewable within that scale. Though,
overexploitation of renewable resources (i.e. making use of them beyond their rates of recovery) can lead to long-term irreversible damage.

In the context of construction, the principle of using renewable resources in preference to non-renewable resources is applied to both building materials and energy (Hill and Bowen, 1998). OGC (2005a) shows that the construction industry is making an increasing use of Crop based materials as alternative to more traditional materials. Examples of natural products which have the advantages of low embodied energy in manufacturing and have renewable feedstock include insulation materials (hemp, flax, wool) and paints (crop-derived pigments, binders and thinners, solvents and emulsifiers) (OGC, 2005a). In relation to timber, using FSC timber or equivalent helps to ensure that timber is sourced from renewable and sustainable sources, as discussed in Section 6.3.4.

In relation to energy, an increasing attention has been given to attaining energy from renewable resources. Renewable energy refers to “energy flows that occur naturally and continuously in the environment, such as energy from the wind, waves or tides” (DTI, 2006). The original sources of the majority of renewable energy sources are the sun (or the gravitational effects of the sun) and the moon. Such energy sources are therefore unlimited.

Renewable energy should be promoted not only for reasons related to minimising reliance on the finite and diminishing sources of fossil fuel (such as coal, oil and gas) and ensuring security of supply, but also for reasons related to reducing pollution and tackling climate change (DTI, 2006). Currently, the use of fossil fuel, which is a non-renewable resource, produces the bulk of UK energy. Generating more than one third of the UK carbon emissions, the UK energy industry is the largest single contributor to UK greenhouse gas emissions. Figures show that the UK produces 3% of greenhouse gas emissions in the world although its population represents only 1% of the world's population. Moreover, the increasing demand on energy leads to producing levels of these emissions that are sufficient to affect the climate system. Climate change will affect every economic sector and every level of governance (Hebbert, 2006). It is now a real threat to the world, can lead to global problems (such as drought, famine, flooding, disease, regional insecurity and population displacements), and can seriously hinder poor countries' efforts to tackle poverty (DTI, 2006).
Significant reduction in greenhouse gas emissions has become a must. The UK government, through the Energy White Paper, has made a commitment to cut the country’s carbon dioxide emissions by some 60% by about 2050, with real progress by 2020 (HM Government, 2005). Renewable energy sources, which produce zero or low levels of greenhouse emissions, have an increasingly important role in contributing to the achievement of such a target.

Through their procurement, public clients can promote the use of renewable energy technologies, which are at a stage where they can play a major part in supplying domestic energy needs (TCPA and WWF, 2003). The Sustainability Action Plan required government departments to meet targets in their procurement that include increasing the supply of energy from renewable resources (GCCP, 2000). Moreover, the UK Business Council for Sustainable Energy shows that “guidance for the development of housing and other buildings should require that, wherever possible, new developments include some form of sustainable energy generation within their design” (TCPA and WWF, 2003; p. 31). Through design and specifications, public clients should consider solutions such as natural light, natural air movement, thermal mass, solar water heating, wind turbines, biomass and photovoltaics as well as the orientation and the setting of the buildings (GCCP, 2000; Rethinking Construction, 2003a; Hill and Bowen, 1998).

6.3.7 Minimising water, land and air pollution

The criterion “minimising water, land and air pollution (including noise)” was ranked first by the experts with a mean of 4.54 and standard deviation of 0.66. It was considered important by 100% of the experts (was considered extremely important by 61.54%, very important by 30.77%, and moderately important by 7.69%).

Construction sites can be a major source of pollution and can adversely affect health, quality of life and the environment (Glass and Simmonds, 2006). The development undertaken by the UK construction industry is the most frequent industrial polluter of air, water and land (Addis and Talbot, 2001). According to DETR (2000), the major potential sources of pollution from construction processes include waste materials; emissions from vehicles; noise; and releases of contaminants to ground, water, and atmosphere. Risks of pollution need to identified and actions to mitigate them need to be accommodated in a plan that can be stated in the brief (OGC, 2005).

Among the 70 million tonnes of waste generated by the development undertaken by
the construction industry, 13 million tones are materials delivered to sites and removed without being used (Addis and Talbot, 2001). As discussed in Section 5.3.8, several measures can be taken to reduce waste materials. These can include setting a requirement for the contractor or the supplier to provide a waste management plan that helps in putting construction waste to a positive use, introducing waste reduction targets, promoting the adoption of lean construction techniques, reuse and recycling of materials and adopting improved logistics strategies.

As for emissions from vehicles, consideration should be given to minimising the distances over which construction materials and products and materials are transferred. Adopting effective logistics strategies as well as local sourcing of materials should help in this regard (see Sections 5.3.12 and 6.3.12).

As shown above, noise is major source of pollution. As discussed in Section 4.3.14, tender documentation needs to incorporate any commitments about noise made in an environmental statement. Moreover, contractors may be asked to register with the Considerate Constructors Scheme. As discussed in Section 4.3.14, this scheme requires participating sites to commit to a code of practice that makes reference to keeping noise to a minimum.

Contaminants to ground, water, and atmosphere are also another major source of pollution. To minimise pollution caused by construction to land, preference should be always given to using previously built on and contaminated sites (see Section 6.3.1). However, decontamination should be carried out for contaminated sites. This should be done according to statutory requirements to ensure that health risks are removed or reduced to within acceptable limits (TCPA and WWF, 2003). According to Addis and Talbot (2001), water is one of the main means by which pollutants are dispersed from a contamination event. Any potential risks for water contamination posed by the development should be identified and managed (Addis and Talbot, 2001; OGC, 2005a). In relation to atmosphere, a significant amount of the UK carbon emissions are produced as a result of the energy consumed during the operation of the facilities. Carbon emissions are also produced as a result of the energy consumed not only during construction but also during the extraction, manufacture and transportation of construction materials and products. Reducing energy consumption should contribute to minimising carbon emissions that are associated with construction related activities. More details in relation to this were provided in Section 6.3.2.
6.3.8 Preserving and enhancing biodiversity

The criterion “preserving and enhancing biodiversity” was ranked ninth by the experts with a mean of 4.31 and standard deviation of 0.75. It was considered important by 100% of the experts (was considered extremely important by 46.15%, very important by 38.46%, and moderately important by 15.38%).

Government Commitment to this principle has been reflected by the Sustainability Action Plan which required government departments to take all reasonable measures to protect habitat and species in planning new construction. Despite setting such a requirement, the key findings presented by DEFRA (2006b) showed that infrastructure development (mainly housing infrastructure and development on the coast) was one of three key issues currently posing, or likely to pose, a significant threat to the species or habitat over the next 5 years. According to DEFRA (2006b) global warming is another key issue and construction projects, through production of greenhouse gas emissions in construction related activities and processes, are also contributing to global warming.

Public clients’ commitment to preserving and enhancing biodiversity should be reflected in their procurement processes. A biodiversity management plan for the development and long term management should be included in the project brief (OGC, 2005a). Public clients should also set biodiversity standards that need to be achieved and clarify how performance in relation to these would be measured. Paying attention to design issues would also help in safeguarding biodiversity. For example, building elements can be used for encouraging bird and bat populations. Road verges can be rich areas for wild life and amount to significant areas of land with potential for improving habitat (Addis and Talbot, 2001). On the contrary, replacing roadside buried drains can lead to loss of habitat for wetland species. Public clients can also contribute indirectly to preserving and enhancing biodiversity through the actions they can take to reduce pollution, reduce energy consumption and use renewable resources (such as renewable energy), as all these should contribute to tackling global warming.

6.3.9 Waste minimisation and management

The criterion “waste minimisation and management” was ranked second by the experts with a mean of 4.46 and standard deviation of 0.66. It was considered important by 100% of the experts (was considered extremely important by 53.85%, very important by 38.46%, and moderately important by 7.69%). This criterion has
been discussed before within economic sustainability criteria (see Section 5.3.8).

6.3.10 Minimising negative visual impact

The criterion "minimising negative visual impact" was ranked thirteenth by the experts with a mean of 3.62 and standard deviation of 0.96. It was considered important by 92.31% of the experts (was considered extremely important by 23.08%, very important by 23.08%, and moderately important by 46.15%).

Facilities should be constructed in a way that enhances appearance, preserves the heritage of the area and minimises any negative visual impact. The style of the facilities constructed should be in harmony with local architectural styles and heritage of the area (OGC, 2005a). In landscaping, consistency with natural appearance needs to be taken into account when considering the mounting and planting of earth (CRISP Sustainable Construction Theme Group, 1999). Such requirements should be articulated in the brief.

6.3.11 Creating a healthy, non-toxic environment

The criterion "creating a healthy, non-toxic environment (e.g. high indoor air quality)" was ranked eighth by the experts with a mean of 4.33 and standard deviation of 0.65. It was considered important by 100% of the experts (was considered extremely important by 41.67%, very important by 50%, and moderately important by 8.33%).

Figures show that in European countries, people typically spend a significant amount of their time within buildings (up to 95% of their time) (Addis and Talbot, 2001). Several factors can contribute to negative impact on indoor air quality. These could include (Addis and Talbot, 2001): Emissions from building materials and equipment; external air of poor quality (e.g. due to pollution) brought into building; carbon monoxide produced from gas and paraffin heaters; bacteria and dust spreading as a result of poor filtering and maintenance of heating, ventilation and air conditioning systems; and very humid atmosphere helping bacteria to grow. Improving indoor air quality can lead not only to improving health conditions and reducing the risk of being affected by building-related health impacts (such as asthma, allergic reactions and chemical hypersensitivity), but also to achieving higher levels of comfort and satisfaction, more efficiency and less absenteeism.

Public clients can contribute to creating a healthy, non-toxic environment by having appropriate procedures in place to identify and manage any risks that can negatively
affect the creation of a healthy environment and the attainment of appropriate of indoor air quality. Introducing requirements related to using minimum percentage of construction materials rated “A” through the Green Guide to Specification should also help in this regard (TCPA and WWF, 2003).

6.3.12 Considering transport issues

The criterion “considering transport issues (e.g. public transport provision, reducing the need to travel)” was ranked second by the experts with a mean of 4.46 and standard deviation of 0.52. It was considered important by 100% of the experts (was considered extremely important by 46.15% and very important by 53.85%).

Increasing transport usage leads to increased energy consumption, more congestion and noise, higher levels of pollution, increased risk of accidents and greater negative impact on health and safety (TCPA and WWF, 2001). Issues such as how the facilities used by members of the society are located and how constructions materials and products are transferred have significant impact on transport usage. Proper planning and design that reduces the usage of private cars would take into account the relative locations of the different facilities (such as homes, work places, shops and schools, health centres); the provision of high quality public transport and its closeness to such facilities; and the provision of walking and cycling facilities. Considering effective logistics strategies and promoting sourcing of materials from local suppliers should help in reducing the distances over which products and materials are transferred and contribute to more efficient transport usage.

6.3.13 Protecting and enhancing sensitive landscapes

The criterion “protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)” was ranked tenth by the experts with a mean of 4.17 and standard deviation of 0.72. It was considered important by 100% of the experts (was considered extremely important by 33.33%, very important by 50%, and moderately important by 16.67%).

As discussed in Section 4.3.13, construction projects should take into account preservation and enhancement of existing cultural areas and heritage. In landscaping, attention should be given to consistency with natural appearance when considering the mounting and planting of earth (CRISP Sustainable Construction Theme Group, 1999). Several features of landscape such as ponds, hedgerows and grassland can be protected and improved through careful design (Rethinking Construction, 2003a).
This can also contribute to preserving and enhancing biodiversity, which was discussed in Section 6.3.8. Requirements related to protecting and enhancing sensitive landscapes need to be included within the brief.

6.4 Summary

This chapter presented and discussed the findings of the Delphi Exercise in relation to developing an agreed set of the major environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy. This involved applying indicators for identifying importance and agreement (including mean values, standard deviation values and percentages of respondents agreeing on ranking the criterion). Finally, a set of 13 environmental sustainability criteria was developed. These criteria included:

- sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)
- reducing energy consumption
- reducing water consumption
- selection and use of materials (including specifying low environmental impact materials, re-use and recycling)
- reusing existing built assets
- considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources
- minimising water, land and air pollution (including noise)
- preserving and enhancing biodiversity
- waste minimisation and management
- minimising negative visual impact
- creating a healthy, non-toxic environment (e.g. high indoor air quality)
- considering transport issues (e.g. public transport provision, reducing the need to travel)
- protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)

These criteria were presented and discussed throughout the chapter. The development
of this set represented the achievement of sub-objective 1c of this research.

The results reported in this chapter were incorporated in the framework that was developed in this thesis and which is shown Figure 11.1. The part of the framework which involves the results reported in this chapter is clearly shown in Figure 6.2 (presented in black font colour).

Figure 6.2 - Incorporating the results obtained in Chapter 6 in the framework that was developed in this thesis and which is shown in Figure 11.1
Chapter 7: Establishing the important factors for UK public clients to better address sustainable construction in developing a procurement strategy

7.1 Introduction

This chapter focuses on achieving objective 2 of this research. The aim is to identify the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy. In other words, while Chapters 4, 5 and 6 focused on developing sustainability criteria that should be addressed by public clients, this chapter is about identifying what would enable UK public clients to better address these criteria.

Seeking to achieve triangulation, the factors were identified using Delphi Exercise and semi-structured interviews/case studies (see Figure 7.1). Adopting such an approach led to obtaining more confidence in the results as well as increasing reliability and validity (as discussed in Section 3.4.3). The factors attained were combined, resulting in 41 factors in total and these were categorised within 7 main categories, as will be shown throughout the chapter.

7.2 Establishing factors using the Delphi Method

7.2.1 Round 1

As discussed in Section 3.3.1.8, the first round of the Delphi Exercise began with open-ended format. Respondents were invited to identify the ways through which UK public clients can better address sustainable construction in developing a procurement strategy.

All issues related to selection of experts, development of the first round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in Section 3.3.1. As shown in Section 3.3.1.8, seventeen responses were in first round.

Procedures used in analysing the results of Round 1 were discussed in detail in Section 3.3.1.8. The analysis carried out led to the development of 36 factors. These are presented in Table 7.1
Objective 1: To develop agreed sets of the major social (sub-objective 1a), economic (sub-objective 1b) and environmental (sub-objective 1c) sustainability criteria that should be addressed by UK public clients in developing a procurement strategy.

Objective 2: To develop the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy.

Objective 3: To identify the barriers to better addressing sustainable construction in developing a procurement strategy.

Objective 4: To identify the parties which are most capable of removing such barriers.

Objective 5: To identify whether or not local authorities in the UK, as a major sector of public client organisations, are following or planning to follow policies or guidelines which indicate the need to have sustainability considerations addressed in construction project procurement strategies (Objective 3 met).

Objective 6: To identify and demonstrate how local authorities in the UK are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures (Objective 5 met).

Figure 7.1 – Achieving objective 2
<table>
<thead>
<tr>
<th>ID</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Developing a common understanding of what constitutes sustainable development</td>
</tr>
<tr>
<td>F2</td>
<td>Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)</td>
</tr>
<tr>
<td>F3</td>
<td>Highlighting the need for regulations and government policies that are more consistent with sustainability</td>
</tr>
<tr>
<td>F4</td>
<td>Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors</td>
</tr>
<tr>
<td>F5</td>
<td>Ensuring that client organisations have clear policies and guidelines regarding the application of sustainability principles</td>
</tr>
<tr>
<td>F6</td>
<td>Ensuring involvement of all project stakeholders and consideration of their needs</td>
</tr>
<tr>
<td>F7</td>
<td>Ensuring timely involvement of project stakeholders</td>
</tr>
<tr>
<td>F8</td>
<td>Allowing sufficient time in the programme to address and assess sustainability issues</td>
</tr>
<tr>
<td>F9</td>
<td>Emphasising that sustainability is not to be compromised in the search for efficiency</td>
</tr>
<tr>
<td>F10</td>
<td>Highlighting sustainability in the project brief as a primary aim</td>
</tr>
<tr>
<td>F11</td>
<td>Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)</td>
</tr>
<tr>
<td>F12</td>
<td>Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)</td>
</tr>
<tr>
<td>F13</td>
<td>Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions</td>
</tr>
<tr>
<td>F14</td>
<td>Ensuring that sustainability requirements can be clearly assessed and measured</td>
</tr>
<tr>
<td>F15</td>
<td>Ensuring transparency in procurement decision making</td>
</tr>
<tr>
<td>F16</td>
<td>Emphasising the importance of sustainability in tender evaluation and selection procedures</td>
</tr>
<tr>
<td>F17</td>
<td>Ensuring the consideration of whole life costing/value</td>
</tr>
<tr>
<td>F18</td>
<td>Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)</td>
</tr>
<tr>
<td>F19</td>
<td>Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation</td>
</tr>
<tr>
<td>F20</td>
<td>Requiring the supply side to demonstrate capability of delivering sustainability requirements</td>
</tr>
<tr>
<td>F21</td>
<td>Encouraging tenderers to suggest innovative solutions and approaches that support the client’s overall sustainability objectives</td>
</tr>
<tr>
<td>F22</td>
<td>Promoting Corporate Social Responsibility policy and implementation</td>
</tr>
<tr>
<td>F23</td>
<td>Requiring the employment of a properly trained workforce within the supply side</td>
</tr>
<tr>
<td>F24</td>
<td>Ensuring that payment mechanisms take account of whether sustainability requirements are delivered</td>
</tr>
<tr>
<td>F25</td>
<td>Evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives</td>
</tr>
<tr>
<td>F26</td>
<td>Encouraging the use of target cost contracts</td>
</tr>
<tr>
<td>F27</td>
<td>Encouraging long term contractual arrangements through strategic partnering (covering a series of projects)</td>
</tr>
<tr>
<td>F28</td>
<td>Encouraging integrated supply chains</td>
</tr>
<tr>
<td>F29</td>
<td>Encouraging the adoption of lean construction techniques</td>
</tr>
<tr>
<td>F30</td>
<td>Encouraging the incorporation of sustainability issues into value management</td>
</tr>
<tr>
<td>F31</td>
<td>Encouraging the incorporation of sustainability issues into risk management</td>
</tr>
<tr>
<td>F32</td>
<td>Provision of incentives and rewards based on sustainability performance throughout the project life cycle</td>
</tr>
</tbody>
</table>

Table 7.1 – Analysed set of factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy based on responses received in Delphi Round 1
<table>
<thead>
<tr>
<th>ID</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>F33</td>
<td>Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM)</td>
</tr>
<tr>
<td>F34</td>
<td>Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle</td>
</tr>
<tr>
<td>F35</td>
<td>Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle</td>
</tr>
<tr>
<td>F36</td>
<td>Promoting cultural change towards sustainability throughout the industry</td>
</tr>
</tbody>
</table>

Continue Table 7.1 – Analysed set of factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy based on responses received in Delphi Round 1

### 7.2.2 Round 2

As discussed in Section 3.3.1.8, the second round questionnaire was developed based on the analysis of the experts’ responses received in the first round. As shown in that section, respondents were asked to assess the level of importance of the 36 factors criteria included (F1 to F36 in Table 7.2), using a 5-point Likert Scale ranging from 0 denoting “not important” to 5 denoting “extremely important”. Experts were also asked to add any other factors which were not listed and identify their level of importance and to add any comments.

Issues related to format and content of questions, distributing the questionnaire, follow up, responses received and their analysis were discussed in Section 3.3.1.8. As shown in that section fifteen responses were received in the second round.

Procedures used in analysing the results of Round 2 were discussed in Section 3.3.1.8. The analysis carried out led to identifying the level of importance of the 36 factors included in the second round and to the identification of 1 new factor. As shown in Section 3.3.1.8, for each of the 36 factors, the mean and the standard deviation of the scores provided by the experts were calculated. The newly identified factor was “demonstrating the business case for taking the sustainability route”. These results are presented in Table 7.2.
<table>
<thead>
<tr>
<th>Id</th>
<th>Factor</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Analysed set of factors based on responses received in Round 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>Developing a common understanding of what constitutes sustainable</td>
<td>3.93</td>
<td>0.88</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>Ensuring compliance with regulations and government policies (e.g.</td>
<td>4.20</td>
<td>0.77</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Sustainable and Secure Buildings Act 2004)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Highlighting the need for regulations and government policies that</td>
<td>3.87</td>
<td>0.99</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>are more consistent with sustainability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>Raising awareness/providing training regarding sustainability issues</td>
<td>3.93</td>
<td>0.88</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>and its implementation among the public and the private sectors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Ensuring that client organisations have clear policies and guidelines</td>
<td>4.20</td>
<td>0.86</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>regarding the application of sustainability principles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>Ensuring involvement of all project stakeholders and consideration</td>
<td>4.20</td>
<td>0.86</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>of their needs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td>Ensuring timely involvement of project stakeholders</td>
<td>4.33</td>
<td>0.82</td>
<td>3</td>
</tr>
<tr>
<td>F8</td>
<td>Allowing sufficient time in the programme to address and assess</td>
<td>4.27</td>
<td>0.70</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>sustainability issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F9</td>
<td>Emphasising that sustainability is not to be compromised in the search</td>
<td>3.73</td>
<td>1.10</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>for efficiency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F10</td>
<td>Highlighting sustainability in the project brief as a primary aim</td>
<td>3.80</td>
<td>1.26</td>
<td>24</td>
</tr>
<tr>
<td>F11</td>
<td>Ensuring the consideration of complete range of options to meet the</td>
<td>4.27</td>
<td>0.80</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>need (e.g. refurbishment, new build)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F12</td>
<td>Integrating sustainability requirements into contract specifications</td>
<td>4.53</td>
<td>0.64</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>and conditions (including specifying any project specific</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sustainability requirements)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F13</td>
<td>Adopting a balanced approach that ensures the explicit consideration</td>
<td>4.36</td>
<td>0.63</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>of all sustainability dimensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F14</td>
<td>Ensuring that sustainability requirements can be clearly assessed and</td>
<td>4.33</td>
<td>0.72</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>measured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F15</td>
<td>Ensuring transparency in procurement decision making</td>
<td>4.07</td>
<td>0.88</td>
<td>19</td>
</tr>
<tr>
<td>F16</td>
<td>Emphasising the importance of sustainability in tender evaluation</td>
<td>4.20</td>
<td>0.77</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>and selection procedures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F17</td>
<td>Ensuring the consideration of whole life costing/value</td>
<td>4.20</td>
<td>0.77</td>
<td>8</td>
</tr>
<tr>
<td>F18</td>
<td>Ensuring the competency of the people responsible for implementing and</td>
<td>4.20</td>
<td>0.68</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>assessing sustainability issues (in both the client organisation and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the supply side)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F19</td>
<td>Requirement/incentive for the supply side to demonstrate commitment</td>
<td>3.80</td>
<td>0.68</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>to sustainable development through policy and implementation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F20</td>
<td>Requiring the supply side to demonstrate capability of delivering</td>
<td>3.80</td>
<td>0.86</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>sustainability requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F21</td>
<td>Encouraging tenderers to suggest innovative solutions and approaches</td>
<td>4.20</td>
<td>0.68</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>that support the client's overall sustainability objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F22</td>
<td>Promoting Corporate Social Responsibility policy and</td>
<td>3.50</td>
<td>1.16</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>implementation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F23</td>
<td>Requiring the employment of a properly trained workforce within the</td>
<td>3.87</td>
<td>0.92</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>supply side</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.2 – Analysed set of factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy based on responses received in Delphi Round 2
<table>
<thead>
<tr>
<th>Id</th>
<th>Factor</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>F24</td>
<td>Ensuring that payment mechanisms take account of whether sustainability requirements are delivered</td>
<td>3.57</td>
<td>1.22</td>
<td>33</td>
</tr>
<tr>
<td>F25</td>
<td>Evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives</td>
<td>3.71</td>
<td>0.91</td>
<td>30</td>
</tr>
<tr>
<td>F26</td>
<td>Encouraging the use of target cost contracts</td>
<td>3.07</td>
<td>1.33</td>
<td>36</td>
</tr>
<tr>
<td>F27</td>
<td>Encouraging long term contractual arrangements through strategic partnering (covering a series of projects)</td>
<td>3.64</td>
<td>1.34</td>
<td>31</td>
</tr>
<tr>
<td>F28</td>
<td>Encouraging integrated supply chains</td>
<td>3.64</td>
<td>1.39</td>
<td>31</td>
</tr>
<tr>
<td>F29</td>
<td>Encouraging the adoption of lean construction techniques</td>
<td>3.79</td>
<td>1.05</td>
<td>27</td>
</tr>
<tr>
<td>F30</td>
<td>Encouraging the incorporation of sustainability issues into value management</td>
<td>4.07</td>
<td>0.92</td>
<td>17</td>
</tr>
<tr>
<td>F31</td>
<td>Encouraging the incorporation of sustainability issues into risk management</td>
<td>4.07</td>
<td>0.92</td>
<td>17</td>
</tr>
<tr>
<td>F32</td>
<td>Provision of incentives and rewards based on sustainability performance throughout the project life cycle</td>
<td>3.57</td>
<td>0.94</td>
<td>33</td>
</tr>
<tr>
<td>F33</td>
<td>Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM)</td>
<td>4.29</td>
<td>0.61</td>
<td>5</td>
</tr>
<tr>
<td>F34</td>
<td>Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle</td>
<td>4.14</td>
<td>0.66</td>
<td>15</td>
</tr>
<tr>
<td>F35</td>
<td>Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle</td>
<td>3.79</td>
<td>0.89</td>
<td>27</td>
</tr>
<tr>
<td>F36</td>
<td>Promoting cultural change towards sustainability throughout the industry</td>
<td>4.14</td>
<td>0.95</td>
<td>15</td>
</tr>
<tr>
<td>F37</td>
<td>Demonstrating the business case for taking the sustainability route</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Factors identified in the Round 2 (based on experts' suggestions made in the Round 2)**

As discussed in Section 3.3.1.8, the third round questionnaire was developed based on the analysis of the experts' responses received in the second round. Respondents were given feedback from the second round which involved presenting the factors F1 to F37 with two scores indicating their level of importance. The first score was named “Your Score” and represented the score that the expert provided in Round 2 regarding the level of importance of the criterion while the second score was named “Mean Score” and represented the mean of the scores provided by all the experts participated in Round 2 regarding the level of importance of the criterion. In the third round, experts had the opportunity to reconsider the scores they provided in the second round using the same 5-point Likert Scale ranging from 0 denoting “not important” to 5 denoting “extremely important” which was used in the second round.

7.2.3 Round 3

As discussed in Section 3.3.1.8, the third round questionnaire was developed based on the analysis of the experts' responses received in the second round. Respondents were given feedback from the second round which involved presenting the factors F1 to F37 with two scores indicating their level of importance. The first score was named “Your Score” and represented the score that the expert provided in Round 2 regarding the level of importance of the criterion while the second score was named “Mean Score” and represented the mean of the scores provided by all the experts participated in Round 2 regarding the level of importance of the criterion. In the third round, experts had the opportunity to reconsider the scores they provided in the second round using the same 5-point Likert Scale ranging from 0 denoting “not important” to 5 denoting “extremely important” which was used in the second round.
Again, issues related to development of the third round questionnaire, information given to the respondents for clarification, sending out the questionnaire, follow up procedures and distribution of respondents were discussed in full detail in Section 3.3.1.8. As shown in that section, thirteen responses were received in that round.

The factors that will be presented and discussed in this chapter are those factors resulting from the analysis of Round 3 of the Delphi Exercise (see Table 7.3). The development of this set of factors was based on applying the same procedures and indicators used in developing the sets of social, economic, and environmental sustainability criteria (Chapters 4, 5 and 6). This involved identifying and assigning, for each factor, the mean value, standard deviation value, and percentage of respondents agreeing on ranking the factor.

A factor with a value of mean that is equal or above 3 can be considered important (based on the Likert Scale ranging from 1 to 5 which was introduced above).

Agreement among respondents that a certain factor is important can be established based on having 75% or more of the respondents agreeing on giving a ranking that is equal to or more than 3 (i.e. a ranking of 3=moderately important, 4=very important or 5=extremely important). The values shown in column 11 of Table 7.3 show the percentages of respondents agreeing on ranking that is equal to or more than 3.

The values of standard deviation shown in Table 7.3 can be considered relatively low (therefore indicating agreement).

Factors which satisfy the above indicators include 36 factors out of the 37 factors included in Round 3. These factors, which will be discussed later in this chapter, scored mean values above 3, were rated by 75% or more as important, and had relatively low values of standard deviation. The factor “encouraging the use of target cost contracts” was omitted as only 69.23% of experts gave the criterion a ranking of 5 or 4 or 3 (i.e. less than 75% agreed that it was important).
| (1) Id | (2) Factor                                                                 | (3) Mean | (4) Std. Dev. | (5) Rank | (6) % of experts giving a rating of 5 | (7) % of experts giving a rating of 4 | (8) % of experts giving a rating of 3 | (9) % of experts giving a rating of 2 | (10) % of experts giving a rating of 1 | (11) % of experts giving a rating of 5 or 4 or 3 | (12) % of experts giving a rating of 2 or 1 | (13) Total Est. |
|-------|---------------------------------------------------------------------------|----------|---------------|----------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------|-------------|
| F1    | Developing a common understanding of what constitutes sustainable development | 4.15     | 0.99          | 16       | 46.15                              | 30.77                               | 15.38                               | 7.69                               | 0                                   | 92.31                              | 7.69                               | 100            |
| F2    | Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004) | 4.23     | 0.73          | 12       | 38.46                              | 46.15                               | 15.38                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F3    | Highlighting the need for regulations and government policies that are more consistent with sustainability | 3.92     | 0.86          | 24       | 30.77                              | 30.77                               | 38.46                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F4    | Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors | 3.92     | 0.86          | 24       | 30.77                              | 30.77                               | 38.46                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F5    | Ensuring that client organisations have clear policies and guidelines regarding the application of sustainability principles | 4.38     | 0.51          | 6        | 38.46                              | 61.54                               | 0                                   | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F6    | Ensuring involvement of all project stakeholders and consideration of their needs | 4.38     | 0.65          | 6        | 46.15                              | 46.15                               | 7.69                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F7    | Ensuring timely involvement of project stakeholders | 4.54     | 0.66          | 1        | 61.54                              | 30.77                               | 7.69                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F8    | Allowing sufficient time in the programme to address and assess sustainability issues | 4.31     | 0.63          | 9        | 38.46                              | 53.85                               | 7.69                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F9    | Emphasising that sustainability is not to be compromised in the search for efficiency | 3.85     | 1.14          | 28       | 30.77                              | 38.46                               | 23.08                               | 7.69                               | 92.31                              | 7.69                               | 100            |
| F10   | Highlighting sustainability in the project brief as a primary aim | 4.08     | 1.12          | 21       | 38.46                              | 46.15                               | 7.69                               | 0                                   | 7.69                               | 92.31                              | 7.69                               | 100            |
| F11   | Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build) | 4.46     | 0.66          | 3        | 53.85                              | 38.46                               | 7.69                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F12   | Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements) | 4.54     | 0.52          | 1        | 53.85                              | 46.15                               | 0                                   | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F13   | Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions | 4.46     | 0.66          | 3        | 53.85                              | 38.46                               | 7.69                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |
| F14   | Ensuring that sustainability requirements can be clearly assessed and measured | 4.31     | 0.75          | 9        | 46.15                              | 38.46                               | 15.38                               | 0                                   | 0                                   | 100.00                              | 0                      | 100            |

Table 7.3 - Analysed set of factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy based on responses received in Delphi Round 3.
<table>
<thead>
<tr>
<th>(1) Id</th>
<th>(2) Factor</th>
<th>(3) Mean</th>
<th>(4) Std. Dev.</th>
<th>(5) Rank</th>
<th>(6) % of experts giving a rating of 5</th>
<th>(7) % of experts giving a rating of 4</th>
<th>(8) % of experts giving a rating of 3</th>
<th>(9) % of experts giving a rating of 2</th>
<th>(10) % of experts giving a rating of 1</th>
<th>(11) % of experts giving a rating of 5 or 4 or 3</th>
<th>(12) % of experts giving a rating of 2 or 1</th>
<th>(13) Total Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>F15</td>
<td>Ensuring transparency in procurement decision making</td>
<td>4.15</td>
<td>0.80</td>
<td>16</td>
<td>38.46</td>
<td>38.46</td>
<td>23.08</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F16</td>
<td>Emphasising the importance of sustainability in tender evaluation and selection procedures</td>
<td>4.38</td>
<td>0.65</td>
<td>6</td>
<td>46.15</td>
<td>46.15</td>
<td>7.69</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F17</td>
<td>Ensuring the consideration of whole life costing/value</td>
<td>4.46</td>
<td>0.78</td>
<td>3</td>
<td>61.54</td>
<td>23.08</td>
<td>15.38</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F18</td>
<td>Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)</td>
<td>4.15</td>
<td>0.69</td>
<td>16</td>
<td>30.77</td>
<td>53.85</td>
<td>15.38</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F19</td>
<td>Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation</td>
<td>3.92</td>
<td>0.64</td>
<td>24</td>
<td>15.38</td>
<td>61.54</td>
<td>23.08</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F20</td>
<td>Requiring the supply side to demonstrate capability of delivering sustainability requirements</td>
<td>3.85</td>
<td>0.90</td>
<td>28</td>
<td>23.08</td>
<td>46.15</td>
<td>23.08</td>
<td>7.69</td>
<td>0</td>
<td>92.31</td>
<td>7.69</td>
<td>100</td>
</tr>
<tr>
<td>F21</td>
<td>Encouraging tenderers to suggest innovative solutions and approaches that support the client's overall sustainability objectives</td>
<td>4.23</td>
<td>0.73</td>
<td>12</td>
<td>38.46</td>
<td>46.15</td>
<td>15.38</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F22</td>
<td>Promoting Corporate Social Responsibility policy and implementation</td>
<td>3.62</td>
<td>0.96</td>
<td>35</td>
<td>15.38</td>
<td>46.15</td>
<td>23.08</td>
<td>15.38</td>
<td>0</td>
<td>84.61</td>
<td>15.38</td>
<td>100</td>
</tr>
<tr>
<td>F23</td>
<td>Requiring the employment of a properly trained workforce within the supply side</td>
<td>4.08</td>
<td>0.64</td>
<td>21</td>
<td>23.08</td>
<td>61.54</td>
<td>15.38</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F24</td>
<td>Ensuring that payment mechanisms take account of whether sustainability requirements are delivered</td>
<td>3.69</td>
<td>1.03</td>
<td>34</td>
<td>23.08</td>
<td>38.46</td>
<td>23.08</td>
<td>15.38</td>
<td>0</td>
<td>84.62</td>
<td>15.38</td>
<td>100</td>
</tr>
<tr>
<td>F25</td>
<td>Evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives</td>
<td>3.77</td>
<td>0.83</td>
<td>33</td>
<td>23.08</td>
<td>30.77</td>
<td>46.15</td>
<td>0</td>
<td>0</td>
<td>100.00</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>F26</td>
<td>Encouraging the use of target cost contracts</td>
<td>3.08</td>
<td>1.38</td>
<td>37</td>
<td>23.08</td>
<td>7.69</td>
<td>38.46</td>
<td>15.38</td>
<td>15.38</td>
<td>69.23</td>
<td>30.76</td>
<td>100</td>
</tr>
<tr>
<td>F27</td>
<td>Encouraging long term contractual arrangements through strategic partnering (covering a series of projects)</td>
<td>3.54</td>
<td>1.27</td>
<td>36</td>
<td>30.77</td>
<td>15.38</td>
<td>38.46</td>
<td>7.69</td>
<td>7.69</td>
<td>84.61</td>
<td>15.38</td>
<td>100</td>
</tr>
<tr>
<td>F28</td>
<td>Encouraging integrated supply chains</td>
<td>3.85</td>
<td>1.21</td>
<td>28</td>
<td>38.46</td>
<td>23.08</td>
<td>30.77</td>
<td>0</td>
<td>7.69</td>
<td>92.31</td>
<td>7.69</td>
<td>100</td>
</tr>
</tbody>
</table>

Continue Table 7.3 – Analysed set of factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy based on responses received in Delphi Round 3
| (1) id | (2) Factor                                                                 | (3) Mean | (4) Std. Dev. | (5) Rank | (6) % of experts giving a rating of 5 | (7) % of experts giving a rating of 4 | (8) % of experts giving a rating of 3 | (9) % of experts giving a rating of 2 | (10) % of experts giving a rating of 1 | (11) % of experts giving a rating of 5 or 4 or 3 | (12) % of experts giving a rating of 2 or 1 | (13) Total Est. |
|--------|---------------------------------------------------------------------------|----------|---------------|----------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|----------------|----------------|
| F29    | Encouraging the adoption of lean construction techniques                   | 3.85     | 1.14          | 28       | 30.77                                | 38.46                                | 23.08                                | 0                                    | 7.69                                 | 92.31                                | 7.69                                 | 100             |
| F30    | Encouraging the incorporation of sustainability issues into value management| 4.31     | 0.75          | 9        | 46.15                                | 38.46                                | 15.38                                | 0                                    | 0                                    | 100.00                              | 0                                    | 100             |
| F31    | Encouraging the incorporation of sustainability issues into risk management| 4.15     | 0.80          | 16       | 38.46                                | 38.46                                | 23.08                                | 0                                    | 0                                    | 100.00                              | 0                                    | 100             |
| F32    | Provision of incentives and rewards based on sustainability performance throughout the project life cycle | 3.92     | 0.76          | 24       | 23.08                                | 46.15                                | 30.77                                | 0                                    | 0                                    | 100.00                              | 0                                    | 100             |
| F33    | Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM) | 4.23     | 0.60          | 12       | 30.77                                | 61.54                                | 7.69                                 | 0                                    | 0                                    | 100.00                              | 0                                    | 100             |
| F34    | Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle | 4.15     | 0.69          | 16       | 30.77                                | 53.85                                | 15.38                                | 0                                    | 0                                    | 100.00                              | 0                                    | 100             |
| F35    | Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle | 3.85     | 0.69          | 28       | 15.38                                | 53.85                                | 30.77                                | 0                                    | 0                                    | 100.00                              | 0                                    | 100             |
| F36    | Promoting cultural change towards sustainability throughout the industry | 4.23     | 0.93          | 12       | 46.15                                | 38.46                                | 7.69                                 | 7.69                                 | 0                                    | 92.31                                | 7.69                                 | 100             |
| F37    | Demonstrating the business case for taking the sustainability route         | 4.00     | 1.41          | 23       | 50.00                                | 25.00                                | 12.50                                | 0                                    | 12.5                                 | 87.50                                | 12.5                                 | 100             |

Continue Table 7.3 – Analysed set of factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy based on responses received in Delphi Round 3

7.3 Establishing factors using interviews/case studies

As discussed in Section 3.3.2.4, semi-structured interviews were conducted with 9 experts and professionals (a list of these interviewees is provided in Appendix B). The interviewees were asked an open-ended question about what factors are important for UK public clients to better address sustainable construction in developing a procurement strategy (see Appendix B).

In addition to the above 9 interviews, another group of interviews was carried out as part of the case studies (see Section 3.3.4.6 and Appendix C). People interviewed in these case studies were asked about factors that are important for their organisations,
as public clients, to better address sustainable construction in developing a procurement strategy (see Appendix C). The responses were analysed and the results of the analysis were compared with the results obtained in the Delphi Exercise, as will be described below.

7.4 Comparing, combining, and categorising the factors obtained by the Delphi Exercise and the interviews/case studies

The analysis of the responses obtained in the interviews/case studies indicated the following:

- Confirming a number of the factors obtained through Delphi: the analysis of responses obtained from the interviews/case studies led to confirming the majority of the factors obtained through Delphi (25 factors). Table 7.4 indicates the factors were confirmed by the interviews/case studies (the factors F1 to F8, F10, F12 to F14, F16 to F20, F25, F27 to F29, F32 to F33, F36 to F37).

- Identifying new factors that were not identified through Delphi: the analysis of responses obtained from the interviews/case studies enabled the identification of new factors (5 factors) that were not identified through Delphi. This generated a more comprehensive list of the factors. These 5 factors identified include the following:
  - F38: Greater focus, joined up thinking, leadership, and commitment by the government
  - F39: Availability of funding
  - F40: Introducing more mandatory influence
  - F41: Facilitating publicity of actions taken by public procurers towards addressing the sustainability agenda
  - F42: Improving communication and knowledge sharing within the client organisation regarding sustainability implementation and best practice

- Obtaining in-depth information regarding the factors identified: The analysis of responses obtained from the interviews/case studies enabled the attainment of more information of qualitative nature about the factors that are important for
UK public clients to better address sustainable construction in developing a procurement strategy.

In total, 41 factors were obtained from the Delphi Exercise or the interviews/case studies. The factors were categorised into 8 main categories:

- knowledge and perception factors
- organisational and management factors
- political and regulative factors
- contractual factors
- instrumental factors
- logistical factors
- strategic factors, and
- financial factors.

Table 7.4 shows the categorisation of the factors as well as the method through which each factor was developed or confirmed. Section 7.5 provides a detailed discussion of these factors.

A point to note is that a factor can be classified in more than one category. For example, the factor “raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors” can be considered among the knowledge and perception factors and also among the organisational and management factors. Therefore, the categorisation introduced in this chapter should be treated as illustrative rather than definitive.
<table>
<thead>
<tr>
<th>Id</th>
<th>Factor</th>
<th>Identification of the factor through Delphi</th>
<th>Identification/confirmation of the factor through Interviews/Case studies</th>
<th>Category in which the factor was classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Developing a common understanding of what constitutes sustainable development</td>
<td>✓</td>
<td>✓</td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F2</td>
<td>Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)</td>
<td>✓</td>
<td>✓</td>
<td>Organisational and management</td>
</tr>
<tr>
<td>F3</td>
<td>Highlighting the need for regulations and government policies that are more consistent with sustainability</td>
<td>✓</td>
<td>✓</td>
<td>Political and Regulative</td>
</tr>
<tr>
<td>F4</td>
<td>Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors</td>
<td></td>
<td></td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F5</td>
<td>Ensuring that client organisations have clear policies and guidelines regarding the application of sustainability principles</td>
<td>✓</td>
<td>✓</td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F6</td>
<td>Ensuring involvement of all project stakeholders and consideration of their needs</td>
<td>✓</td>
<td>✓</td>
<td>Organisational and management</td>
</tr>
<tr>
<td>F7</td>
<td>Ensuring timely involvement of project stakeholders</td>
<td>✓</td>
<td>✓</td>
<td>Logistical</td>
</tr>
<tr>
<td>F8</td>
<td>Allowing sufficient time in the programme to address and assess sustainability issues</td>
<td>✓</td>
<td>✓</td>
<td>Logistical</td>
</tr>
<tr>
<td>F9</td>
<td>Emphasising that sustainability is not to be compromised in the search for efficiency</td>
<td></td>
<td></td>
<td>Organisational and management</td>
</tr>
<tr>
<td>F10</td>
<td>Highlighting sustainability in the project brief as a primary aim</td>
<td>✓</td>
<td>✓</td>
<td>Contractual</td>
</tr>
<tr>
<td>F11</td>
<td>Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)</td>
<td></td>
<td></td>
<td>Organisational and management</td>
</tr>
<tr>
<td>F12</td>
<td>Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)</td>
<td></td>
<td></td>
<td>Contractual</td>
</tr>
<tr>
<td>F13</td>
<td>Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions</td>
<td></td>
<td></td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F14</td>
<td>Ensuring that sustainability requirements can be clearly assessed and measured</td>
<td></td>
<td></td>
<td>Instrumental</td>
</tr>
</tbody>
</table>

Table 7.4 - Categorisation of the factors and the method through which each factor was developed/confirmed.
<table>
<thead>
<tr>
<th>Id</th>
<th>Factor</th>
<th>Id Factor Identification of the factor through Delphi</th>
<th>Identification of confirmation of the factor through Interviews/Case studies</th>
<th>Category in which the factor was classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>F15</td>
<td>Ensuring transparency in procurement decision making</td>
<td>✓</td>
<td></td>
<td>Organisational and Management</td>
</tr>
<tr>
<td>F16</td>
<td>Emphasising the importance of sustainability in tender evaluation and selection procedures</td>
<td>✓</td>
<td>✓</td>
<td>Contractual</td>
</tr>
<tr>
<td>F17</td>
<td>Ensuring the consideration of whole life costing/value</td>
<td>✓</td>
<td>✓</td>
<td>Organisational and management</td>
</tr>
<tr>
<td>F18</td>
<td>Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)</td>
<td>✓</td>
<td>✓</td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F19</td>
<td>Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation</td>
<td>✓</td>
<td>✓</td>
<td>Contractual</td>
</tr>
<tr>
<td>F20</td>
<td>Requiring the supply side to demonstrate capability of delivering sustainability requirements</td>
<td>✓</td>
<td>✓</td>
<td>Contractual</td>
</tr>
<tr>
<td>F21</td>
<td>Encouraging tenderers to suggest innovative solutions and approaches that support the client’s overall sustainability objectives</td>
<td>✓</td>
<td></td>
<td>Contractual</td>
</tr>
<tr>
<td>F22</td>
<td>Promoting Corporate Social Responsibility policy and implementation</td>
<td>✓</td>
<td></td>
<td>Strategic</td>
</tr>
<tr>
<td>F23</td>
<td>Requiring the employment of a properly trained workforce within the supply side</td>
<td>✓</td>
<td></td>
<td>Contractual</td>
</tr>
<tr>
<td>F24</td>
<td>Ensuring that payment mechanisms take account of whether sustainability requirements are delivered</td>
<td>✓</td>
<td></td>
<td>Contractual</td>
</tr>
<tr>
<td>F25</td>
<td>Evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives</td>
<td>✓</td>
<td>✓</td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F26</td>
<td>Encouraging the use of target cost contracts</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F27</td>
<td>Encouraging long term contractual arrangements through strategic partnering (covering a series of projects)</td>
<td>✓</td>
<td>✓</td>
<td>Strategic</td>
</tr>
</tbody>
</table>

Continue Table 7.4 – Categorisation of the factors and the method through which each factor was developed/confirmed
<table>
<thead>
<tr>
<th>Id</th>
<th>Factor</th>
<th>Identification of the factor through Delphi</th>
<th>Identification/confirmation of the factor through Interviews/Case studies</th>
<th>Category in which the factor was classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>F28</td>
<td>Encouraging integrated supply chains</td>
<td>✓</td>
<td>✓</td>
<td>Strategic</td>
</tr>
<tr>
<td>F29</td>
<td>Encouraging the adoption of lean construction techniques</td>
<td>✓</td>
<td>✓</td>
<td>Strategic</td>
</tr>
<tr>
<td>F30</td>
<td>Encouraging the incorporation of sustainability issues into value management</td>
<td>✓</td>
<td></td>
<td>Instrumental</td>
</tr>
<tr>
<td>F31</td>
<td>Encouraging the incorporation of sustainability issues into risk management</td>
<td>✓</td>
<td></td>
<td>Instrumental</td>
</tr>
<tr>
<td>F32</td>
<td>Provision of incentives and rewards based on sustainability performance throughout the project life cycle</td>
<td>✓</td>
<td>✓</td>
<td>Contractual</td>
</tr>
<tr>
<td>F33</td>
<td>Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM)</td>
<td>✓</td>
<td>✓</td>
<td>Instrumental</td>
</tr>
<tr>
<td>F34</td>
<td>Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle</td>
<td>✓</td>
<td></td>
<td>Organisational and management</td>
</tr>
<tr>
<td>F35</td>
<td>Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle</td>
<td>✓</td>
<td></td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F36</td>
<td>Promoting cultural change towards sustainability throughout the industry</td>
<td>✓</td>
<td>✓</td>
<td>Strategic</td>
</tr>
<tr>
<td>F37</td>
<td>Demonstrating the business case for taking the sustainability route</td>
<td>✓</td>
<td>✓</td>
<td>Knowledge and perception</td>
</tr>
<tr>
<td>F38</td>
<td>Greater focus, joined up thinking, leadership, and commitment by the government</td>
<td>✓</td>
<td></td>
<td>Political and regulative</td>
</tr>
<tr>
<td>F39</td>
<td>Availability of funding</td>
<td>✓</td>
<td></td>
<td>Financial</td>
</tr>
<tr>
<td>F40</td>
<td>Introducing more mandatory influence</td>
<td>✓</td>
<td></td>
<td>Political and regulative</td>
</tr>
<tr>
<td>F41</td>
<td>Facilitating publicity of actions taken by public procurers towards addressing the sustainability agenda</td>
<td>✓</td>
<td></td>
<td>Organisational and management</td>
</tr>
<tr>
<td>F42</td>
<td>Improving communication and knowledge sharing within the client organisation regarding sustainability implementation and best practice</td>
<td>✓</td>
<td></td>
<td>Knowledge and perception</td>
</tr>
</tbody>
</table>

Continue Table 7.4 - Categorisation of the factors and the method through which each factor was developed/confirmed.
7.5 Discussion of the results

7.5.1 Knowledge and perception factors

Knowledge and perception factors include the following:

- F1: Developing a common understanding of what constitutes sustainable development
- F4: Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors
- F5: Ensuring that client organisations have clear policies and guidelines regarding the application of sustainability principles
- F13: Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions
- F18: Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)
- F25: Evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives
- F35: Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle
- F37: Demonstrating the business case for taking the sustainability route
- F42: Improving communication and knowledge sharing within the client organisation regarding sustainability implementation and best practice

These factors are discussed below.

- Developing a common understanding of what constitutes sustainable development

The factor "developing a common understanding of what constitutes sustainable development" was ranked sixteenth by the experts with a mean of 4.15 and standard deviation of 0.99. It was considered important by 92.3% of the experts (was considered extremely important by 46.15%, very important by 30.77%, and moderately important by 15.38%). It was also confirmed in the interviews/case studies.
An argument was raised during the interviews that sustainability had a huge scope and that it would be difficult to capture all the issues included within it. There were also concerns about the extent to which the subject was understandable, even at the level of well-qualified construction professionals. Concerns were also expressed regarding the vagueness of current definitions of sustainability. This vagueness, which makes sustainability not confined to any thing in particular as one interviewee put it, may be used by some decision makers as a "get out" for not taking decisions addressing sustainability. The interviews showed also worries regarding the existence of several interpretations of what is meant by sustainable development. As some has put it, "sustainable development means different things to different people". In addition, as expected, some interviewees mentioned that sustainable development was still perceived as rather an environmental problem.

The views expressing problems about common understanding seem to be consistent with the views of Hawkins and Shaw (2004), Carter and Fortune (2002), Environmental Audit Committee (2005) and Adetunji et al (2003). Hawkins and Shaw (2004) observed that the terms "sustainable" and "sustainable development" were being used before a common understanding and definition have been properly established. Carter and Fortune (2002) noticed that despite what appeared to be an acceptance of the definition of sustainability the national level, there was opportunity for divergence in understanding at the project delivery level. The perception that sustainable development is an environmental issue (Environmental Audit Committee, 2005b) has also contributed to the lack of common understanding. Adetunji et al (2003) observed that lack of understanding and fuzziness of the concept present one of the barriers to the implementation of sustainable construction.

The origins of sustainable development in terms of association with environmental issues have played an important role in creating a common perception that sustainability is rather an environmental problem. The exchangeable use of the terms "sustainable development" and "sustainability" may have also contributed to lack of understanding. Sustainability refers to the ability to keep things going over time or continuously. When such a term is not associated with the term "development", confusion may result in relation to what to sustain and why social, economic and environmental issues should be considered.

Public clients need to have a common understanding regarding the social, economic, and environmental criteria that need to be addressed in the different stages of the
project life cycle as well as the linkages between these criteria. Guidance such as OGC (2005a) is a significant step towards achieving a common understanding. In addition, the development of consensus on the social, economic and environmental sustainability criteria that should be addressed in developing a procurement strategy in this thesis contributes to achieving this objective.

- Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors

The factor “raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors” was ranked 24th by the experts with a mean of 3.92 and standard deviation of 0.86. It was considered important by 100% of the experts (was considered extremely important by 30.77%, very important by 30.77%, and moderately important by 38.46%). It was also confirmed in the interviews/case studies.

Although awareness might have improved recently, strong concerns were reported in the interviews and the case studies about having a low level of awareness, not only in public clients' organisations but also in typical stakeholders organisations (such as contractors, funding organisations and the wider community). The interviews conducted stressed the need to provide training on sustainability issues at all levels, and particularly at the level of senior procurement decision makers. This needs to involve breaking down the sustainability concept from the abstract level, making more use of examples that could facilitate better understanding of the concept, and providing simpler and more structured guidance in relation to what is meant by sustainability in the context of construction projects and how it could be implemented.

The findings from Delphi, the interviews, and the case studies regarding the need for raising awareness and providing training seem to be consistent with what was reported in the literature. According to the Sustainable Construction Task Group (2003), although awareness within the construction professions and trades was increasing, it was not enough. The publication “Society, Sustainability and Civil Engineering” has also highlighted the need to raise awareness of sustainable development throughout the industry (ICE et al, 2002).

- Ensuring that client organisations have clear policies and guidelines regarding the application of sustainability principles

The factor “ensuring that client organisations have clear policies and guidelines
regarding the application of sustainability principles" was ranked 6th by the experts with a mean of 4.38 and standard deviation of 0.51. It was considered important by 100% of the experts (was considered extremely important by 38.46% and very important by 61.54%). It was also confirmed in the interviews/case studies.

The need for sharper policies that can promote sustainability, even if this would imply greater capital cost, was highlighted in the interviews/case studies. In addition, confusion in public sector organisations in relation to “what needs to be done” and “how to do it” was reported. The need for more government steering, for simpler and more structured guidance, and for more examples, demonstrations, tools and techniques was raised. In the semi-structured interviews, while interviewees admit that there was already available guidance, they reported that confronting public clients with huge amounts of guidance that do not clearly and specifically illustrate “what needs to be done” and “how to do it” was not helpful. On contrary, this might have added to the confusion experienced. The codes of practice produced by OGC however were mentioned as a significant development by one of the interviewees.

The need for more steering and clearer guidance may have risen as a result of the current political views which try to avoid prescription. Such views tend to advocate the specification of targets and outcomes, leaving it to the organisations to make their own interpretation and to determine how best to meet these targets. However, in order to do that, more in-house expertise would be needed. Doubts were raised in several interviews about the existence of sufficient in-house expertise in public sector organisations to undertake such a job. In one of the interviewees however a different view was expressed. According to this view, what were needed were clearer instructions about what should be aimed for rather than more perspective guidance. Such a view expressed confidence in the level of in-house expertise available in the public sector to make their own interpretations and determine how to achieve the aims.

The literature shows support to some of the views mentioned above. For example, a memorandum submitted by Bristol City Council presented in the Sustainable Public Procurement Sixth Report, shows that there is no one single comprehensive guidance and that Local authorities are left to produce their own guidance from different sources and implement sustainable procurement to whatever extent they choose (Environmental Audit Committee, 2005b).
Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions

The factor "adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions" was ranked 3rd by the experts with a mean of 4.46 and standard deviation of 0.66. It was considered important by 100% of the experts (was considered extremely important by 53.85%, very important by 38.46%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies.

The interviews/case studies highlighted that the wider the evaluation undertaken (in terms of considering the social, economic and environmental dimensions when making decisions), the wiser the decision making process from a government perspective. The issue that sustainability was still perceived as an environmental problem, even at the level of senior decision makers, was also raised. As discussed earlier in this section, this may be attributed to the association between the origins of sustainable development and environmental issues. When such a perception exists in organisations dominated by economic drivers and searching for more cost effective solutions, the social dimension would be expectedly the dimension that is most negligible.

The literature demonstrates that the environmental and the economic dimensions are more emphasised in comparison with the social dimension. For example, despite the referral of policy documents to social and economic sustainability, the majority of indicators and measurement criteria are based on the ideas of environmental and technical sustainability (Carter and Fortune, 2002). IDeA (2003; p. 3) shows that the extent to which environmental and social are taken into in selecting suppliers can be limited: "Environmental and social criteria can be applied to a certain extent when selecting suppliers and at the contract award stage. Contract award criteria must always be objective, relevant to the subject of the contract and provide best value for money for the local authority."

Giving less emphasis to the social dimension leads to making decisions which lack the balance that needs to be created between the social, economic and environmental dimensions of sustainable development. An important point to note in this context is that creating such a balance may involve making compromises, as these dimensions could involve conflicting objectives. The notion that sustainability involves balancing the social, environmental and economic dimensions has been reported in several
publications (e.g. Rethinking Construction, 2003a; OGC, 2005a; Strategic Forum for Construction, 2002).

- Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)

The factor “ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)” was ranked 16th by the experts with a mean of 4.15 and a standard deviation of 0.69. It was considered important by 100% of the experts (was considered extremely important by 30.77%, very important by 53.85%, and moderately important by 15.38%). It was also confirmed in the interviews/case studies.

As discussed above, current political views tend to specify targets and outcomes and give organisations the freedom to make their own interpretation in order to determine how best to meet these targets. In the light of such views, it is becomes of particular importance to have more in-house experienced people who are competent enough to appropriately assess and measure sustainability issues. However, doubts were raised during interviews about the existence of people in public sector organisations (including people making procurement decisions) who possess the needed expertise. The need for such competent people does not exist only in client organisations but also in the supply side. OGC (2005a), for example, highlights the need to ensure that the supply teams have skilled and experienced resources to implement sustainable projects.

- Evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives

The factor “evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives” was ranked 33rd by the experts with a mean of 3.77 and standard deviation of 0.83. It was considered important by 100% of the experts (was considered extremely important by 23.08%, very important by 30.77%, and moderately important by 46.15%). This factor was also confirmed in the interviews/case studies.

Procurement routes (e.g. PFI, Prime Contracting, Design & Build, and traditional procurement routes) deliver the procurement strategy. Selecting a suitable procurement route needs to consider several factors related to the client needs,
contractor requirements and project characteristics (Ambrose and Tucker, 2000). Despite the increasing recognition that sustainability criteria need to be accommodated in procurement strategies, it does not seem that such criteria represent a key aspect to consider when selecting a procurement route. This may be attributed to lack of clarity regarding whether the different procurement routes have different potential to deliver sustainability requirements.

The lack of clarity regarding whether the different procurement routes have different potential to deliver sustainability requirements has been reflected in the literature. For example, the criteria “control over sustainability issues” is now among the evaluation criteria of procurement systems, as appears in the evaluation template developed by OGC (2003a). Addis and Talbot (2001) highlighted the importance of identifying the distinct opportunities associated with the different procurement routes to deliver sustainable projects. However, they argued that no procurement route is clearly and consistently better than other routes in relation to the potential of delivering environmental objectives. Despite this, procurement routes have shown different potential to deliver certain economic objectives such as cost, time, etc. (Love et al, 1998; Ambrose and Tucker, 2000; Alhazmi and McCaffer, 2000). On the social side, the issue of whether these routes have different potential to deliver objectives of sustainability remains unclear. In the light of the above, there is a need to assess the potential of these routes to attain the different objectives underpinning sustainability dimensions. In making decisions about which procurement route is the most suitable to adopt, such an assessment would be helpful to ensure that the decision taken is informed about the opportunities associated with each procurement route to realise sustainability objectives.

- Encouraging the supply side to improve communication and knowledge sharing between all stakeholders throughout the project life cycle

The factor “encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle” was ranked 28th by the experts with a mean of 3.85 and standard deviation of 0.69. It was considered important by 100% of the experts (was considered extremely important by 15.38%, very important by 53.85%, and moderately important by 30.77%).

During the procurement process, public clients need to consider the willingness and ability of the supply team to educate the different stakeholders and provide handover
training (OGC, 2005a). For example, users of the facility need to be educated about how to contribute to achieving sustainability through conserving water, reducing energy consumption, and minimising waste.

- Demonstrating the business case for taking the sustainability route

The factor "demonstrating the business case for taking the sustainability route" was ranked 23rd by the experts with a mean of 4 and standard deviation of 1.41. It was considered important by 87.5% of the experts (was considered extremely important by 50%, very important by 25%, and moderately important by 12.5%). It was also confirmed in the interviews/case studies.

The lack of clear concept definition, the domination of economic drivers in a commercial environment, and the general perception that sustainability leads to incurring high costs, are all factors that may have contributed to lack of understanding about why a sustainability route should be adopted. Establishing the social, economic and environmental benefits associated with sustainability can help the parties involved in construction projects in dealing with this issue.

The client needs to understand that adopting a sustainability route can lead to creating buildings with happier, healthier, less absent from work, and more productive occupants. He needs to understand that adopting such route can lead also to creating buildings with less life cycle costs and smaller environmental impacts. With such understanding, the client would be more inclined to search for more sustainability-oriented procurement strategies.

If the contractor understands the benefits associated with sustainability and appreciate the legislative pressure, market forces, investor concerns and client demand (Sustainable Construction Task Group, 2001), then construction companies would be encouraged to develop their internal policies and practices (e.g. in relation to training and development policies, environmental policies, corporate social responsibility, etc.) in a way that is leading to more sustainable outcome. This would enable them to respond to the sustainability requirements included in the tender documents more innovatively.

In addition to clients and contractors, other stakeholders (e.g. funding organisation, planning authority, and even internal stakeholders within a client organisation) need to be convinced with the sustainability case. All these parties have different interests and can influence procurement decisions. They all need to understand why a
sustainability route should be adopted. In this way, procurement strategies developed can address sustainability better.

- Improving communication and knowledge sharing within the client organisation regarding sustainability implementation and best practice

The factor "improving communication and knowledge sharing within the client organisation regarding sustainability implementation and best practice" was highlighted in the case studies. The case studies conducted show that even if best practice regarding sustainability and its implementation is available, it may not be shared between the various departments within the client organisation. In this context, the case studies show, for example, the importance for establishing links between sustainability and procurement professionals working within the same organisation. Establishing such links would help develop the necessary technical knowledge needed for appropriate application of sustainability principles in the relevant field.

7.5.2 Organisational and management factors

Organisational and management factors include the following:

- F2: Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)
- F6: Ensuring involvement of all project stakeholders and consideration of their needs
- F9: Emphasising that sustainability is not to be compromised in the search for efficiency
- F11: Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)
- F15: Ensuring transparency in procurement decision making
- F17: Ensuring the consideration of whole life costing/value
- F34: Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle
- F41: Facilitating publicity of actions taken by public procurers towards addressing the sustainability agenda
These factors are discussed below.

- Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)

The factor "ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)" was ranked 12th by the experts with a mean of 4.23 and standard deviation of 0.73. It was considered important by 100% of the experts (was considered extremely important by 38.46%, very important by 46.15%, and moderately important by 15.38%). It was also confirmed in the interviews/case studies.


Ensuring compliance with these regulations and policies should help public clients better address sustainability in their procurement strategies.

- Ensuring involvement of all project stakeholders and consideration of their needs

The factor "ensuring involvement of all project stakeholders and consideration of their needs" was ranked 6th by the experts with a mean of 4.38 and standard deviation of...
It was considered important by 100% of the experts (was considered extremely important by 46.15%, very important by 46.15%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies.

The issue of stakeholders' involvement was discussed in Section 4.3.2. The interviews emphasised the importance of not only involving external stakeholders but also internal stakeholders (i.e. the different groups within the client organisation) as all these would have a say in the project and would influence the budget. The interviews have also highlighted the importance of persuading all project stakeholders to take a sustainability route.

- Emphasising that sustainability is not to be compromised in the search for efficiency

The factor “emphasising that sustainability is not to be compromised in the search for efficiency” was ranked 28th by the experts with a mean of 3.85 and standard deviation of 1.14. It was considered important by 92.31% of the experts (was considered extremely important by 30.77%, very important by 38.46%, and moderately important by 23.08%.

Public clients should pay attention not only to attaining an efficient performance (which is more to do with economic aspects), but also to meeting social and environmental objectives. Their policies as well as their codes of practice need to reflect the balance that sustainability tries to achieve. These policies and codes should make it clear that social and environmental considerations should not be compromised in favour of more cost effective solutions. This would have consequences on all aspects of the construction project including consideration of how specification are put, how materials and construction products are selected, how the facility is designed and how the contractors are selected.

- Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)

The factor “ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)” was ranked 3rd by the experts with a mean of 4.46 and standard deviation of 0.66. It was considered important by 100% of the experts (was considered extremely important by 53.85%, very important by 38.46%, and moderately important by 7.69%.

Public clients' awareness of the need to ensure the consideration of the whole range of
options can contribute to developing procurement strategies that address social, economic and environmental concerns. For example, if the procurement strategies developed showed that the need can be met through the refurbishment of an existing building, then more cost effective solutions and less negative environmental and social impacts may be achieved with such an option than with a new build option. Details of evaluating the range of options available to meet the need were presented in Section 5.3.1. Although evaluating the range of options available to meet the need was presented within the discussion of the major economic sustainability criteria, such an issue has clear environmental and social consequences.

- Ensuring transparency in procurement decision making

The factor "ensuring transparency in procurement decision making" was ranked 16th by the experts with a mean of 4.15 and standard deviation of 0.8. It was considered important by 100% of the experts (was considered extremely important by 38.46%, very important by 38.46%, and moderately important by 23.08%).

Procurement decisions should be made in a transparent manner to ensure that clear and comprehensive coverage as well as proper weighting of sustainability issues have been considered during the procurement process. The use of transparent models and metrics should assist decision makers in addressing sustainability issues in procurement strategies.

- Ensuring the consideration of whole life costing/value

The factor "ensuring the consideration of whole life costing/value" was ranked 3rd by the experts with a mean of 4.46 and standard deviation of 0.78. It was considered important by 100% of the experts (was considered extremely important by 61.54%, very important by 23.08%, and moderately important by 15.38%). It was also confirmed in the interviews/case studies.

Whole life costing was discussed before as one of the economic sustainability criteria (see Section 5.3.6). However, adopting such an approach has further consequences in terms of ensuring that social and environmental considerations are better addressed through procurement strategies. Adopting whole life costing helps to ensure that future costs are considered and impact on future generations is assessed. This supports the argument developed by the IDeA (2003) which shows that undertaking a whole life costing exercise enables the minimisation of the social and environmental impacts of the products throughout their lifetime and also facilitates better understanding of
the true financial implications of procurement decisions. Whole life costing facilitates attaining a bigger picture of the overall life of the facility. It therefore helps justifying initial capital investments in sustainable products which can bring benefits in the longer terms (e.g. materials with less environmental impact, energy saving measures, etc.). This issue was also raised in the interviews conducted and supported by the literature. For example, according to IDeA (2003), energy-efficient design can significantly reduce whole life costs.

- Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle

The factor “requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle” was ranked 16th by the experts with a mean of 4.15 and standard deviation of 0.69. It was considered important by 100% of the experts (was considered extremely important by 30.77%, very important by 53.85%, and moderately important by 15.38%).

OGC (2005a) highlights the need to conduct periodic review of sustainability performance during the construction process. Arranging such reviews needs to be considered in contract preparation.

- Facilitating publicity of actions taken by public procurers towards addressing the sustainability agenda.

The interviews conducted showed that it was important for public procurers to enjoy a good public image. Making good publicity for the work undertaken by public clients in relation to addressing sustainable development in their construction projects can motivate these clients and other clients to adopt similar approaches. This can lead to adopting procurement strategies that focus on meeting the criteria underpinning sustainable construction.

### 7.5.3 Political and regulative factors

Political and regulative factors include the following:

- F3: Highlighting the need for regulations and government policies that are more consistent with sustainability

- F38: Greater focus, joined up thinking, leadership, and commitment by the government
F40: Introducing more mandatory influence

These factors are discussed below.

Highlighting the need for regulations and government policies that are more consistent with sustainability

The factor "highlighting the need for regulations and government policies that are more consistent with sustainability" was ranked 24th by the experts with a mean of 3.92 and standard deviation of 0.86. It was considered important by 100% of the experts (was considered extremely important by 30.77%, very important by 30.77%, and moderately important by 38.46%). It was also confirmed in the interviews/case studies.

Although there are regulations and government policies in place to assist public clients in addressing sustainability issues in their procurement, such regulations and policies may be insufficient. During the interviews conducted, several interviewees supported this view. In particular, they highlighted that in the current situation, the incorporation of sustainability issues remains optional. There is a need therefore for a more mandatory role in order to better address sustainability. Interviewees also reported concerns about the possibility of conflict between the different sustainability publications (whether produced by the government or by other interested bodies).

Although the EU regulations allow for environmental considerations within procurement, neither they nor the UK National Government require environmental issues to be considered during procurement (Environmental Audit Committee, 2005b). One important issue to note when examining the appropriateness of current legislation in relation to considering sustainability is how advanced the position of the organisation is in terms of addressing the sustainability agenda. While there is scope to do more by most bodies within the existing legislation, this legislation may be seen restrictive to certain organisations, such as the Environment Agency or London Borough of Camden. These organisations already have high standards of sustainable procurement and want to do more, particularly in relation to social issues (Environmental Audit Committee, 2005b). In the housing sector, the views regarding the need for stronger government policies seem to be supported by TCPA and WWF (2003), which highlighted the need for backing the construction industry by strong planning policies requiring developers to build strong sustainability credentials into new developments. The views expressed in Environmental Audit Committee (2005b)
also seem to be supportive in this regard. The Committee showed that there was an opportunity for the Central Government to set out its expectations through stronger policy messages.

- Greater focus, joined up thinking, leadership, and commitment by the government

The interviews conducted showed that the government needs to show more leadership, commitment, and accountability in relation to advancing the sustainability agenda. They showed that this was applicable at the different levels, within departments and among professionals in the government, including those at the very top level. The strict requirements on expenditure imposed by the Treasury were seen restrictive for public sector organisations to think long term and therefore raised doubts about leadership and commitment. The interviews highlighted the need for more focus by government and emphasised the importance of more involvement by government departments in sustainable procurement and more joined up thinking between these departments (for example, the interviews highlighted the lack of standard way of construction procurement in the several programmes such as schools, hospitals, etc.). In this context, the creation of the Sustainable Procurement Task Force and the Public Sector Construction Clients Forum was cited as an important development. As the interviews showed, the later body, which involves top level people across the procurers of construction in public sector organisations, would consider how procurement could be improved collectively.

- Introducing more mandatory influence

The interviews showed that more mandatory influence was needed. Most of the current codes of practice are of voluntary type, and, therefore, commitment to implementing the requirements included in these codes becomes optional. Some may find this an opportunity to ignore such requirements. Even if there is a commitment to these voluntary codes, progress may not be made be quick enough. However, by enforcing these requirements and checking upon their implementation, organisations would have no other choice but to commit themselves to implementing such requirements. Against this, there is the argument that introducing mandatory influence could lead to adopting a common but fairly low standard that may not go beyond legal requirements, while if codes remain voluntary, then standards could be improved. However, one interviewee showed that there was no reason to believe why this should
be the case. In consistency with such a position, the interviews conducted were clearly in favour of introducing more mandatory influence, despite the argument which favours keeping voluntary nature of the codes.

Some of the interviewees showed that many good construction companies expressed their wish to see a level of playing field in order to push organisations to move towards a certain standard and to enable competition on equal terms. One way of ensuring that such a field is created is by making the delivery of sustainability requirements an obligatory requirement instead of keeping it as an optional or a bolt on activity.

7.5.4 Contractual factors

Contractual factors include the following:

- F10: Highlighting sustainability in the project brief as a primary aim
- F12: Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)
- F16: Emphasising the importance of sustainability in tender evaluation and selection procedures
- F19: Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation
- F20: Requiring the supply side to demonstrate capability of delivering sustainability requirements
- F21: Encouraging tenderers to suggest innovative solutions and approaches that support the client's overall sustainability objectives
- F23: Requiring the employment of a properly trained workforce within the supply side
- F24: Ensuring that payment mechanisms take account of whether sustainability requirements are delivered
- F32: Provision of incentives and rewards based on sustainability performance throughout the project life cycle.
These factors are discussed below.

- Highlighting sustainability in the project brief as a primary aim

The factor "highlighting sustainability in the project brief as a primary aim" was ranked 21st by the experts with a mean of 4.08 and standard deviation of 1.12. It was considered important by 92.3% of the experts (was considered extremely important by 38.46%, very important by 46.15%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies.

According to OGC (2005), the project brief must clearly highlight the importance of sustainability considerations in order to ensure that all the parties involved are conscious of the client's needs and requirements. The project brief describes the completed project, specifies the expected outcome, outlines the role of contractor and highlights constraints and difficulties. It is often a cause of failure of construction procurement (Hodgkinson, 2001). Integrating sustainability into a proper project brief and clearly stating the multi-dimensional nature of sustainability enable the presentation of sustainability in a way that cannot be ignored at any of the project delivery stages (Sourani and Sohail, 2005a).

- Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)

The factor "integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)" was ranked 1st by the experts with a mean of 4.54 and standard deviation of 0.52. It was considered important by 100% of the experts (was considered extremely important by 53.85% and very important by 46.15%). It was also confirmed in the interviews/case studies.

The interviews/case studies highlighted the need to make use of the BRE Green Guide to Specification. An important point raised in the interviews was the negative impact that the separation of capital cost from other costs incurred during the project life cycle could have on developing specifications that address sustainability. If the party developing the specifications has no interest in reducing the different costs over the facility life cycle but has an interest in reducing the initial capital cost only, then less sustainable products and materials may be specified on the long term with the aim of reducing the initial capital cost.
As shown throughout Chapters 4, 5 and 6, many of the social, economic, and environmental sustainability considerations can be addressed in procurement strategies through specifications. These include, for example, minimising the disruptive impacts of construction; creating a positive impact on the local environment; meeting users' requirements; supporting the regional/local economy; fitness for purpose; waste minimisation and management; reducing energy consumption; reducing water consumption; selection and use of materials; considering the use of renewable resources and reducing the use of non-renewable resources; minimising water, land and air pollution; and creating a healthy, non-toxic environment. The importance of developing specifications in which sustainability requirements are integrated has also been highlighted by several publications in the literature (e.g. OGC, 2005a; Addis and Talbot, 2001; NHS Estates, 2001; Environmental Audit Committee, 2005b).

- Emphasising the importance of sustainability in tender evaluation and selection procedures

The factor “emphasising the importance of sustainability in tender evaluation and selection procedures” was ranked 6th by the experts with a mean of 4.38 and standard deviation of 0.65. It was considered important by 100% of the experts (was considered extremely important by 46.15%, very important by 46.15%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies. The interviews/case studies highlighted the need to encourage contractors who are paying attention to sustainability and showed that clients need to be attracted to contractors with the best sustainability performance. However, the interviews raised the issue that although questions of sustainable construction are being included in the pre-qualifying questionnaires (PQQs), in-depth answers for these questions are not expected.

The literature highlighted the need to emphasise sustainability in tender evaluation and selection procedures. OGC (2005a), for example, clearly shows the importance of sustainability as a vital part of the pre-qualification and the tender assessment processes. It also shows that the brief should identify clearly the sustainability criteria against which tenderers will be measured. It indicates that tenderers should be asked to provide full details of how they will respond to the required sustainability objectives and that the importance of this element in the tender appraisal process
should be made clear. OGC (2005a) shows that the client should explicitly appraise the responses to the sustainability criteria defined within the tender documentation, as part of the tender evaluation process.

- Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation

The factor “requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation” was ranked 24th by the experts with a mean of 3.92 and standard deviation of 0.64. It was considered important by 100% of the experts (was considered extremely important by 15.38%, very important by 61.54%, and moderately important by 23.08%). It was also confirmed in the interviews/case studies.

The interviews conducted stressed the need to encourage contractors who are emphasising sustainability and showed that clients should to be attracted to the contractor with the best sustainability performance. The provision of requirement or incentive by the client to the supply side to demonstrate commitment to sustainability can be seen crucial as the contractor can go in his commitment to sustainability as far as the client is concerned. Such an issue was also raised during the interviews. There are several examples of what evidence can be used to establish the extent to which an organisation is committed to sustainability. These can include the existence of (see Addis and Talbot, 2001): sustainability policy and its linkage to business goals and strategy, environmental policy, environmentally responsible purchasing policy, corporate social responsibility policy, Environmental Management Systems, registration with the Considerate Constructors Scheme, method statements on waste and resource management, records of previous convictions of illegal waste disposal, records of previous convictions for pollution incidents and other environmental infringements, awards for environmental excellence, prosecutions under health and safety legislation, health and safety processes and statistics, stakeholder consultation and impacts, training and staff development, communication and adoption of sustainability principles at all levels, and link to business and customer benefits as well as government aspirations.

- Requiring the supply side to demonstrate capability of delivering sustainability requirements

The factor “requiring the supply side to demonstrate capability of delivering sustainability requirements
sustainability requirements" was ranked 28th by the experts with a mean of 3.85 and standard deviation of 0.9. It was considered important by 92.31% of the experts (was considered extremely important by 23.08%, very important by 46.15%, and moderately important by 23.08%). It was also confirmed in the interviews/case studies.

Public clients need to ensure that the supply side is really capable of delivering the sustainability requirements they set. This can involve requiring the supply side to demonstrate possession of the resources as well as the relevant experience needed to achieve the required outcome and to provide examples of sustainable projects that they completed successfully. Visits to the sites where these projects were carried out may be organised to examine certain aspects associated with the delivery of the project (OGC, 2005a). Such aspects could include questioning the owners and the users about issues related to the construction and operation of the facility. The supply team's suitability needs to be assessed against sustainability criteria in a clear and methodical manner. Thought must be given to the structure of the tender evaluation process when scripting the tender documentation (OGC, 2005a).

- Encouraging tenderers to suggest innovative solutions and approaches that support the client's overall sustainability objectives

The factor "encouraging tenderers to suggest innovative solutions and approaches that support the client's overall sustainability objectives" was ranked 12th by the experts with a mean of 4.23 and standard deviation of 0.73. It was considered important by 100% of the experts (was considered extremely important by 38.46%, very important by 46.15%, and moderately important by 15.38%).

The importance of attaining innovative solutions and approaches from tenderers was mentioned in several occasions in the literature. OGC (2005a) shows that tender documentation can encourage suppliers to provide innovative sustainability solutions. If clients specify their sustainability objectives without prescribing how these objectives can be achieved by the tenderers, the tenderers would be encouraged to provide innovative solutions in their responses (OGC, 2005a; Business Vantage, 2005). Tenderers may be asked to show in a separate section of the tender how they will meet or exceed the specified sustainability objectives (OGC, 2005a).
- Requiring the employment of a properly trained workforce within the supply side

The factor “requiring the employment of a properly trained workforce within the supply side” was ranked 21st by the experts with a mean of 4.08 and standard deviation of 0.64. It was considered important by 100% of the experts (was considered extremely important by 23.08%, very important by 61.54%, and moderately important by 15.38%).

Public clients need to ensure that the workforce undertaking the project is properly trained because, after all, it is this workforce which is going to carry out the responsibility of achieving many of the sustainability objectives during the project delivery. The importance of this element in enabling the attainment of a sustainable outcome has been highlighted in the literature. OGC (2005a), for example, shows the importance of having commitment from the contractors, the suppliers and the designers towards their workforce and towards achieving the Respect for People Standards. OGC (2005a) highlights the need to ensure that all site staff and sub-contractors receive proper training and education in environmental awareness. CITB-ConstructionSkills (2004) recommends stimulating employers to train existing employees and seeking out employees with skills in sustainable development when recruiting them.

- Ensuring that payment mechanisms take account of whether sustainability requirements are delivered

The factor “ensuring that payment mechanisms take account of whether sustainability requirements are delivered” was ranked 34th by the experts with a mean of 3.69 and standard deviation of 1.03. It was considered important by 84.62% of the experts (was considered extremely important by 23.08%, very important by 38.46%, and moderately important by 23.08%).

Linking payment mechanisms to whether sustainability requirements are delivered or not can create an incentive for the contractor to deliver these requirements. The integration of such requirements into contract specifications and conditions is crucial to ensure that such a link can be established. This is consistent with the demand by OGC for public clients to induct sustainability KPIs into payment mechanisms during the contract preparation process (OGC, 2005a).
Provision of incentives and rewards based on sustainability performance throughout the project life cycle

The factor "provision of incentives and rewards based on sustainability performance throughout the project life cycle" was ranked 24th by the experts with a mean of 3.92 and standard deviation of 0.76. It was considered important by 100% of the experts (was considered extremely important by 23.08%, very important by 46.15%, and moderately important by 30.77%). It was also confirmed in the interviews/case studies.

The role of incentives in introducing improvement towards more sustainable construction was appreciated by CIB (1999). Incentives, taking the form of financial gain or improved contract terms, encourage future behaviour. Rewards recognise past performance and usually take the form of improved access to work or improved contract terms (Kenley et al., 2001). Both are means, within a strategic procurement framework, by which change can be driven to the industry, as Kenley et al. (2001) argue. One way of providing incentives to obtain a more sustainability-oriented procurement is highlighted by Casella Stanger et al. (2002). At the tender stage, contractors may be encouraged to identify sustainable solutions that can result in life cycle savings. These can then be shared, as an incentive, through certain mechanism.

The interviews conducted highlighted how creating an incentive for achieving savings throughout the facility life cycle could lead to an improved consideration of sustainability issues. In PFI projects, for example, the contractor may have no interest in investing in energy conservation measures if the client represents the party responsible for paying energy bills over the facility life cycle. On the other hand, if the contractor is responsible for paying these bills, the client may have no interest either in allocating more money to energy conservation measures. However, if the client and the contractor have shares in paying these bills based on a certain mechanism, then both of them may have an interest in investing in energy conservation measures in order to gain the savings achieved throughout the life cycle as a result of putting these measures in place.

7.5.5 Instrumental factors

Instrumental factors include the following:

- F14: Ensuring that sustainability requirements can be clearly assessed and measured
- F30: Encouraging the incorporation of sustainability issues into value management
- F31: Encouraging the incorporation of sustainability issues into risk management
- F33: Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM)

These factors are discussed below.

- Ensuring that sustainability requirements can be clearly assessed and measured

The factor "ensuring that sustainability requirements can be clearly assessed and measured" was ranked 9th by the experts with a mean of 4.31 and standard deviation of 0.75. It was considered important by 100% of the experts (was considered extremely important by 46.15%, very important by 38.46%, and moderately important by 15.38%). It was also confirmed in the interviews/case studies.

An argument was developed in Chapter 6 regarding the need to determine how performance would be measured in relation to certain sustainability aspects (e.g. energy performance, water use, etc.). During the interviews, the importance of having in place sustainability indicators and measurement techniques was raised. This was seen helpful for decision makers in terms of giving more structure to the huge scope of issues included within the sustainability agenda. Some tools and indicators are already available. These include, for example, Economic Key Performance Indicators (KPIs), Environmental Performance Indicators (EPIs), Respect for People toolkits, and BREEAM. While these tools and indicators can be helpful in assessing certain aspects of sustainability, they are not sufficiently comprehensive to address the whole range of issues underpinning sustainability. Moreover, in relation to problems such as the need to measure the contractor's sustainability performance, there do not seem to be tools and mechanisms to deal with such problems.

- Encouraging the incorporation of sustainability issues into value management

The factor "encouraging the incorporation of sustainability issues into value management" was ranked 9th by the experts with a mean of 4.31 and standard deviation of 0.75. It was considered important by 100% of the experts (was considered extremely important by 46.15%, very important by 38.46 %, and moderately important by 15.38%).
Value management can be used an important tool for maximising the value delivered to the client through ensuring that the clients objectives are met in the most efficient way (Addis and Talbot, 2001). Value management however may be used in certain ways that exclude the consideration of sustainability principles (Forum for the Future, 2003). Some clients, for example, may utilise it for the sole purpose of reducing costs. This can lead, for example, to recommending the use of cheaper and less sustainable materials. Value management should be rather used in a way that enhances the integration of sustainability issues in the planning process. For example, sustainability issues should be given high priority when prioritising key objectives in a value tree (Addis and Talbot, 2001). Focus should also be given in a value management exercise to identify certain design areas which have the greatest potential to deliver sustainability solutions.

- Encouraging the incorporation of sustainability issues into risk management

The factor "encouraging the incorporation of sustainability issues into risk management" was ranked 16th by the experts with a mean of 4.15 and standard deviation of 0.8. It was considered important by 100% of the experts (was considered extremely important by 38.46%, very important by 38.46%, and moderately important by 23.08%).

The importance of risk management in addressing sustainability has been highlighted in the literature. ODPM (2003) recommends that sustainability in design and procurement needs to be considered in risk-based strategies complementing the corporate procurement strategy and the community plan. Addis and Talbot (2001) show that developing a procurement strategy directed towards delivering sustainable construction must involve the identification of sustainability linked risks as well as the most appropriate party to manage these risks. The scope of risk management should be extended to deal not only with financial aspects (such as time and cost) but also with social aspects (such as health and safety) and environmental aspects (such as pollution).

- Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM)

The factor "utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM)" was ranked 12th by the experts with a mean of 4.23 and standard deviation of 0.6. It was considered
important by 100% of the experts (was considered extremely important by 30.77%, very important by 61.54%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies.

As shown before, tools and indicators that can help in assessing certain sustainability aspects are already available. These include, for example, Economic Key Performance Indicators (KPIs), Design Quality Indicators (DQIs), Environmental Performance Indicators (EPIs), Respect for People toolkits, BREEAM and CEEQUAL. Despite this, no one tool or technique seems to be sufficiently comprehensive in terms of addressing the whole range of criteria underpinning the social, economic and environmental dimensions of sustainability. Moreover, the interviews conducted showed that the huge amount of indicators currently available has contributed to creating a kind of confusion among practitioners. There is a growing need to develop simple but comprehensive techniques and tools which could focus on sustainability issues and provide a better alternative to the existing large set of indicators, which are dealing partly with certain sustainability issues. Enhancement of current techniques and tools or even the creation of new ones should recognise such a need.

7.5.6 Logistical factors

Logistical factors include the following:

- F7: Ensuring timely involvement of project stakeholders
- F8: Allowing sufficient time in the programme to address and assess sustainability issues

These factors are discussed below.

- Ensuring timely involvement of project stakeholders

The factor “ensuring timely involvement of project stakeholders” was ranked 1st by the experts with a mean of 4.54 and standard deviation of 0.66. It was considered important by 100% of the experts (was considered extremely important by 61.54%, very important by 30.77%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies.

Project stakeholders need to be consulted and their interests should be considered as early as possible in the project life cycle. If such a process is undertaken at a late stage, then it may not be possible to accommodate the needs of all stakeholders and significant costs may be incurred. This therefore could have negative consequences on
the likelihood of attaining a sustainable outcome.

- Allowing sufficient time in the programme to address and assess sustainability issues

The factor “allowing sufficient time in the programme to address and assess sustainability issues” was ranked 9th by the experts with a mean of 4.31 and standard deviation of 0.63. It was considered important by 100% of the experts (was considered extremely important by 38.46%, very important by 53.85%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies. Public clients need to be aware of the need to allow sufficient time in the programme in order to address and measure sustainability issues in construction projects appropriately. For example, more time may need to be given when attempting to consider how the specification or the design of the facility can accommodate sustainable solutions. Allowing sufficient time in the programme to perform such tasks demands that the client’s vision for sustainability is set at an early stage.

7.5.7 Strategic factors

Strategic factors include the following:

- F22: Promoting Corporate Social Responsibility policy and implementation
- F27: Encouraging long term contractual arrangements through strategic partnering (covering a series of projects)
- F28: Encouraging integrated supply chains
- F29: Encouraging the adoption of lean construction techniques
- F36: Promoting cultural change towards sustainability throughout the industry

These factors are discussed below.

- Promoting Corporate Social Responsibility policy and implementation

The factor “promoting Corporate Social Responsibility policy and implementation” was ranked 35th by the experts with a mean of 3.62 and standard deviation of 0.96. It was considered important by 84.61% of the experts (was considered extremely important by 15.38%, very important by 46.15%, and moderately important by 23.08%).

Corporate Social Responsibility (CSR) shows how a business considers its social, economic, and environmental impacts in the way it operates. It shows how this
business establishes the voluntary actions than can be taken beyond compliance with minimum legal requirements, in order to address the firm’s own competitive interests and the interests of wider society (CSR, 2005a). According to Glass and Simmonds (2006), growing CSR has the impact of encouraging contractors to improve ethical standing by responding in a better way to stakeholder expectations.

Best practice guidance, intelligent regulation and fiscal incentives are instruments that can be used by the government in its approach to encourage the adoption of CSR (CSR, 2005b). One way through which tenderers can demonstrate commitment to CSR is by registering to the Considerate Constructors Scheme (Considerate Constructors Scheme, 2005). As shown in OGC (2005a), clients need to ensure that contractors are registered to this Scheme or a local equivalent. The discussion presented in Section 4.3.14 provides further details about the scheme.

- Encouraging long term contractual arrangements through strategic partnering (covering a series of projects)

The factor “encouraging long term contractual arrangements through strategic partnering (covering a series of projects)” was ranked 36th by the experts with a mean of 3.54 and standard deviation of 1.27. It was considered important by 84.61% of the experts (was considered extremely important by 30.77%, very important by 15.38%, and moderately important by 38.46%). It was also confirmed in the interviews/case studies.

Strategic partnering, according to OGC (2003d), “involves the integrated supply team and the client organisation working together on a series of construction projects to promote continuous improvement”. OGC (2003d) shows that under such arrangement “a contract or framework agreement is awarded to an integrated supply team for a specified period of time; the team prices individual projects within the contractual arrangement”.

Partnering can help in resolving disputes, achieving continuous improvement, encouraging performance measurement and improving risk allocation. These, according to Addis and Talbot (2001), are important to achieve sustainable construction. The Strategic Forum for Construction (2002) shows that long term strategic partnering can deliver savings for clients and bring benefits to the supply chain. Concerns however were reported in the literature about potential negative impacts of long term relationships. NAO (2005a), for example, shows that the major
risk associated with longer-term framework contracts and partnering arrangements is the absence of competitive and commercial tension. According to NAO (2005a), this means that the departments may not achieve a fair price. The Strategic Forum for Construction (2002) reported concerns expressed by some clients about what seems to be conflict between the principles of integrated teams moving from one project to another to maximise knowledge and efficiency on one side and EU and UK government procurement rules on open competition on the other side. However, NAO (2005a) shows that as long as this is carried out in an open and transparent way with adequate measurement in place to ensure the best value is in fact being delivered, such a method of procurement did comply (Strategic Forum for Construction, 2002).

Most of the benefits brought by partnering are financial. Nevertheless, the partnering philosophy may be further extended and employed with all stakeholders (Addis and Talbot, 2001), thereby bringing social and environmental benefits.

- Encouraging integrated supply chains

The factor “encouraging integrated supply chains” was ranked 28th by the experts with a mean of 3.85 and standard deviation of 1.21. It was considered important by 92.31% of the experts (was considered extremely important by 38.46%, very important by 23.08%, and moderately important by 30.77%). It was also confirmed in the interviews/case studies.

Integrated supply chains were discussed in Sections 5.3.9. The interviews conducted showed that lack of integration in the construction industry was hindering the progress towards sustainable construction. They showed that the majority of the firms constituting the industry were small firms which have very limited resources and which may only able to achieve small margin of profits out of their operations. In such a fragmented environment, it is difficult to expect that these firms would think beyond their short term interests. Therefore, paying attention to addressing sustainable construction issues by these firms becomes less anticipated. Achieving more integration in the industry can enable firms to have longer term perspective and can increase the likelihood of addressing sustainable construction by these firms.

The benefits of integrated supply chains have been realised by several publications. OGC (2003a), for example, highlights integrated supply chains as one of the elements that can increase the likelihood of delivering the greatest performance benefits to the client. According to the Strategic Forum for Construction (2002), clients should
require the use of integrated teams and long term supply chains and should actively participate in their creation. OGC (2003c) shows that all departments should use innovative procurement strategies based on integration of the supply chain.

- Encouraging the adoption of lean construction techniques

The factor "encouraging the adoption of lean construction techniques" was ranked 28th by the experts with a mean of 3.85 and standard deviation of 1.14. It was considered important by 92.31% of the experts (was considered extremely important by 30.77%, very important by 38.46%, and moderately important by 23.08%). It was also confirmed in the interviews/case studies.

The role of lean construction in contributing to achieving sustainability was realised in the 2000 UK strategy for more sustainable construction. Aiming for lean construction was considered as one of the major ten themes for action in that strategy (DETR, 2000). Lean construction offers a variety of techniques and methods for reducing waste including standardisation, off-site construction, and use of modular components (Rethinking Construction, 2003a). The adoption of lean construction should be encouraged by public clients as it has been recognised as a cross-cutting theme that has an impact on delivering several sustainability criteria. For example, lean construction helps obtaining better quality, improving efficiency in the use of resources (including energy, water and materials), reducing and managing waste, achieving cost and time savings, and realising value for money (Rethinking Construction, 2003a; Highways Agency, 2003; Constructing Excellence, 2004c; GCCP, 2000).

- Promoting cultural change towards sustainability throughout the industry

The factor "promoting cultural change towards sustainability throughout the industry" was ranked 12th by the experts with a mean of 4.23 and standard deviation of 0.93. It was considered important by 92.3% of the experts (was considered extremely important by 46.15%, very important by 38.46%, and moderately important by 7.69%). It was also confirmed in the interviews/case studies.

The construction industry can be considered "inherently defensive" for change (CIB, 1999). This issue was highlighted in the interviews. There is evidence that this industry is falling behind other sectors in its attitude towards sustainability (CRISP Sustainable Construction Theme Group, 1999). The industry's fragmented nature and lack of long term perspective have all been factors hindering the progress towards
more sustainable construction. Government clients seem to have a key role in introducing the cultural change which should affect the whole industry. Awareness raising and education of the different parties, producing best practice guidance, recognising the business case for better social and environmental performance, and competition pressure should be helpful in introducing cultural change towards sustainability (DETR, 2000).

7.5.8 Financial factors

Financial factors include the factor

- F39: Availability of funding

The interviews highlighted availability of funding as a major factor. They showed that reducing the funding available for the public sector was one of the main problems facing public clients in their attempts to obtain a more sustainable outcome. With the need for more initial capital expenditure which, sometimes, may be required to address sustainability, the issue can become further complicated. Moreover, in local authorities, for example, decisions need to be justified to financial auditors who may not be used to look beyond managing the budget. They may not be able to understand the need for taking a sustainability route or to appreciate the value that can be brought through taking such a route. Hence, they may not be able to appreciate the need for more initial capital expenditure. It is vital therefore to demonstrate the business case for all stakeholders (including the people responsible for the finance), and win their support (see the discussion in Section 7.5.1 regarding demonstrating the business case for taking the sustainability route).

7.6 Summary

This chapter introduced the important factors for UK public clients to better address sustainable construction in developing a procurement strategy. These were identified using the Delphi Exercise and interviews/case studies. Forty one factors were identified in total. Among these, 25 factors were obtained by Delphi and confirmed by the interviews/case studies, 11 factors were identified through Delphi without being confirmed by the interviews/case studies and 5 factors were identified through the interviews/case studies only. The 41 factors were categorised into 8 main categories. These involved:

- knowledge and perception factors
- organisational and management factors
- political and regulative factors
- contractual factors
- instrumental factors
- logistical factors
- strategic factors, and
- financial factors

The chapter also provided a detailed discussion of these factors.

The results reported in this chapter were incorporated in the framework that was developed in this thesis and which is shown Figure 11.1. The part of the framework which involves the results reported in this chapter is clearly shown in Figure 7.2 (presented in black font colour).
Figure 7.2 – Incorporating the results obtained in Chapter 7 in the framework that was developed in this thesis and which is shown in Figure 11.1
Chapter 8: Identifying the barriers and the parties most capable of removing them

8.1 Introduction
This chapter focuses on achieving objectives 3 and 4 of this research. The aim is to identify the barriers to better address sustainable construction in developing a procurement strategy by UK public clients and to identify the parties which are most capable of removing such barriers. The barriers and the parties were identified using interviews/case studies (as shown in Figure 8.1). In total, 12 main barriers and 4 key parties were identified.

8.2 Establishing barriers and parties using interviews/case studies
As shown in Section 7.3, two sets of interviews were conducted. The first set is the set of interviews conducted with 9 experts and professionals (a list of these interviewees is provided in Appendix B). The interviewees were asked, in an open-ended question, about the barriers to better addressing sustainable construction by UK public clients in developing construction projects' procurement strategies and about the parties most capable of removing these barriers.

The second set of the interviews is the set of interviews carried out as part of the case studies (as shown in Sections 3.3.4.6 and 7.3). People interviewed in these case studies were asked about the barriers to better addressing sustainable construction by their organisation (as public clients) in developing their construction projects' procurement strategies and about the parties most capable of removing these barriers.

The responses were analysed in a way that is similar to the way of analysing the open-ended questions in Delphi Round 1 (see Section 3.3.1.8). The analysis led to the identification of 12 barriers (B1 to B12). The barriers, which are discussed in detail in Section 8.3.1, include the following:

- B1: Lack of awareness, understanding, information and demand
- B2: Vagueness of definitions and diversity of interpretations
- B3: Insufficient/confusing guidance, tools, demonstrations and best practice
Objective 3: To identify the barriers to better addressing sustainable construction in developing a procurement strategy and the parties which are most capable of removing these barriers identified from interviews/case studies (Objectives 3, 4 met)

Objective 4: To identify the parties which are most capable of removing such barriers

Figure 8.1 – Achieving objectives 3 and 4
- B4: Insufficient/inconsistent policies, regulations, incentives and commitment by leadership
- B5: Lack of funding and restrictions on expenditure
- B6: Separation between capital budget and operational budget
- B7: General perception that addressing sustainability leads to incurring greater capital cost
- B8: Lack of sufficient time to address sustainability issues
- B9: Resistance to change
- B10: Lack of long term perspective
- B11: Insufficient integration and link up in the industry
- B12: Insufficient research and development.

The analysis led also to the identification of 4 main parties which were considered as the most capable parties of removing the barriers. The parties, which are discussed in detail in Section 8.3, include the following:

- Government, regulatory bodies, and individual public sector organisations (including Treasury, DTI, OGC, NAO)
- Supply chain
- Professional/educational bodies
- Users.

8.3 Discussion of the results

8.3.1 Barriers

8.3.1.1 Lack of awareness, understanding, information, commitment and demand

The interviews and the case studies conducted highlighted the low the level of awareness and understanding about sustainability issues among people working in public client organisations (including senior procurement decision makers working in these organisations) and other stakeholders' organisations and groups (such as contractors, funding organisations and users). Some of these stakeholders may not stimulate levels of demand that are sufficient to advance the agenda beyond minimum compliance with regulations. This may be attributed to the lack of training on
sustainable development issues in the several institutions and professional bodies, the lack of long term perspective, the confusion created by the several interpretations and indicators, the lack of clear and structured guidance, and the nature of the relevant codes in terms of being advisory rather than mandatory. The interviews also highlighted the lack of information needed to make the right decisions in relation to issues such as selection of sustainable products and materials (e.g. how the materials were obtained, the embodied energy, the recycled content, etc.).

8.3.1.2 Vagueness of definitions and diversity of interpretations
The interviews showed that the definitions of many of the issues related to sustainability were vague and confusing and that sustainability was interpreted differently by different people. For example, one of the interviewees highlighted the difficulty in making clear distinction between whole life value, whole life costing and life cycle assessment. As discussed in Section 7.5.1, vagueness of definitions and diversity of interpretations make it difficult to confine sustainability to anything in particular. This therefore this may be used by some decision makers as an excuse to ignore addressing sustainability issues.

8.3.1.3 Insufficient/confusing guidance, tools, demonstrations and best practice
The interviews conducted showed that insufficient/confusing guidance, tools, demonstrations and best practice represent an important barrier. As shown in Section 7.5.5, although there are tools and indicators already in place, the huge amount of these tools and indicators is creating confusion among practitioners. Moreover, these tools and indicators are not comprehensive enough to assess the full range of sustainability criteria. As shown in Section 7.5.5, there is a growing need to develop simple but comprehensive tools and techniques to deal with situations where sustainability needs to be assessed. For example, these can include a situation where an assessment of contractors' performance on sustainability needs to be undertaken so that the results of such an assessment can be integrated in contractors' prequalification and selection procedures). The interviews also highlighted the lack of simple and structured guidance, demonstrations, and best practice illustrating what is meant by sustainability and how it could be implemented.

8.3.1.4 Insufficient/inconsistent policies, regulations, incentives and commitment by leadership
The interviews and the case studies conducted showed that the policies, regulations,
incentives and commitment by leadership may not be sufficient to move towards realisation of sustainable development. Examples highlighted by the interviewees in relation to this were the lack of sufficient funds allocated for government departments and the restrictions imposed by the Treasury on expenditure. These could obstruct long term thinking by public sector organisations and could hinder their efforts to invest in sustainability measures (see Section 7.5.3). One of the interviewees provided another relevant example that is related to Value Added Tax (VAT) imposed on refurbishment. Despite the recognition that refurbishment could be a much better option than new build from an environmental point of view, there is a question about why refurbishment is penalised by 17.5% VAT, while new build is rewarded by 0% VAT. Another example mentioned in the case studies was the inconsistency of having a policy requirement for local authorities to make annual savings by 2.5% and at the same time having a requirement to integrate sustainability issues within procurement by local authorities (an issue that could lead to incurring greater capital cost).

The potential difficulty of advancing the sustainability agenda in the light of insufficient mandatory influence was mentioned in Section 7.5.3. Due to lack of this influence and the lack of enforceable codes, several difficulties could be encountered when attempting to integrate sustainability in procurement processes.

As shown in Section 8.3.1.10, sustainability benefits are generally realised in the long term. However, any government coming to power may be in charge for only a temporary period. Government and politicians may therefore be reluctant to invest more in sustainable solutions, thereby favouring their own short term interests over the long term interests of the wider society.

8.3.1.5 Lack of funding, restrictions on expenditure, and reluctance to incur higher capital cost

The interviews and the case studies conducted highlighted reducing the funding available for organisations working in the public sector and imposing restriction on their expenditure as a major problem facing public clients in their attempts obtain a more sustainable outcome. Moreover, in local authorities, for example, decisions need to be justified to financial auditors who may not be accustomed to looking beyond managing the budget, may not be able to understand the need to take a sustainability route or appreciate the value that can be obtained by taking such a route; hence they may not be able appreciate the need for more initial capital expenditure.
The financial problems mentioned above may exert more pressure on public clients to adopt the lowest cost option rather than best value and could be used by some to opt out of the agenda. These problems could also represent a constraint to investing in more sustainable solutions, particularly because more initial capital expenditure may be required to address sustainability, although this may not always the case. For example, according to the interviews conducted and to the literature (e.g. IDeA (2003)), sustainability may not always require more up front cost.

8.3.1.6 Separation between capital budget and operational budget

One important barrier that was highlighted by the interviewees was the separation between the capital budget and the operational budget. Quite often, the organisation (or the part of the organisation) that is responsible for making the upfront investment is not the same organisation (or the part of the organisation) that is responsible for the operational budget throughout the facility life cycle. In such a case, the organisation (or the part of the organisation) which is responsible for the upfront investment might have no interest in investing in sustainable solutions (such as energy saving measures) because it is not the same organisation (or the part of the organisation) that would reap the benefits achieved throughout the facility life cycle. As a result, the client, for example, may not be willing to develop more sustainable procurement strategies if such a development requires more investment and, at the same time, is not bringing benefits to that client. Where the contractor does not have access to benefits that would be obtained as a result of having sustainable solutions in place, he may also be reluctant to investment in these solutions. In this way, the separation between the capital budget and the operational budget becomes one of the barriers to better addressing sustainable construction in procurement strategies.

8.3.1.7 General perception that addressing sustainability leads to incurring greater capital cost

The interviews conducted showed that one of the main barriers was the general perception that addressing sustainability would require greater capital cost. Even if the party responsible for the capital budget is the same party responsible for the operational budget and therefore can obtain the benefits of investing in sustainability solutions, such a party may not be able to bear higher upfront cost, particularly if that party was under funding pressure (discussed in Section 8.3.1.5).

The interviews showed that sustainability may require incurring more capital cost, but
this is not always the case. This is consistent with literature; for example IDeA (2003) shows that there is a mounting evidence that sustainable construction procurement does not necessarily result in an increased capital cost. Sustainability is commonly perceived in differently as it is often viewed in association with incurring greater capital cost. Such a perception represents a barrier to developing procurement strategies that are more directed towards addressing sustainability.

8.3.1.8 Lack of sufficient time to address sustainability issues

The interviews conducted showed that lack of sufficient time to address sustainability issues in procurement strategies was one of the main barriers. Addressing the whole range of sustainability issues involves ensuring that a thorough appraisal of the social, economic, and environmental dimensions has been undertaken. This is a lengthy process which may require experts' advice. However, as the interviews showed, public clients do not often have sufficient time to undertake this. They may choose to ignore addressing sustainability requirements and to adopt practices that they are used to. Moreover, the interviews showed that public clients may find themselves in a situation where funding could be available for a limited period and therefore when designing and constructing the building, they may not have sufficient time to address sustainability adequately. In this way, an opportunity for addressing sustainability in procurement strategies may be missed. The importance of allocating sufficient time to address sustainability issues was also discussed in Section 7.5.6.

8.3.1.9 Resistance to change

Sustainability requires new ways of thinking, methods, practices, and attitude. Hence, it requires change. But as what would happen normally when implementing a new initiative; there would always be a resistance to change. This problem can exist at all levels; from client organisations, all the way through to the supply side and funding organisations. In client organisations, the problem of change may have to do with lack of committed leadership, restrictions on funding and expenditure, and lack of clear guidance. In the supply side, the problem may be related to a passive culture which does not initiate change unless this is deemed necessary by the client. It could be also related to the limitedness of the resources possessed by small companies, which constitute a high proportion of the industry. For those involved in funding, the problem may be attributed to policies and practices that are directed towards reducing the initial cost and managing the budget rather than adopting a long term perspective
which addresses further social, economic, and environmental implications. Unfortunately, the voluntary nature of the codes of practice can be seen by the different parties as an excuse for not initiating change in a sustainable direction.

8.3.1.10 **Lack of long term perspective**

One of the major barriers highlighted by the interviews is the lack of long term perspective which exists at more than one level. As many of the benefits brought by sustainability are generally realised on the long term, several parties may not be able to see these benefits and therefore may have no interest in investing in sustainability. As the interviews showed, the government, for example, may be in charge for a few years and therefore such a period of time would not be sufficient to realise many of the benefits offered by sustainability. In the light of this, government and politicians may be reluctant to invest in more sustainable solutions, favouring thereby their own short term interests over the long term interests of the wider society. The existence of a historical trend among public clients' organisations to choose lowest cost and the lack of funding and the restriction imposed on it could be also discouraging factors to the adoption of a long term perspective. Many contractors also lack a long term perspective. Small contractors represent a large proportion of the industry and these contractors are constrained by very limited resources; therefore they may not be able to look beyond their short term interests.

8.3.1.11 **Insufficient integration and link up in the industry**

The interviews showed that one of the main barriers was the lack of sufficient integration and link up in the industry. They highlighted that this deficiency exists among clients, contractors and consultants and also exists within the supply chain. Such a problem could lead to missing several opportunities for obtaining innovative sustainable solutions e.g. in relation to the design and specification.

8.3.1.12 **Insufficient research and development**

The interviews showed that insufficient research and development was one of the barriers. They showed that such a problem could be attributed to lack of resources (mainly time and funding). They showed that professionals working in public client organisations were suffering from lack of information regarding new products and initiatives addressing sustainability. They also showed that although research was conducted to address the capital cost of the facilities, there was little work carried out
regarding the facilities' operational costs; the interrelationship between the capital cost and the operational costs; and the measurement of the social costs and benefits associated with both the capital and operational costs.

8.3.2 Parties

In the interviews/case studies, four main parties were identified as being the most capable of removing the barriers to better addressing sustainable construction in developing a procurement strategy. These included:

P1: Government, regulatory bodies, and individual public sector organisations

P2: Supply chain

P3: Professional/Educational bodies

P4: Users

8.3.2.1 Government, regulatory bodies, and individual public sector organisations

The government, its departments (including Treasury, DTI, OGC, and NAO), other regulatory bodies, and public sector organisations were seen among the major parties most capable of removing the barriers, as the interviews and the case studies showed. The barriers to which the responsibility of these parties extends to cover are outlined below.

- B1: Lack of awareness, understanding, and demand: OGC in particular and government departments in general were seen among the most capable parties of removing this barrier.

- B2: Vagueness of definitions and diversity of interpretations: OGC and NAO in particular were seen among the most capable parties of removing this barrier.

- B3: Insufficient/confusing guidance, information, tools, demonstrations and best practice: DTI, OGC, NAO, and Treasury in particular and government departments in general were seen among the most capable parties of removing this barrier.

- B4: Insufficient/inconsistent policies, regulations, incentives and commitment by leadership: Treasury and OGC in particular and government departments in general were seen among the most capable parties of removing this barrier. Government and its departments need to give clear message and authority to procurers regarding the integration of sustainability in their policies, procedures
and processes. Any inconsistencies with current policies, which put restrictions on capital expenditure and ask for annual savings to be made by public sector organisations, need to be eliminated.

- **B5**: Lack of funding and restrictions on expenditure: Treasury in particular and government departments in general were seen among the most capable parties of removing this barrier.

- **B6**: Separation between capital budget and operational budget: Treasury and OGC in particular and government departments in general were seen among the most capable parties of removing this barrier.

- **B7**: General perception that addressing sustainability leads to incurring greater capital cost: Treasury in particular was seen among the most capable parties of removing this barrier.

- **B9**: Resistance to change: OGC in particular and government departments in general were seen among the most capable parties of removing this barrier.

- **B10**: Lack of long term perspective: Treasury and OGC in particular and government departments in general were seen among the most capable parties of removing this barrier.

- **B11**: Insufficient integration, link up and collaborative working in the industry: Government departments in general were seen among the most capable parties of removing this barrier.

- **B12**: Insufficient research and development: Treasury and DTI in particular and government departments in general were seen among the most capable parties of removing this barrier, particularly through enabling more funding for research and development.

### 8.3.2.2 Supply chain

The whole supply chain was seen among the major parties most capable of removing the barrier B11 "insufficient integration, link up and collaborative working in the industry".

### 8.3.2.3 Professional/Educational bodies

The interviews and the case studies indicate that professional bodies as well as Educational bodies (such as universities), through educating and providing training
for the various stakeholders that may be involved in construction projects, have a key role in removing the following barriers:

- **B1**: Lack of awareness, understanding, and demand
- **B3**: Insufficient/confusing guidance, information, tools, demonstrations and best practice.

Professional bodies do not only include the bodies which are focusing on construction (such as CITB and Town and Country Planning Association), but also the bodies which focus on other contexts. Among the later bodies are the professional associations of any stakeholders who may be involved in a construction project, such as the professional associations of doctors (for example, a construction project may involve building a hospital and therefore doctors may be among the stakeholders whose interests should be taken into account in procurement decision making).

### 8.3.2.4 Users

Users were seen among the major parties most capable of removing the barrier **B1** "lack of awareness, understanding, and demand". This can be achieved through stimulating demand for sustainable products and materials.

### 8.4 Summary

This chapter focused on identifying the barriers to better address sustainable construction in developing a procurement strategy by UK public clients (objective 5 of this research) and on identifying the parties which are most capable of removing such barriers (objective 6 of this research). Interviews and case studies were used in identifying these barriers and parties.

As shown throughout the chapter, twelve main barriers were identified through the interviews and the case studies. These included

- **B1**: Lack of awareness, understanding, information and demand
- **B2**: Vagueness of definitions and diversity of interpretations
- **B3**: Insufficient/confusing guidance, tools, demonstrations and best practice
- **B4**: Insufficient/inconsistent policies, regulations, incentives and commitment by leadership
- **B5**: Lack of funding and restrictions on expenditure
- B6: Separation between capital budget and operational budget
- B7: General perception that addressing sustainability leads to incurring greater capital cost.
- B8: Lack of sufficient time to address sustainability issues
- B9: Resistance to change
- B10: Lack of long term perspective
- B11: Insufficient integration and link up in the industry
- B12: Insufficient research and development

Four main parties were identified as the main parties most capable of removing the barriers. These included
- Government, regulatory bodies, and individual public sector organisations (including Treasury, DTI, OGC, NAO)
- Supply chain
- Professional/educational bodies
- Users

The chapter provided a detailed discussion of the identified barriers. The chapter also showed, for each party identified, which barriers would be the most relevant for that party to remove.

The results reported in this chapter were incorporated in the framework that was developed in this thesis and which is shown Figure 11.1. The part of the framework which involves the results reported in this chapter is clearly shown in Figure 8.2 (presented in black font colour).
Towards realisation of sustainable construction through procurement strategies

Knowledge/preparation factors

- Developing a consensus amongst stakeholders
- Understanding the needs of the end-user
- Engaging the public in decision-making

Organisational factors

- Establishing sustainability targets
- Integrating sustainability into projects
- Developing sustainable procurement policies

Instrumental factors

- Ensuring that sustainability is adequately integrated and linked to the strategy
- Ensuring that sustainability targets are monitored and evaluated

Figure 8.2 - Incorporating the results obtained in Chapter 8 in the framework developed in this thesis and which is shown in Figure 11.1
Chapter 9: Investigating the inclusion of sustainability considerations by local authorities

9.1 Introduction

Local authorities represent a major sector within public sector organisations. They spend £40 billion every year on goods, works and services (Local Government Association, 2005). The authorities make their own decisions regarding how to invite tenders and award their procurement contracts in line with relevant rules and regulations (Department for Education and Skills, 2006).

According to IDeA (2003), local authorities have long been in a leading position in relation to sustainable development and have gained valuable experience of green procurement. In the light of the huge expenditure of these authorities, significant social, economic and environmental benefits can be gained from integrating sustainability in to their procurement strategies.

The aim of this chapter is to present the findings of the questionnaire survey conducted in this research (see Figure 9.1). Methodological issues related to using the questionnaire survey were discussed in Section 3.3.3. The survey was carried out to identify whether or not local authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have sustainability considerations addressed in its construction projects' procurement strategies or contracts (objective 5). This would lead to identifying the extent to which attention is paid to each sustainability criterion by this sector of public procurers and, consequently, identifying sustainability criteria which are not receiving sufficient attention. Another objective was to investigate respondents' agreement/disagreement regarding some statements in the context of sustainable construction procurement. The statements were related to awareness, policies and regulation, tendering, procurement systems, assessment of sustainability, and innovation.
Identifying whether or not local authorities in the UK, as a major sector of public clients' organisations, are following / planning to follow policies or guidelines which indicate the need to have sustainability considerations addressed in construction projects' procurement strategies (Objective 5 met)

Figure 9.1 – Achieving objective 5
9.2 Analysis and discussion of the results of questionnaire

As mentioned above, methodological issues related to the questionnaire survey were discussed in detail in Section 3.3.3. The responses to the survey were analysed using SPSS 12. This section presents the analysis undertaken in relation to part 2 of the questionnaire (which was divided into three main sub-parts: social, economic and environmental sustainability, as shown in Appendix D) and provides a discussion of the results obtained. Each sub-part in the questionnaire included a number of criteria. Respondents were asked about whether or not their authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have these criteria addressed in their construction projects' procurement strategies or contracts. Based on the percentage of positive answers that a sustainability criterion obtained, the criterion was assigned a distinguished symbol that highlighted the extent to which attention was paid to that criterion by this sector of public procurers. The results of this assignment were incorporated in the framework developed in this thesis.

The indications of these symbols are as follows:

+++ indicates that more than 80% of local authorities provided a positive answer;
++ indicates that 60-80% of local authorities provided a positive answer;
+ indicates that less than 60% of local authorities provided a positive answer.

9.2.1 Social sustainability

The results show that the majority of local authorities in the UK either follow or plan to follow policies, strategies, guidelines, or procedures which indicate the need to have most of the social sustainability criteria addressed in their construction projects' procurement strategies or contracts. The majority of the respondents responded with positive answers in relation to 15 social sustainability considerations. Only in relation to the two considerations "building and maintaining social capital" and "promoting equitable distribution of costs and benefits (at local, regional and international levels)", less than 50% of the respondents responded with positive answers. In the former consideration, those replied with positive answers were very close to represent a majority (49.6%). In relation to the latter consideration, the percentage of those responded with positive answers was 36.9%. A point to note that this consideration i.e. "promoting equitable distribution of costs and benefits (at local, regional and international levels)" has not emerged as a major sustainability consideration in the Delphi Exercise (see Chapter 4). This consideration was included in the questionnaire.
survey because at the time the questionnaire was developed, the Delphi Exercise was not fully completed (two rounds were completed only at that time). Therefore, it was seen more appropriate to include all the considerations that emerged from Rounds 1 and 2 regardless of their level of importance (as it was impossible to establish the final level of importance before completing Round 3). As shown in Table 9.1, when asked about whether their authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have the criterion "improving health and safety performance" addressed in their construction projects' procurement strategies or contracts, 97.0 % of the respondents answered with "yes", 2.3% answered with "no" and 0.8 % chose the answer "don't know/no opinion". In relation to the criterion "participation of stakeholders (including community involvement)", 90.1% of the respondents answered with "yes", 3.8% answered with "no" while 6.1% answered with "don't know/no opinion".

Fewer respondents provided a positive answer regarding the criterion "social inclusion (including tackling poverty and social exclusion)". 71.0% of the responses answered with "yes", 10.7% with "no", and 18.3% with "don't know/no opinion". Regarding the criterion "seeking intergenerational equity by considering cost for future generations", 56.2% answered with "yes", 16.2% answered with "no" and 27.7% answered with "don't know/no opinion". Very high percentage of the respondents (97.0%) chose the answer "yes" in relation to the criterion "consideration of user needs and satisfaction (including accessibility)" while only 0.8% chose the answer "no" and 2.3% chose the answer "don't know/no opinion".

Regarding the criterion "creating employment opportunities", the answer of 77.3% was "yes", the answer of 10.6% was "no" and the answer of 12.1% was "don't know/no opinion". The answers in relation to the criterion "training and development of the workforce" were "yes" by 80.9%, "no" by 11.5% and "don't know/no opinion" by 7.6%. For the criterion "equality and diversity in the workplace", 84.8% of the answers were "yes" while the answers of 9.8% were "no" and the answers of 5.3% were "don't know/no opinion". Smaller positive response was provided by the respondents regarding the criterion "improving workforce satisfaction" as 59.5% of the responses were "yes", 23.7% were "no", and 16.8% were "don't know/no opinion". In the case of the criterion "improving working environment and conditions", 84.1% of the responses were "yes", 9.8% were "no" and 6.1% were "don't know/no opinion".
<table>
<thead>
<tr>
<th>ID</th>
<th>Social sustainability criterion</th>
<th>% of local authorities giving the answers below for each criterion</th>
<th>Symbol assigned to the criterion in the developed framework based on the percentage of positive answers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>S1</td>
<td>Improving health and safety performance</td>
<td>97.0</td>
<td>2.3</td>
</tr>
<tr>
<td>S2</td>
<td>Participation of stakeholders (including community involvement)</td>
<td>90.1</td>
<td>3.8</td>
</tr>
<tr>
<td>S3</td>
<td>Social inclusion (including tackling poverty and social exclusion)</td>
<td>71.0</td>
<td>10.7</td>
</tr>
<tr>
<td>S4</td>
<td>Seeking intergenerational equity by considering cost for future generations</td>
<td>56.2</td>
<td>16.2</td>
</tr>
<tr>
<td>S5</td>
<td>Consideration of user needs and satisfaction (including accessibility)</td>
<td>97.0</td>
<td>0.8</td>
</tr>
<tr>
<td>S6</td>
<td>Creating employment opportunities</td>
<td>77.3</td>
<td>10.6</td>
</tr>
<tr>
<td>S7</td>
<td>Training and development of the workforce</td>
<td>80.9</td>
<td>11.5</td>
</tr>
<tr>
<td>S8</td>
<td>Equality and diversity in the workplace</td>
<td>84.8</td>
<td>9.8</td>
</tr>
<tr>
<td>S9</td>
<td>Improving workforce satisfaction</td>
<td>59.5</td>
<td>23.7</td>
</tr>
<tr>
<td>S10</td>
<td>Improving working environment and conditions</td>
<td>84.1</td>
<td>9.8</td>
</tr>
<tr>
<td>S11</td>
<td>Creating a positive impact on the local environment (local community, business, infrastructure)</td>
<td>89.4</td>
<td>5.3</td>
</tr>
<tr>
<td>S12</td>
<td>Promoting ethical practices</td>
<td>79.2</td>
<td>8.5</td>
</tr>
<tr>
<td>S13</td>
<td>Preservation of culture and heritage</td>
<td>85.6</td>
<td>6.8</td>
</tr>
<tr>
<td>S14</td>
<td>Minimising the disruptive impacts of construction (e.g. noise)</td>
<td>86.9</td>
<td>4.6</td>
</tr>
<tr>
<td>S15</td>
<td>Promoting equitable distribution of costs and benefits (at local, regional and international levels)</td>
<td>36.9</td>
<td>21.5</td>
</tr>
<tr>
<td>S16</td>
<td>Improving security and reducing crime</td>
<td>90.1</td>
<td>1.5</td>
</tr>
<tr>
<td>S17</td>
<td>Building and maintaining social capital</td>
<td>49.6</td>
<td>10.9</td>
</tr>
</tbody>
</table>

+++ indicates that more than 80% of local authorities provided a positive answer
++ indicates that 60-80% of local authorities provided a positive answer
+ indicates that less than 60% of local authorities provided a positive answer

Table 9.1 - Responses of local authorities in relation to whether they follow or plan to follow policies, strategies, guidelines, or procedures which indicate the need to have social sustainability criteria addressed in their construction projects' procurement strategies or contracts.
High percentage of positive answers were provided in relation to the criterion “creating a positive impact on the local environment (local community, business, infrastructure)” as 89.4% of the answers were “yes”, 5.3% were “no” and 5.3% were “don’t know/no opinion”. Regarding the criterion “promoting ethical practices”, 79.2% of the respondents answered with “yes” while 8.5% answered with “no” and 12.3% chose the answer “don’t know/no opinion”. In the case of the criterion “preservation of culture and heritage”, 85.6% of the answers were “yes”, 6.8% were “no” and 7.6% were “don’t know/no opinion”. 86.9% of the answers were “yes” in the case of the criterion “minimising the disruptive impacts of construction (e.g. noise)” while 4.6% of the answers were “no” and 8.5% were “don’t know/no opinion”.

High positive response was obtained in relation to the criterion “improving security and reducing crime” as 90.1% of the respondents answered with “yes”, 1.5% with “no” and 8.4% chose the answer “don’t know/no opinion”. A much lower positive response was provided in the case of the criterion “building and maintaining social capital” as only 49.6% answered with “yes”, 10.9% with “no” and 39.5% chose the answer “don’t know/no opinion”. Even lower positive response was provided in relation to the criterion “promoting equitable distribution of costs and benefits (at local, regional and international levels)” as only 36.9% answered with “yes”, 21.5% answered with “no” and 41.5% chose the answer “don’t know/no opinion”.

As shown in Table 9.1, areas of social sustainability that received the lower responses (i.e. criteria with corresponding positive answers that are less than 80%) can be summarised as follows:

- S3: Social inclusion (including tackling poverty and social exclusion)
- S4: Seeking intergenerational equity by considering cost for future generations
- S6: Creating employment opportunities
- S9: Improving workforce satisfaction
- S12: Promoting ethical practices
- S17: Building and maintaining social capital

**9.2.2 Economic sustainability**

The results presented in Table 9.2 about addressing economic sustainability criteria give indications similar to the indications implied by the results presented in Table 9.1
about addressing social sustainability criteria. The results show that the majority of local authorities in the UK either follow or plan to follow policies, strategies, guidelines, or procedures which indicate the need to have the most of economic sustainability criteria addressed in their construction projects' procurement strategies or contracts. The majority of the respondents responded with positive answers in relation to 9 economic sustainability considerations. Only in relation to one consideration “consideration of effective logistics strategies”, less than 50% of the respondents (35.1%) responded with positive answers.

As shown in Table 9.2, when asked about whether their authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have the criterion “clear establishment of need and evaluation of alternative options” addressed in their construction projects’ procurement strategies or contracts, 88.5% of the respondents answered with “yes”, 5.4% answered with “no”, while 6.2 % chose the answer “don’t know/no opinion”. In case of the criterion “whole life value for money”, 76.5% of the answers were “yes”, 13.6% were “no” and 9.8% were “don’t know/no opinion”. The answers in relation to the criterion “supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)” were “yes” by 82.4%, “no” by 9.9% and “don’t know/no opinion” by 7.6%.

The answers in relation to the criterion “improving the efficiency of the supply side” were “yes” by 60.0%, “no” by 20.8% and “don’t know/no opinion” by 19.2%. In relation to the criterion “financial affordability for intended beneficiaries”, 64.1% of the answers were “yes”, 14.5% were “no” and 21.4% were “don’t know/no opinion”. 88.4% of the answers were “yes” in the case of the criterion “competitiveness”, while 3.9% of the answers were “no” and 7.8% were “don’t know/no opinion”. Equal percentage of respondents (35.1%) provided positive and negative answers in relation to the criterion “consideration of effective logistics strategies”, while 29.8% chose the answer “don’t know/no opinion”.

As shown in Table 9.2, areas of economic sustainability that received the lower responses (i.e. criteria with corresponding positive answers that are less than 80%) can be summarised as follows:
<table>
<thead>
<tr>
<th>ID</th>
<th>Economic sustainability criterion</th>
<th>% of local authorities giving the answers below for each criterion</th>
<th>Symbol assigned to the criterion in the developed framework based on the percentage of positive answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Clear establishment of need and evaluation of alternative options</td>
<td>Yes: 88.5, No: 5.4, Don’t Know/No opinion: 6.2, Total: 100</td>
<td>+++</td>
</tr>
<tr>
<td>E2</td>
<td>Whole life value for money</td>
<td>Yes: 76.5, No: 13.6, Don’t Know/No opinion: 9.8, Total: 100</td>
<td>++</td>
</tr>
<tr>
<td>E3</td>
<td>Supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)</td>
<td>Yes: 82.4, No: 9.9, Don’t Know/No opinion: 7.6, Total: 100</td>
<td>+++</td>
</tr>
<tr>
<td>E5</td>
<td>Fitness for purpose (including consideration of long term flexibility)</td>
<td>Yes: 91.7, No: 3.0, Don’t Know/No opinion: 5.3, Total: 100</td>
<td>+++</td>
</tr>
<tr>
<td>E6</td>
<td>Consideration of whole life costing</td>
<td>Yes: 80.3, No: 11.4, Don’t Know/No opinion: 8.3, Total: 100</td>
<td>+++</td>
</tr>
<tr>
<td>E7</td>
<td>Economic Key Performance Indicators (KPIs)</td>
<td>Yes: 72.7, No: 15.2, Don’t Know/No opinion: 12.1, Total: 100</td>
<td>++</td>
</tr>
<tr>
<td>E9</td>
<td>Improving the efficiency of the supply side</td>
<td>Yes: 60.0, No: 20.8, Don’t Know/No opinion: 19.2, Total: 100</td>
<td>++</td>
</tr>
<tr>
<td>E10</td>
<td>Financial affordability for intended beneficiaries</td>
<td>Yes: 64.1, No: 14.5, Don’t Know/No opinion: 21.4, Total: 100</td>
<td>++</td>
</tr>
<tr>
<td>E11</td>
<td>Competitiveness</td>
<td>Yes: 88.4, No: 3.9, Don’t Know/No opinion: 7.8, Total: 100</td>
<td>+++</td>
</tr>
<tr>
<td>E12</td>
<td>Consideration of effective logistics strategies</td>
<td>Yes: 35.1, No: 29.8, Don’t Know/No opinion: 35.1, Total: 100</td>
<td>+</td>
</tr>
</tbody>
</table>

+++ indicates that more than 80% of local authorities provided a positive answer
++ indicates that 60-80% of local authorities provided a positive answer
+ indicates that less than 60% of local authorities provided a positive answer

Table 9.2 - Responses of local authorities in relation to whether they follow or plan to follow policies, strategies, guidelines, or procedures which indicate the need to have economic sustainability criteria addressed in their construction projects’ procurement strategies or contracts.

E2: Whole life value for money

E7: Economic Key Performance Indicators (KPIs)

E9: Improving the efficiency of the supply side

E10: Financial affordability for intended beneficiaries

E12: Consideration of effective logistics strategies.

9.2.3 Environmental sustainability

The results presented in Table 9.3 about addressing environmental sustainability criteria give indications similar to the indications implied by the results presented in Table 9.1 and Table 9.2 about addressing social and economic sustainability criteria.
The results show that the majority of local authorities in the UK either follow or plan to follow policies, strategies, guidelines, or procedures which indicate the need to have all environmental sustainability criteria (the 13 environmental sustainability criteria included in the questionnaire) addressed in their construction projects' procurement strategies or contracts.

As shown in Table 9.3, when asked about whether their authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have the criteria “sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)” addressed in their construction projects’ procurement strategies or contracts, 78.6% of the respondents answered with “yes”, 7.6% answered with “no”, while 13.7% chose the answer “don’t know/no opinion”. High percentage of the respondents (93.9%) chose the answer “yes” in relation to the criterion “reducing energy consumption” while only 3.0% chose the answer “no” and 3.0% chose the answer “don’t know/no opinion”. In relation to the criterion “reducing water consumption”, 84.1% of the answers were “yes”, 9.8% were “no” and 6.1% were “don’t know/no opinion”.

The answers in relation to the criterion “selection and use of materials (including specifying low environmental impact materials, re-use and recycling)” were “yes” by 83.3%, “no” by 7.6% and “don’t know/no opinion” by 9.1%. As for the criterion “reusing existing built assets”, 80.9% of the answers were “yes”, 11.5% were “no” and 7.6% were “don’t know/no opinion”. In relation to the criterion “considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources”, 82.6% of the answers were “yes”, 9.8% were “no” and 7.6% were “don’t know/no opinion”.

High percentage of the respondents (88.6%) chose the answer “yes” in relation to the criterion “minimising water, land and air pollution (including noise)” while only 5.3% chose the answer “no” and 6.1% chose the answer “don’t know/no opinion”. The answers in relation to the criterion “preserving and enhancing biodiversity” were “yes” by 69.5%, “no” by 13.7% and “don’t know/no opinion” by 16.8%. In relation to the criterion “waste minimisation and management”, 79.5% of the answers were “yes”, 11.4% were “no” and 9.1% were “don’t know/no opinion”.

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<table>
<thead>
<tr>
<th>ID</th>
<th>Environmental sustainability criterion</th>
<th>% of local authorities giving the answers below for each criterion</th>
<th>Symbol assigned to the criterion in the developed framework based on the percentage of positive answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)</td>
<td>78.6 7.6 13.7 100 ++</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Reducing energy consumption</td>
<td>93.9 3.0 3.0 100 +++</td>
<td></td>
</tr>
<tr>
<td>N3</td>
<td>Reducing water consumption</td>
<td>84.1 9.8 6.1 100 +++</td>
<td></td>
</tr>
<tr>
<td>N4</td>
<td>Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)</td>
<td>83.3 7.6 9.1 100 +++</td>
<td></td>
</tr>
<tr>
<td>N5</td>
<td>Reusing existing built assets</td>
<td>80.9 11.5 7.6 100 +++</td>
<td></td>
</tr>
<tr>
<td>N6</td>
<td>Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources</td>
<td>82.6 9.8 7.6 100 +++</td>
<td></td>
</tr>
<tr>
<td>N7</td>
<td>Minimising water, land and air pollution (including noise)</td>
<td>88.6 5.3 6.1 100 +++</td>
<td></td>
</tr>
<tr>
<td>N8</td>
<td>Preserving and enhancing biodiversity</td>
<td>69.5 13.7 16.8 100 ++</td>
<td></td>
</tr>
<tr>
<td>N9</td>
<td>Waste minimisation and management</td>
<td>79.5 11.4 9.1 100 ++</td>
<td></td>
</tr>
<tr>
<td>N10</td>
<td>Minimising negative visual impact</td>
<td>74.2 10.6 15.2 100 ++</td>
<td></td>
</tr>
<tr>
<td>N11</td>
<td>Creating a healthy, non-toxic environment (e.g. high indoor air quality)</td>
<td>70.5 12.9 16.7 100 ++</td>
<td></td>
</tr>
<tr>
<td>N12</td>
<td>Considering transport issues (e.g. public transport provision, reducing the need to travel)</td>
<td>76.5 11.4 12.1 100 ++</td>
<td></td>
</tr>
<tr>
<td>N13</td>
<td>Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)</td>
<td>84.0 4.6 11.5 100 +++</td>
<td></td>
</tr>
</tbody>
</table>

+++ indicates that more than 80% of local authorities provided a positive answer
++ indicates that 60-80% of local authorities provided a positive answer
+ indicates that less than 60% of local authorities provided a positive answer

Table 9.3 - Responses of local authorities in relation to whether they follow or plan to follow policies, strategies, guidelines, or procedures which indicate the need to have environmental sustainability criteria addressed in their construction projects' procurement strategies or contracts.

With regards to the criterion “minimising negative visual impact”, 74.2% of the answers were “yes”, 10.6% were “no” and 15.2% were “don’t know/no opinion”. 70.5% of the answers were “yes” in relation to the criterion “creating a healthy, non-
toxic environment (e.g. high indoor air quality)” while 12.9% of the answers were “no” and 16.7% were “don’t know/no opinion”. The answers in relation to the criterion “considering transport issues (e.g. public transport provision, reducing the need to travel)” were “yes” by 76.5%, “no” by 11.4% and “don’t know/no opinion” by 12.1%. In the case of the criterion “protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)”, 84.0% of the answers were “yes”, 4.6% were “no” and 11.5% were “don’t know/no opinion”.

As shown in Table 9.3, areas of environmental sustainability that received the lower responses (i.e. criteria with corresponding positive answers that are less than 80%) can be summarised as follows:

N1: Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)

N8: Preserving and enhancing biodiversity

N9: Waste minimisation and management

N10: Minimising negative visual impact

N11: Creating a healthy, non-toxic environment (e.g. high indoor air quality).

9.2.4 Consistency of the results regarding addressing sustainability criteria with previous evidence suggested by the literature

The generally positive responses obtained in this survey in relation to addressing sustainable development criteria seem to be consistent in several respects with the findings of a survey which addressed procurement strategies within local authorities in general (not only in the construction context) and was carried out by the IDeA during the latter half of 2004. The findings of the survey by IDeA show that 87% of respondents have addressed sustainability within their corporate procurement strategy (Environmental Audit Committee, 2005b).

The findings of the survey carried out within this research about addressing social sustainability criteria show also consistency with the findings of the survey by IDeA. The findings of the survey by IDeA indicate that 68% of respondents have addressed the relationship of procurement to the community plan within their corporate procurement strategy; 77% of respondents have addressed workforce issues within their corporate procurement strategy; 80% of respondents have addressed diversity and equality within their corporate procurement strategy; 66% of respondents have
addressed how the council would encourage a diverse and competitive market (including small firms, social enterprises, ethnic minority businesses, and voluntary and community sectors within their corporate procurement strategy).

The argument by Murray, as presented in the minutes of the Sustainable Public Procurement Sixth Report mentions evidence which shows that 87% of the councils state that they have addressed sustainable development within their procurement strategies (Environmental Audit Committee, 2005b). However, according to Murray (2005), the analysis of at least 100 procurement strategies showed that sustainable construction was rarely mentioned in these strategies. While this may seem as an inconsistent argument, it is important to take into account the factors that will be discussed in the following section to interpret any findings meaningfully.

9.2.5 Important factors to be taken into account when interpreting the results

The findings of the questionnaire survey undertaken in this research seem to be consistent with the findings of the questionnaire survey undertaken by IDeA (as discussed above). However, the findings of the questionnaire survey undertaken in this research should be interpreted with care, particularly in the light of what may appear to be inconsistent argument by Murray (as discussed in Section 9.2.4). Several factors should be taken into account when interpreting the findings, undertaking any comparison, or trying to deal with any inconsistencies.

The first factor to be taken into account is related to the right interpretation of what a positive response implies. A positive response regarding certain sustainability consideration therefore does not imply necessarily that the council is already following policies, strategies, guidelines, or procedures which indicate the need to have the consideration addressed in its construction projects' procurement strategies or contracts. Rather, it implies that the council either follows or plans to follow such policies, strategies, guidelines, or procedures. The questionnaire sheet clearly shows that a positive response "yes" means that the respondent's authority either follows or plans to follow policies, strategies, guidelines, or procedures which indicate the need to have the consideration addressed in its construction projects' procurement strategies or contracts. The sheet also shows that a negative answer "no" means that the respondent's authority neither follows nor plans to follow policies, strategies, guidelines, or procedures which indicate the need to have the consideration addressed in its construction projects' procurement strategies or contracts. Many local
authorities may be undergoing a transitional period in which they are planning to adopt these policies, strategies, guidelines, or procedures. The argument by Waller (2005) which indicates that local authorities are increasingly addressing sustainable development in their contracts and that sustainable development criteria are generally described within procurement strategies seems to be consistent with such a position. This move by local authorities is expected, particularly in the light of the recommendations by the National Procurement Strategy. The Strategy asked local authorities to build sustainability into their procurement strategies, processes and contracts by 2004 and set certain targets related to sustainability to be achieved by 2004 and 2005.

The second factor is related to the importance of breaking down the sustainability concept in order to identify, in a meaningful way, whether sustainability is addressed or not in any policy or strategy. In some cases, a policy or a strategy may not emphasise the terms “sustainable development” or “sustainability” in particular but may emphasise criteria underpinning sustainability (such as health and safety performance or training and development of the workforce). Therefore, any conclusion regarding whether sustainability is addressed or not within a certain strategy or policy should consider whether the criteria underpinning the several dimensions of sustainability are incorporated in such a policy or a strategy.

The final factor to be taken into account is related to the source of responses to the questionnaire survey undertaken in this research. In this survey, the questionnaire targeted those responsible for or involved in developing construction procurement strategies in local authorities. While these people are more likely to be the most knowledgeable people about addressing sustainability issues in the policies, strategies, guidelines or procedures followed by their authorities, the likelihood of bias within their answers should not be excluded. When providing their answers, respondents may try to protect themselves and their councils by indicating a positive response with regards to addressing sustainability issues. This may be expected in the light of the increased pressures on local authorities to adopt more sustainable policies and strategies.

9.2.6 The expectancy of the results

In general, as the findings of the questionnaire survey show, the majority of local authorities follow or plan to follow policies, strategies, guidelines, or procedures
which indicate the need to have most of sustainability considerations addressed in their construction projects' procurement strategies or contracts. However, the extent of this majority varies from one consideration to another. This could be expected since local authorities, as the Environmental Audit Committee (2005b) shows, are left to produce their own guidance to the extent they chose. However, they are becoming under increased pressure to adopt procurement strategies, policies and procedures that are addressing sustainable development issues.

9.2.7 The scope for local authorities to do more
Within the existing body of legislation, there is a large scope for most organisations to make improvements. For those who are ahead on the agenda; however, regulations and policies may prohibit them from doing more, particularly in relation to the social side (Environmental Audit Committee, 2005b). As Constructing Excellence (2005c) shows, the scope of regulations can be extended to incorporate a wider range of sustainability issues, but until this happens, officers lack the power to enforce the adoption of such issues. One example of authorities which are ahead on the agenda and are at the same time restricted by legislation when attempting to do more (particularly in relation to social issues) is Camden Borough Council. This Council, which can be seen as an exemplar organisation (Environmental Audit Committee, 2005b) in relation to sustainable procurement in general, will be examined as a case study in Chapter 10.

9.2.8 Agreement/disagreement with relevant statements
This section presents and discusses the findings of the questionnaire survey regarding agreement/disagreement of the respondents with certain statements addressing the subject of sustainable construction. These statements were presented in part 3 of the questionnaire (see Appendix D). Table 9.4 summarises the results.

The analysis of the respondents' answers show that 50% of the respondents agree (whether strongly or not) that there is a low level of effective awareness among practitioners in the UK construction industry regarding sustainable construction issues. 28% of the respondents disagree (whether strongly or not) with the statement while 22% of them neither agree nor disagree with it. This is consistent with the literature which indicates the existence of insufficient level of awareness of sustainable construction in the construction industry and the need to raise that level. Examples of publications indicating such an issue include the Sustainable
Construction Task Group (2003) and ICE et al. (2002). Such a result also highlights the importance of the issue of awareness, which was mentioned within the important factors and barriers to better addressing sustainable construction in developing a procurement strategy (Chapters 7 and 8).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Respondents' agreement/disagreement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a low level of effective awareness among practitioners in the UK construction industry regarding sustainable construction issues</td>
<td>1.5 26.5 22.0 47.0 3.0</td>
</tr>
<tr>
<td>Relevant regulations and government policies are sufficiently consistent with the objective of achieving sustainability construction</td>
<td>8.3 37.9 31.1 22.0 0.8</td>
</tr>
<tr>
<td>Meeting sustainable construction requirements should be emphasised as a primary objective in tender evaluation and contractor selection procedures</td>
<td>0.8 6.8 16.7 59.8 15.9</td>
</tr>
<tr>
<td>There can be differences among procurement routes (e.g. traditional, design and build, prime contracting etc.) in terms of their potential to deliver sustainable construction</td>
<td>0.8 6.8 14.4 56.8 21.2</td>
</tr>
<tr>
<td>In evaluating tenders in my authority, there is a difficulty in assessing sustainable construction issues</td>
<td>0.8 21.2 20.5 51.5 6.1</td>
</tr>
<tr>
<td>In my authority, tenderers are encouraged to suggest innovative solutions and approaches that support the attainment of sustainable construction</td>
<td>3.0 33.3 22.0 36.4 5.3</td>
</tr>
</tbody>
</table>

Table 9.4 – Respondents' agreement/disagreement with relevant statements included in the questionnaire survey

46.2% of the respondents disagree (whether strongly or not) with the statement that relevant regulations and government policies are sufficiently consistent with the objective of achieving sustainability construction. Only 22.8% agree (whether strongly or not) with the statement and 31.1% neither agree nor disagree with it. Such results seem to be supportive to the findings presented in Chapters 7 and 8 regarding the important factors and the barriers to better addressing sustainable construction in developing a procurement strategy. The findings in Sections 7.5.3 and 8.3.1.4, which focused on the issue of regulations and policies, indicated that "highlighting the need for regulations and government policies that are more consistent with sustainability" was one of the important factors and that "insufficient policies, regulations, incentives and commitment by leadership" was one of the barriers.

A significant majority of the respondents (75.7%) agree (whether strongly or not) with
the statement that meeting sustainable construction requirements should be emphasised as a primary objective in tender evaluation and contractors’ selection procedures. Only 7.6% disagree with the statement and 16.7% neither agree nor disagree with it. Such results seem to be consistent with the findings reported in Section 7.5.4 which showed that “emphasising the importance of sustainability in tender evaluation and selection procedures” was one of the important factors to better addressing sustainable construction in developing a procurement strategy.

The large majority of the respondents (78.0%) agree (whether strongly or not) that there can be differences among procurement routes (e.g. traditional, design and build, prime contracting, etc.) in terms of their potential to deliver sustainable construction. Only 7.6% disagree with that and 14.4% express a neutral position. Such results confirm the importance of “evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives” as one of the important factors to better address sustainable construction in developing a procurement strategy (this was discussed in detail in Section 7.5.1).

The majority of the respondents (57.6%) agree (whether strongly or not) that in evaluating tenders in there authorities, there is a difficulty in assessing sustainable construction issues. 22% disagree (whether strongly or not) with that while 20.5% adopt a neutral stance. While the questionnaire survey did not investigate the reasons behind the difficulty in assessing sustainable construction in tender evaluation, the presence of a majority among the respondents supporting the existence of this difficulty can be seen a logical result to the existence of barriers such as lack of awareness, understanding, information and demand; vagueness of definitions and diversity of interpretations; and insufficient/confusing guidance, tools, demonstrations and best practice (see Sections 8.3.1.1, 8.3.1.2 and 8.3.1.3 for further details regarding these barriers).

Division among the respondents was apparent regarding whether in their authorities tenderers are encouraged to suggest innovative solutions and approaches that support the attainment of sustainable construction. While 41.7% of the respondents agree that in their authorities tenders are encouraged to do so, 36.3% show disagreement and 22% show neither agreement nor disagreement with this. This division suggests that the factor “encouraging tenderers to suggest innovative solutions and approaches that support the client’s overall sustainability objectives” (which, as shown in Section 7.5.4, was seen as one of the important factors to better address sustainable
construction in developing a procurement strategy), has not been sufficiently considered from an implementation point of view.

9.3 Summary

This chapter addressed the questionnaire survey conducted in this research and presented its findings. The questionnaire survey, which was undertaken in October/November 2006, targeted the people responsible for or involved in construction procurement in local authorities in the UK and attracted a good response rate of 29%. The findings show that the majority of local authorities follow or plan to follow policies, strategies, guidelines, or procedures which indicate the need to have most of the social and the economic sustainability considerations and all the environmental considerations, which were included in the questionnaire, addressed in their construction projects' procurement strategies or contracts. However, the extent of this majority varies from one consideration to another. The results obtained highlighted the extent to which attention is paid to each sustainability criterion by this sector of public procurers and showed which social, economic and sustainability areas are receiving less attention.

The results could be expected as local authorities are left to produce their own guidance to the extent they chose and are becoming under increased pressure to adopt procurement strategies, policies and procedures that are addressing sustainable development issues.

The majority of the respondents agree that there is a low level of effective awareness among practitioners in the UK construction industry regarding sustainable construction issues; that sustainable construction requirements should be emphasised as a primary objective in tender evaluation and contractor selection procedures; that there can be differences among procurement routes in terms of their potential to deliver sustainable construction; that in evaluating tenders in their authorities, there is a difficulty in assessing sustainable construction issues. The percentage of respondents who disagreed with the statement that relevant regulations and government policies were sufficiently consistent with the objective of achieving sustainability construction was clearly higher than the percentage of respondents who agreed with it. A clear division among the respondents was apparent regarding whether in their authorities tenderers were encouraged to suggest innovative solutions and approaches that support the attainment of sustainable construction.
In general, as shown throughout the discussion presented in this Chapter, the findings of the questionnaire survey show consistency with previous evidence and findings presented in the literature.

The results reported in this chapter were incorporated in the framework that was developed in this thesis and which is shown Figure 11.1. The part of the framework which involves the results reported in this chapter is clearly shown in Figure 9.2 (presented in black font colour).
Figure 9.2 - Incorporating the results obtained in Chapter 9 in the framework developed in this thesis and which is shown in Figure 11.1
Chapter 10: Identifying and demonstrating how local authorities are addressing sustainability criteria

10.1 Introduction

The aim of this chapter is to present the findings of the case studies conducted in this research in relation to identifying and demonstrating how local authorities in the UK are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures (objective 6). Two case studies were conducted about two public client organisations: London Borough of Camden and Nottinghamshire County Council.

Methodological issues related to using case studies were discussed in Section 3.3.4. As shown in that section, interviews and document analysis were used as the main sources of data (see Section 3.3.4.6). This chapter present each case study and shows the main conclusions, which can be divided into two sets. The first set focuses on addressing sustainability in general while the other set focuses on addressing specific sustainability criteria, as will be shown throughout the chapter.

The analysis of relevant documents and the interviews conducted will show that many of the social, economic, and environmental criteria which emerged from the Delphi Exercise and presented in Chapters 4, 5 and 6 have been addressed by the organisations studied. However, an important point to note is that some of the criteria may be addressed in some ways that are not mentioned in this chapter. This should be expected as the ways of addressing the criteria mentioned below are limited to those ways identified from the analysis of the relevant documents and the interviews that were carried out within the case studies.

10.2 The local authorities context

Local authorities are a major sector within public client organisations. They spend £40 billion every year on goods, works and services (Local Government Association, 2005) and make their own decisions regarding how to invite tenders and award their procurement contracts in line with relevant rules and regulations (Department for Education and Skills, 2006). Local authorities have long been in a leading position in relation to sustainable development, have gained valuable experience of green procurement (IDeA, 2003) and can assist sustainable development in several ways as the ODPM’s Planning Policy Statement shows (Hebbert, 2006).
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policies,guidelinaor
(Obj6 met)
prmedures

Figure 10.1 -Achieving objective 6

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Taking into account the significance of this sector of public clients, the benefits that can be obtained from addressing the social, economic and environmental sustainability in construction procurement strategies developed by this sector can be considerable.

10.3 Case study 1: London Borough of Camden

10.3.1 Construction procurement in the Council

The London Borough of Camden covers an area of approximately 22 square kilometres of inner London. The population of Camden are estimated at 220,700 (London Borough of Camden, 2005a).

Through its Housing Department, which is responsible for managing more than 35,000 dwellings, the Council undertakes construction work that is focused on refurbishment (Mr Chong interview, p. 2; Ms Adams interview, p. 2). However, the Council sometimes procures types of new build construction which involves building offices schools (or parts of schools) and constructing roads and highways that lie outside the responsibility of Transport of London (Mr Chong interview, p. 2). The Council has designated 36 conservation areas. Nearly 6,000 buildings have special architectural or historic interest (London Borough of Camden, 2006).

The Council recognises that procurement has a key role in its success (London Borough of Camden, 2002). It defines procurement as a process by which the Council contracts for its works, goods and services requirements (London Borough of Camden, 2002). Procurement within the Council is managed in a devolved manner. While the Strategic Procurement Unit (SPU) provides a corporate focus for strategy, policy, procedures and advice to Council departments on range of procurement issues (including sustainability), the majority of the procurement activity is conducted at the departmental level (London Borough of Camden, 2002; Ms Adams Interview, p. 1). The London Borough of Camden (2002) shows that the structures of procurement in the Council should allow a corporate approach to be adopted for contracts which are common to more than one department; should encourage cross-departmental networking; should acknowledge the need for flexibility; should facilitate cross-departmental and cross-functional working where appropriate for specific tasks or projects; and should facilitate departmental focus for procurement communications through nominated points of contact at departmental level.
10.3.2 The Council's commitment to sustainability

Camden has been recognised as one of the local authorities which have high standards on sustainable procurement and as an exemplar authority (Environmental Audit Committee, 2005b). The commitment of the Council to sustainable procurement has been seen crucial to its success in this regard (Environmental Audit Committee, 2005b). Such a commitment was established even before the emergence of the National Procurement Strategy, through setting a number of sustainability targets in the Council's Procurement Strategy (Environmental Audit Committee, 2005b) and was reflected at the departmental level. The Housing Department at the Council, for example, has clearly established its commitment to sustainable construction (London Borough of Camden, undated-1). The Council's commitment to sustainability has been reflected in several respects through its policies, strategies, and guidelines:

- In its procurement policy and strategy, Camden set a vision that by August 2005, Camden's procurement would be acknowledged as "best in class" and would make a clear contribution to the Council's sustainability objectives (London Borough of Camden, 2002).

- The Council has established that one of the key elements of its policy for procurement involves conducting procurement with due regard to sustainability issues throughout the supply chain (London Borough of Camden, 2002).

- The Council has developed an environmentally and socially responsible procurement policy which has five main goals. These include meeting Camden's corporate objectives, minimising environmental risk, maximising social benefits, considering whole life costing, and consulting and engaging stakeholders (London Borough of Camden, 2003). The policy addresses the Council's procurement in general, including the products bought and the works carried out by the Council. In other words, the policy covers not only procurement of construction but also procurement in other sectors, such as food, stationary, etc. (Ms Adams Interview, p. 1).

- In its environmentally and socially responsible procurement policy, Camden has clearly shown its commitment to integrating social, economic and environmental considerations into every stage of its procurement processes (London Borough of Camden, 2003; Ms Adams Interview, p. 1).

- The Council has developed sustainable construction policy and programme...
which would enable the Council to take a lead on this issue amongst local authorities. The policy builds on Corporate Environmental Policy and aims to integrate sustainable development in all construction activities of the Council. The policy is relevant to all stages of building projects and is implemented through practical guidance notes and procedures which are reviewed annually (London Borough of Camden, 2003).

- In its Capital Programme Procedure, the Council emphasises its commitment to sustainable construction in newsletters, at relevant meetings with consultants, contractors, residents and other stakeholders (London Borough of Camden, undated-1).

- The Council has developed a number of policies that are relevant to sustainable development and construction including Community Strategy (which is the Council’s overarching strategy on sustainable development); Environmental and Social Procurement Policy; Corporate Environmental Policy; Biodiversity Action Plan; Green Transport Strategy; Waste Minimisation Strategy; Trees Strategy (London Borough of Camden, 2004; Environmental Audit Committee, 2005b; Ms Adams Interview, p. 1).

- Sustainability analysis constitutes one of the key sections within the published Camden’s contracting strategy. The strategy mentions several considerations to be taken into account, including conducting an environmental risk analysis, drawing up the results of such an analysis in the specifications and other documentation, examining the availability of specific products/processes that would reduce the impact of the contract upon the environment, and examining the appropriateness of including special conditions relating to environmental issues (London Borough of Camden, 2005b).

Camden has taken a significant initiative towards adopting a sustainable approach in its procurement. The Council adopts the view that integrating sustainability throughout the procurement process rather than addressing it on a contract by contract basis is a more effective approach to realise sustainable procurement. To ensure that sustainability was embedded into all procurement practices, the coordination of the work on environmentally and socially responsible procurement has become the responsibility of the Strategic Procurement Unit (SPU) within the Council. Moreover, the Council has appointed a designated Sustainable Procurement Officer into the SPU.
Such a way of addressing sustainability impacts of procurement across the Council, with the central coordination provided by SPU, was the first in the UK (Environmental Audit Committee, 2005b).

Addressing sustainability in the procurement undertaken by the Council’s departments however is not mandatory (Ms Adams interview, p. 7). While SPU develops policies and provides advice and guidance in relation to addressing of sustainability objectives in the Council’s procurement, it is up to the individual departments within the council to decide whether such objectives can be addressed in the contract in question. Such a decision will take into account several factors such as the nature of the contract and whether such objectives are relevant to this nature, the level of risk and value of the contract, the actions that can be taken realistically in relation to addressing such objectives, and compliance with best value (Ms Adams interview, pp. 3-5). Although the Housing Department generally follows standard housing specifications in its contracts rather than developing new ones in each contract, the principles underlying the application of sustainability principles in Council’s procurement are generally relevant to the Council’s procurement of construction (Ms Adams interview, pp. 2, 5).

10.3.3 Social sustainability

- Improving health and safety performance

In its standard pre-qualification questionnaire PQQ (London Borough of Camden, undated – 2), the Council asks the tenderer about how health and safety are managed throughout out his organisation and on customer sites. The Council also asks about the tenderer’s health and safety policy or evidence of adherence to appropriate health and safety legislation. Evaluation is then undertaken based on the information supplied by tenderers and the results are incorporated within evaluation of the technical capability of tenderers. In addition, the contract strategy highlights the importance of identifying any significant health and safety implications with the contract and ensuring that attention is paid to safest solutions in specifying goods and services.

- Participation of stakeholders (including community involvement)

The interviews conducted shows that the Council undertakes extensive consultation exercises with stakeholders (Mr Chong Interview, p. 3). Analysis of relevant documents shows that in its contract strategy, the Council mentions the need to ensure full representation from all affected departments and stakeholder groups (London
Borough of Camden, 2005b). Under a section entitled “stakeholder engagement”, the strategy shows the need to identify stakeholders including users, departmental procurement representatives, budget holders, professional specialists (e.g. legal, finance, etc.). The strategy indicates the need to:

- consider how they will be consulted and what their role will be in contract drafting, letting and management
- obtain their buy-in and commitment to participate in contract letting and management
- develop communication plans, and
- consider strategy for ensuring total contract compliance across all relevant parts of the council.

In addition, the Sustainable Construction Policy and Programme (London Borough of Camden, 2004) shows that one of its objectives is to consult the community on sustainability issues in the context of construction projects.

- Consideration of user needs and satisfaction (including accessibility)

As discussed above in relation to participation of stakeholders, the contract strategy of Camden indicates the need to identify stakeholders (including users of goods and services); to consult them; to allocate a role for them in contract drafting, letting and management; to obtain their buy-in and commitment to participate; and to develop communication plans with them (London Borough of Camden, 2005b). The contract strategy also highlights the need to consider how the contract affects the different groups (including the users) and to take into account disability, age, etc. (London Borough of Camden, 2005b). The Council also undertakes post implementation surveys on users’ needs and satisfaction and feeds the results of these surveys into the planning of new projects (Mr Chong Interview, p. 4).

- Creating employment opportunities

Employment creation is addressed through promoting local employment and increasing the number of local people who are employed in the Council’s construction contracts (Mr Chong interview, p. 4; Ms Adams interview, p. 2). This is confirmed by the policies of the council which show that it will achieve its community strategy to promote local small and medium business and to promote the use of local labour by the council’s vendors and in construction activities (London Borough of Camden,
Equality and diversity in the workplace

The contract strategy of the council indicates the need to consider whether equalities issues have been taken into account in drawing up the contract strategy and to consider the extent to which such issues are built into each stage of the procurement process (London Borough of Camden, 2005b).

One of the actions included within the Council's Procurement Policy and Strategy is to incorporate diversity issues into the procurement process (London Borough of Camden, 2002). This involves developing, implementing and publicising cross-Council diversity in procurement policy as well as indicating that progress initiatives meet and exceed the requirements of the Race Relations Amendment Act (including workforce monitoring of contractors and targeting of small black, minority and ethnic businesses).

In its standard pre-qualification questionnaire (London Borough of Camden, undated-2), Camden Council provides a statement which shows its commitment not to discriminate on the basis of a person's race, disability, age, gender, religion, sexuality or any other aspects of an individual's background or heritage. The statement shows that the Council expects that its contractors and others who deliver its services to share and implement such a vision and values. The Council shows that all organisations wishing to provide services on Camden's behalf must be able to demonstrate that they allow equal access and equal treatment in employment and service delivery for all.

The questions directed to the organisations submitting the pre-qualification questionnaire include questions enquiring about (London Borough of Camden, undated-2):

- whether its enterprises is ethnic minority-owned business
- what the ethnic group(s) that of the owners or managers of the firm is/are
- what the size of the firm is
- whether the organisation has an equal opportunity policy
- whether the organisations has been the subject of a formal investigation on the grounds of unlawful discrimination
how the equal opportunities policy is communicated to the organisation's staff and whether the organisation provides training to its staff on equalities issues

numbers of current staff in each category (e.g. disabled, white (British), etc.).

- Improving working environment and conditions/improving workforce satisfaction

In its contracting strategy, the Council indicates the need to consider whether certain considerations, including prevailing rates of pay, working conditions, recruitment and retention of staff, and other staffing issues, are taken into account in the contract (London Borough of Camden, 2005b).

- Creating a positive impact on the local environment (e.g. local community, business, infrastructure)

In its procurement policy and strategy (London Borough of Camden, 2002; p. 8), the Council shows that it will encourage local employment and local small and medium business through

- changing vendor selection to encourage competition from local or small business

- encouraging council's vendors to engage local subcontractors, and

- promoting use of local labour by the council's vendors.

The Council has included community benefits clauses into its housing department's construction contract. Such benefits involve asking contractors to provide training for local people during the life of the contract (Environmental Audit Committee, 2005b). The Sustainable Construction Policy and Programme (London Borough of Camden, 2004) indicates that local community and economic well being can be improved through employing local labour on sustainable construction projects and stimulating the market for local and small contractors. One objective of the policy is to promote the use of local labour and business in construction activities (London Borough of Camden, 2004)
Promoting ethical practices

One of the main elements in the Procurement Policy and Strategy for Camden is conducting procurement in a professional and ethical manner (London Borough of Camden, 2002). The Council develops policies to promote fair trade and provides guidance in this regard (Mr Chong Interview, p. 5; London Borough of Camden, 2002).

The council clearly shows the need to address ethical issues when considering construction materials. For example, in its Sustainable Construction Policy and Programme for Council-owned housing, the Council shows that only legally sourced timber should be used. It shows that preference should be given to obtaining timber and its products from well managed forests. These must be independently verified by a credible certification scheme that take into account the recognition of indigenous people’s rights (London Borough of Camden, 2004).

In the section entitled “conduct information” in its pre-qualification questionnaire, the Council also addresses issues that are relevant to ethical practices. An organisation submitting a pre-qualification questionnaire needs to indicate whether it is associated with or retained/employed by any organisation posing potential conflict of interest with the Council. It also needs to indicate whether it has been convicted of a criminal offence relating to the conduct of its business or profession (London Borough of Camden, undated-2).

10.3.4 Economic sustainability

Whole life value for money

In its contract strategy, Camden indicates that one of the issues that need to be considered is how value for money improvements would be assessed in tender evaluation, what measures would be taken to track these improvements, and how such improvements impact the budget.

One of the key points included in Camden’s Procurement Policy and Strategy, shows that “procurement decisions, whilst designed to deliver maximum financial savings, will be focused on whole life considerations, not mere price reduction” (London Borough of Camden, 2002). The strategy clearly shows that whole life calculations are included in the tender process (London Borough of Camden, 2002). London Borough of Camden (undated-1) and London Borough of Camden (2004) show the
results of undertaking whole life costing calculations for several products and materials. Examples include calculations for windows materials (such as timber, PVCU, aluminium, etc.) and for floor covering materials (such as linoleum, vinyl, rubber, etc.). Such calculations show how the use of sustainable solutions could deliver savings over the whole life. For example, whole life costs of high performance timber can be significantly lower than whole life costs of PVCU.

- Competitiveness

In relation to competitiveness, a key point to note within the Council's procurement policy and strategy is that procurement would be based upon fair competition (London Borough of Camden, 2002).

10.3.5 Environmental sustainability

- Reducing energy consumption

One key objective of the Sustainable Construction Policy of the Council is to minimise the use of energy through considering various measures, including renewable energy, natural light and ventilation, materials that use less energy in manufacturing and transport, wall insulation, roof/loft insulation, gas condensing boilers, heating controls, and high performance double glazing (London Borough of Camden, 2004). In its contracting strategy, Camden Council lists energy consumption as one of the possible environmental risks that need to be considered in terms of frequency and severity (London Borough of Camden, 2005b).

- Reducing water consumption

The Sustainable Construction Policy of the Council highlights conservation of water as one of its key objectives. Several measures could be taken to achieve this objective. Among these are using low volume baths, showers, taps and toilets as well as recycling water, where possible (London Borough of Camden, 2004).

- Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)

The Council provides clear statements regarding the need to use sustainable materials. In relation to timber, for example, the Council shows that all timber materials must be from sustainable sources and that this should be demonstrated by a chain of custody from the Forest Stewardship Council (FSC) or equivalent system (London Borough of
In its contracting strategy, Camden Council indicates the need to consider whether the product is made of unsustainable materials and whether the contractor uses such materials (London Borough of Camden, 2005b).

The Sustainable Construction Policy and Programme of the Council includes the specification of environmentally-friendly materials such as recycled cellulose insulation, low solvent paints, linoleum flooring and steel guttering (London Borough of Camden, 2004). A key part of the Policy and Programme examines the use of sustainable materials and shows the performance of alternative materials with regards to particular aspects that are related to sustainability. For example, alternative window frame materials (such as Timber, Aluminium, PVC, etc.) are compared in terms of their performance in relation to embodied energy, life years, maintenance, repairing, recycling, and disposal hazards (London Borough of Camden, 2004).

- Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources

The Council's policies and strategies reflect the Council's interest in using renewable resources. In the context of renewable energy, for example, the Sustainable Construction Policy and Programme shows that one of its key objectives is to minimise energy use by considering several measures, including renewable energy (London Borough of Camden, 2004). The Council's policies show its commitment towards achieving such an objective at the present time and in the future. For example, Camden's Unitary Development Plan encourages renewable energy systems like solar thermal panels, which use the sun's energy for heating water (London Borough of Camden, undated-1; London Borough of Camden, 2004). In its additional sustainable construction options for consideration in the 2009-2010 capital programme, the policy shows the most applicable renewable energy technologies for use in cities. Among these are solar thermal and solar photo voltaic (PV), which convert's sun energy into electricity (London Borough of Camden, 2004).

- Minimising water, land and air pollution (including noise)

In its contracting strategy, Camden Council lists emissions to air, releases to water, and contamination of land among the possible environmental risks that need to be considered in terms of frequency and severity (London Borough of Camden, 2005b). The need to minimise such environmental impacts has also been declared among the
key objectives of the Sustainable Construction Policy and Programme (London Borough of Camden, 2004).

- Preserving and enhancing biodiversity

In its Contracting Strategy, the Council lists destruction of biodiversity among the possible environmental risks that need to be considered in terms of frequency and severity (London Borough of Camden, 2005b). In addition, a number of plans and policies such as Camden’s Biodiversity Action Plan and Camden’s Corporate Environmental Policy reflect the commitment of the Council to preserving and enhancing biodiversity (London Borough of Camden, undated-1; London Borough of Camden, 2004). Such an objective has also been declared as one of the key objectives of the Council’s Sustainable Construction Policy and Programme (London Borough of Camden, 2004, p. 10). The Council shows that any construction should protect and where possible enhance the habitat of certain species (London Borough of Camden, undated-1). The Council highlights certain actions to promote diversity such as installation of green roofs; raising awareness of biodiversity amongst residents, consultants and contractors; and liaising with the Council’s conservation officer on opportunities for promoting biodiversity (London Borough of Camden, undated-1).

- Waste minimisation and management

In its Contracting Strategy, the Council lists production of waste amongst the possible environmental risks that need to be considered in terms of frequency and severity (London Borough of Camden, 2005b). The need to minimise environmental impacts of on site operations including production of waste have also been declared among the key objectives of the Sustainable Construction Policy and Programme (London Borough of Camden, 2004). Among the actions that could be taken to achieve such an objective is including requirements in contract documents that contractors reuse and recycle construction waste where possible.

- Creating a healthy, non-toxic environment (e.g. high indoor air quality)

The Sustainable Construction Policy of the Council shows that one of its main objectives is using the most environmentally and socially responsible goods and services in consistency with good performance (London Borough of Camden, 2004). This involves avoiding materials, where possible, with significant environmental risk during the life cycle. Examples of actions highlighted by the Council to achieve this include using low solvent paints (as this can lead to reducing volatile organic solvents
and risk of smog and indoor pollution) and using linoleum in place of vinyl flooring (as this can lead to reducing toxic chemicals) (London Borough of Camden, 2004; Mr Chong Interview, p. 7). The Sustainable Construction Policy and Programme of the Council presents the disadvantages associated with using PVC. Among these are its high chlorine content and toxic additives, including lead and cadmium. The Sustainable Construction Policy and Programme of the Council highlights also the performance of alternative window frame materials, such as timber, aluminium, etc. (London Borough of Camden, 2004).

- Considering transport issues (e.g. public transport provision, reducing the need to travel)

In its contracting strategy, the Council relates transport to emissions to air, which is considered by the strategy as one of the environmental risks that need to be considered in terms of frequency and severity (London Borough of Camden, 2005). The Council also indicates that one of the key objectives of its sustainable construction policy is to minimise the environmental impacts of on site operations, including use of transport.

10.4 Case study 2: Nottinghamshire County Council

10.4.1 The Council views in relation to sustainability and procurement

Nottinghamshire covers an area of 2085 sq km has a population just under 750,000 and a workforce of 350,000 (Nottinghamshire County Council, 2006a). The main construction activities of Nottinghamshire County Council involve building roads, public buildings, schools, etc. (Mr Brown interview, pp. 8, 9).

The Council recognises the growing role of public procurement in delivering sustainable development objectives and shows that its procurement activities should contribute to the social, economic and environmental well being of the County (Nottinghamshire County Council, 2003; Nottinghamshire County Council, 2006b). The Council considers sustainability as one of four corner stones underpinning the priorities and the targets for improvement in its strategic plan (Nottinghamshire County Council, 2003).

The Council states that the principles of sustainable development are consistent with the organisation’s policies and argues that the government approach to best value in its procurement enables sustainability to be taken into account (Nottinghamshire
County Council, 2003; Nottinghamshire County Council, 2005a). In this context, the Council views social factors of sustainable development (including benefits to local people, good workforce management, diversity and fairness) as key factors contributing to best value (Nottinghamshire County Council, 2003).

The commitment to sustainability has implications regarding how construction is procured by the Council. Construction is considered as one of the Council's largest areas of spend. Works undertaken by the Council in this sector involve buildings and highways works (Nottinghamshire County Council, 2003).

10.4.2 Reflecting the Council's views in relation to sustainability in its policies, guidance, and procedures

In line with the commitment to sustainable development are the development by the Council of several policies and guidance focusing on sustainable development issues and the integration of such issues within the Council's systems and procedures. Among these, for example, is the Nottinghamshire and Nottingham Joint Structure Plan (JSP), which is the strategic land use plan for the County and the City (Nottinghamshire County Council and City of Nottingham, 2003). The Council shows that JSP seeks to ensure that development is carried out in consistency with sustainable development (Nottinghamshire County Council and City of Nottingham, 2003). In this context, the Council adopts the view that integrating of social, economic, environmental dimensions in development proposals and encouraging development which works positively towards all three dimensions are the key to sustainable development (Nottinghamshire County Council and City of Nottingham, 2003).

In addition to the development of JSP, the Council produced other guidance which focuses, within the context of the Council's procurement, on other aspects of sustainability e.g. health and safety, equality issues, local community, and environment (Nottinghamshire County Council, 2006b; Nottinghamshire County Council, 2006c; Nottinghamshire County Council, 2006d; Nottinghamshire County Council, 2006e). Moreover, the Council integrated such aspects within the pre-qualification procedures of the organisations providing construction services and of the organisations providing consultancy on property and design management (Nottinghamshire County Council, 2005b; Nottinghamshire County Council, 2005c).
10.4.3 Social Sustainability

- Improving health and safety performance

The Council clearly shows its obligations and responsibilities towards providing a safe place of work and a healthy working environment for all its employees as well as the persons who are engaged in providing services for it (including contractors, consultants, etc.) (Nottinghamshire County Council, 2006c). It also clarifies the regulations that are relevant in this regard, including the Health and Safety at Work Act 1974; the Management of Health and Safety at Work Regulations 1999; and the Construction (Design and Management) Act 1994. The Council shows that contractors need to comply with the relevant legislation and highlights the need to assess potential risks. It also demands businesses to provide evidence to demonstrating that their organisations promote and manage health and safety (Nottinghamshire County Council, 2006c)

In addition to the above, the Council allocates a section for health and safety within the pre-qualification questionnaires targeting the organisations which provide construction services and organisations providing consultancy on property and design management (Nottinghamshire County Council, 2005b). In that section, companies were asked in particular about issues including:

- their health and safety policy
- the company’s arrangements for ensuring the satisfactory communication of health, safety and welfare information for employees
- whether the company is a member of any health and safety and/or trade Association
- risk assessments
- whether the company has been subject of any health and safety enforcement action in the past 5 years
- whether the company has a safety training policy
- whether the company has a procedure for reporting and investigating accidents
- the company’s key performance indicator for safety for the past 3 years, and
- the company's health and safety record over the past 3 years including details of any notifiable accidents, prosecutions or notices issued by the Health and Safety Executive which have occurred during this period.

The Council shows that companies failing to exceed certain number of marks in the health and safety section would be rejected without further consideration (Nottinghamshire County Council, 2005b). Health and safety issues are always highlighted by the Council in the project brief (Mr Brown interview, p. 2)

- Participation of stakeholders (including community involvement)

The Council considers stakeholders' involvement as a critical factor for successful procurement and emphasises the importance of their input, their involvement in the development of the requirements and specification, and their buy-in to minimise variations and discontent after contract award (Nottinghamshire County Council, 2003; Nottinghamshire County Council, 2005a). The consultation process undertaken by the Council normally involves typical stakeholders such as the local community and the users of the facility. Such a process might be undertaken by the Council or by a contractor on behalf of the Council, as in some big projects (Mr Brown interview, pp. 2, 3).

- Social inclusion (including tackling poverty and social exclusion)

In general, social inclusion is one of the Council’s core objectives and is built into its policies (Mr Brown interview, p. 3). The Council shows that new development can promote social inclusion through ensuring that a provision to meet the variety of needs within the community is in place (Nottinghamshire County Council and City of Nottingham, 2003). In this context, the Council stresses the importance of maximising the opportunity to attain balanced communities through providing a choice of house type, size and affordability within housing sites. It also highlights the need to foster a sense of place through design to create an attractive, safe and accessible environment. The Council also shows that development needs to improve the economy, services and environment in disadvantaged areas (Nottinghamshire County Council and City of Nottingham, 2003)

In its Procurement Strategy, the Council promotes local sourcing and local supply. It shows that the policies oriented towards such principles can help in creating local jobs
and affording training opportunities within local communities, particularly those communities suffering economic disadvantages (Nottinghamshire County Council, 2003). Consideration of the needs of the different groups in designing a facility (such as disabled people or people whose first language is not English) and the provision of public transport are also examples of social inclusion aspects considered by the Council (Mr Brown interview, p. 3).

- Creating employment opportunities

The Council shows that the policies oriented towards local sourcing and local supply could help in employing local workforce, stimulating turnover and trade and therefore sustaining and creating employment (Nottinghamshire County Council, 2003). The Council indicates its ability to use procurement to help in delivering some of its core policy objectives. In this context, it shows that, in a construction contract, it could include a community benefit clause requiring the employment of young trainees or unemployed people could be included (Nottinghamshire County Council, 2006b).

- Training and development of the workforce

The Council shows that a key objective is to develop the Government’s Rethinking Construction Agenda and to apply the appropriate principles to the Council’s construction related procurement activities (Nottinghamshire County Council, 2003). It also emphasises the need to make construction services and internal processes aligned with these principles. Among such principles is commitment to people which involves, among other issues, commitment to training and development of committed and highly capable managers and supervisors.

The commitment by the Council to training and development of the workforce has also been reflected in its pre-qualification questionnaires (Nottinghamshire County Council, 2005b; Nottinghamshire County Council, 2005c). In these questionnaires, companies were asked in particular to submit their training policy or to state how training is managed in their organisations. In cases involving the selection of a suitable consultant to provide consultancy advice, the Council would consider, among other issues, assessing the qualifications and the experience of the people who would be allocated to provide this advice (Mr Brown interview, p. 6).

- Equality and diversity in the workplace

The Council highlights its duty to promote equal opportunity and shows the importance of ensuring that all providers of Council services practice equal
opportunity and are aware of the requirements placed upon them in this regard (Nottinghamshire County Council, 2003; Nottinghamshire County Council, 2006d). The Council shows that failure to comply with equality policy could prevent organisations from being allowed to tender (Nottinghamshire County Council, 2006d).

The Council shows that greater importance would be given to the answers of the questions which are asked at the pre-qualification stage and which refer to an external provider’s policy and practice about discrimination (Nottinghamshire County Council, 2006d, p. 2). Questions within the prequalification questionnaire which targets companies providing construction services and those providing consultant property and design management include, among others, questions about whether the company has an equal opportunities policy; whether the company complies with statutory obligations regarding equal opportunities (e.g. in relation to colour, ethnic origin, gender, race, disability, age, etc.); and whether any finding of discrimination has been made against the company in the past three years (Nottinghamshire County Council, 2005b; Nottinghamshire County Council, 2005c).

The Council shows that clauses covering equalities and extending to contractors and subcontractors will be included in all contracts for services (Nottinghamshire County Council, 2006d). It shows that it would make clear notice in the OJEU that a successful contract would be required to comply with additional questions about providing equal opportunities in relation to gender, race, disability, age, etc. (Nottinghamshire County Council, 2006d)

- Improving workforce satisfaction & improving working environment and conditions

As discussed before, the Council emphasises the need to make construction services and internal processes aligned with the principles of Rethinking Construction (Nottinghamshire County Council, 2003). Among such principles is commitment to people which involves issues such as decent site conditions, fair wages and care for the health and safety of the workforce, and training and development of managers and supervisors. The Council shows that full disclosure of workforce information from tenderers (including arrangement and practices for training, health and safety) is among workforce matters that must be considered during the procurement process (Nottinghamshire County Council, 2003).
- Creating a positive impact on the local environment (e.g. local community, business, infrastructure)

The Council recognises that care over the means of procurement could bring significant local benefits (Nottinghamshire County Council, 2003). Among such benefits are employing local workforce, stimulating turnover and trade, and providing training.

The Council shows that it will build community benefit clauses in its procurement process (Nottinghamshire County Council, 2006b). As discussed above, in a construction contract, for example, the Council shows that it could include a community benefit clause requiring the employment of young trainees or unemployed people (Nottinghamshire County Council, 2006b). The Council also allows for the inclusion of community benefit clause in the contract specification where such a clause is relevant to the product or the service being procured and helps the Council in delivering its key policy objectives (Nottinghamshire County Council, 2006b). The Council also indicates that community benefit clauses included in the contract specification can be scored as part of the tender evaluation process (Nottinghamshire County Council, 2006b).

- Promoting ethical practices

The Council considers ethical procurement among the key factors contributing to successful procurement and highlights its role in enhancing client’s reputation and attracting best suppliers (Nottinghamshire County Council, 2003). In its pre-qualification questionnaires, the Council included several questions related to ethical issues, such as whether there were claims or litigation made against the company submitting the questionnaire; whether the company was convicted of a criminal offence or committed an act or grave misconduct in the course of its business or profession (Nottinghamshire County Council, 2005b; Nottinghamshire County Council, 2005c).

Ethical issues also involve questions about offers or gifts by tenderers. In the pre-qualification stage, the Council clarifies that it is a criminal offence to give or offer any gift or consideration whatsoever as an inducement or reward to any servant of a public body and that such an action would empower the Council to cancel any contract (Nottinghamshire County Council, 2005c).
Preservation of culture and heritage

The Council considers the issue of preserving culture and heritage at the early stages of the project life cycle (before the start of the procurement process) (Mr Brown interview, p. 7). The Council shows that development proposals affecting archaeological sites or their settings will only be permitted where the need for this development outweighs the relative importance of the remains and/or the settings. The Council indicates that where development is permitted, priority would be given to preserving archaeological interest. It shows that where preservation is not feasible or justified, conditions would be imposed to ensure that full surveys, excavation and recording of the remains are undertaken (Nottinghamshire County Council and City of Nottingham, 2003).

10.4.4 Economic sustainability

- Consideration of whole life costing and Whole life value for money

The Council’s views regarding whole life costing are reflected through its commitment to value for money principles. In its Procurement Strategy, the Council shows the necessity of taking all procurement decisions on the basis of value for money, which is the optimum balance of whole-life cost and quality to meet client’s needs. The Council clearly shows that awarding contracts based on the lowest price only is unlikely to offer the best deal (Nottinghamshire County Council, 2003).

- Economic Key Performance Indicators (KPIs)

In its pre-qualification questionnaire and Procurement Strategy, the Council shows that one of its main objectives is to deliver projects to appropriate quality, time and budget. To achieve its objectives, the Council highlights the need to formulate and strive for continuous self improvement through measurable Key Performance Indicators (KPI’s) (Nottinghamshire County Council, 2005b; Nottinghamshire County Council, 2005c). The Council’s consideration of KPIs has also been confirmed in the interviews (Mr Brown interview, p. 11).

- Improving the efficiency of the supply side

In its pre-qualification questionnaires for companies providing construction services and those providing consultancy in property and design management, the Council includes questions which are related to efficiency within the supply side. Among these, for example, are questions about how the company’s policy deals with the
selection and use of sub-contractors; how the company ensures that its subcontractors would deliver to both the quality and time constraints of the project, how the company manages sub-contract resourcing problems, and how the company ensures good working relationships with its subcontractors (Nottinghamshire County Council, 2005b; Nottinghamshire County Council, 2005c).

- Competitiveness

In its Procurement Strategy, the Council establishes a requirement for all procuring departments to adhere to and to promote best value principles, including encouraging competition where appropriate (Nottinghamshire County Council, 2003).

10.4.5 Environmental sustainability

- Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)

The Council shows that one of the objectives set to realise the vision of JSP is to ensure that finite natural resources are managed prudently. This involves maximising the use of urban and previously developed land (Nottinghamshire County Council and City of Nottingham, 2003). The Council adopts a sequential approach for selection of land for development. In this approach, priority order is given to suitable previously developed sites and buildings within urban areas which are or will be served by public transport (Nottinghamshire County Council and City of Nottingham, 2003; Mr Brown interview, p. 13). The Council also shows its commitment to the targets set by the government in relation to promoting the use of previously developed land. For example, the government aims to have 60% of new residential development on previously developed land (Nottinghamshire County Council and City of Nottingham, 2003).

- Reducing energy consumption, reducing water consumption, selection and use of materials, considering the use of renewable resources and reducing the use of non-renewable resources

The Council highlights the need to address environmental impact of procurement (Nottinghamshire County Council, 2003). It encourages all development to have high standards of design and energy efficiency. The Council shows that the setting, design and location of new development can have an important role in reducing energy consumption. In this context, it highlights the role of mixed use development with
good public transport in reducing the need to travel and shows that the setting and the materials used in new buildings can maximise solar heat gain (Nottinghamshire County Council and City of Nottingham, 2003). The interviews showed that where appropriate, the Council considers the use of systems which utilise renewable resources, such as wood burning boilers (Mr Brown interview, p. 14). The Council also showed that the opportunities of having systems and fixtures maximising the efficient use of energy and water (e.g. rain water harvesting systems) are related to the procurement route adopted. Such opportunities are greater where the Council pays for and constructs its buildings than in case the Council adopts the PFI route (Mr Brown interview, pp. 13-14).

- Minimising water, land and air pollution (including noise)

In its policy regarding control of pollution, the Council states that all new developments would minimise or avoid air, land, water, noise, and light pollution by means including good design and control of operations (Nottinghamshire County Council and City of Nottingham, 2003). The Council also shows the necessity of having a level of risk which is acceptable and/or can be successfully mitigated in any development proposals that are sensitive to existing and future sources of potential hazard, pollution or nuisance (Nottinghamshire County Council and City of Nottingham, 2003). The Council also requires its contractors to comply with relevant legislation and highlights the importance of avoiding disturbance to the local community and night time working (Mr Brown interview, pp. 7, 8, 14).

- Preserving and enhancing biodiversity

The Council considers biodiversity as a key test to sustainability. Preserving and enhancing biodiversity involve passing a healthy and diverse environment on to future generations (Nottinghamshire County Council and City of Nottingham, 2003). The Council shows that it will encourage protection and enhancement of the County’s biodiversity to ensure that there is no net loss of biodiversity Action Plan habitats (Nottinghamshire County Council and City of Nottingham, 2003).

The Council’s focus on biodiversity issues is clearly established in site selection (Mr Brown interview, p. 15). The Council shows that planning permission for development likely to cause harm to a species or its habitat protected in law will only be given if the overriding need for the development is demonstrated. In addition, the Council highlights the necessity of undertaking full survey of the affected species in
order to obtain the permission (Nottinghamshire County Council and City of Nottingham, 2003).

As the Council shows, if such permission is obtained, conditions and/or planning obligations will be sought to secure protection of affected species (Nottinghamshire County Council and City of Nottingham, 2003).

- Considering transport issues

The Council shows that the transport policies of JSP involves priorities for reducing congestion and for improving accessibility through integrating transport and land use, reducing the need to travel and promoting the use of public transport (Nottinghamshire County Council and City of Nottingham, 2003). The interviews conducted confirm that when selecting a site for a facility, the Council pays attention to issues such as the accessibility of that facility by the community and its closeness to public transport (Mr Brown interview, p. 15).

- Protecting and enhancing sensitive landscapes

In describing how it can promote sustainable development, the Council shows that it would encourage the protection and the enhancement of the distinctive landscape character of the County (Nottinghamshire County Council and City of Nottingham, 2003; p. 10). The Council shows that development proposals have to consider the characteristics of the area in which they are located and have to encourage local distinctiveness, a sense of place and respect for the historic character of the area (Nottinghamshire County Council and City of Nottingham, 2003). Further details in relation to developments affecting archaeological sites were provided in Section 4.3.13.

10.5 Conclusions

The conclusions derived were divided into two sets. The first set focuses on addressing sustainability in general (Section 10.5.1) while the other set focuses on addressing specific sustainability criteria (Section 10.5.2).

The results reported in this chapter were incorporated in the framework that was developed in this thesis and which is shown Figure 11.1. The part of the framework which involves the results reported in this chapter is clearly shown in Figure 10.2 (presented in black font colour).
10.5.1 Conclusions regarding how public clients are addressing sustainability in procurement strategies, policies, guidelines or procedures

The case studies introduced in this chapter show that public clients are addressing sustainability in their procurement strategies, policies, guidelines or procedures through:

- emphasising the government approach to best value in its procurement for sustainability (as in the case study of Nottinghamshire County Council)
- considering sustainability as a key objective in the organisation’s high level strategic plans (as in the case study of Nottinghamshire County Council)
- developing an environmentally and socially responsible procurement policy (as in the case study of Camden Council)
- emphasising, in the organisation’s procurement strategy/policy, the need to conduct procurement with due regard to sustainability issues throughout the supply chain (as in the case study of Camden Council)
- emphasising commitment to sustainable construction in newsletters and at relevant meetings with consultants, contractors, residents and other stakeholders (as in the case study of Camden Council)
- conducting sustainability analysis within the organisation’s contracting strategy (including conducting environmental risk analysis and drawing up the results of such an analysis in the specifications and other documentation) (as in the case study of Camden Council)
- coordinating the work on sustainable procurement by a strategic procurement unit within the organisation to ensure that sustainability was embedded into all procurement practices (as in the case study of Camden Council)
- appointing a designated sustainable procurement officer (as in the case study of Camden Council).
10.5.2 Conclusions regarding how public clients are addressing specific sustainability criteria in procurement strategies, policies, guidelines or procedures

The case studies introduced this chapter show that public clients are addressing specific sustainability criteria in their procurement strategies, policies, guidelines or procedures through:

- raising awareness of specific sustainability criteria among stakeholders (as in the case of the criterion preserving and enhancing biodiversity in the case study of Camden Council)
- clarifying how specific sustainability issues can deliver savings on the long term (as in the case of showing the results of undertaking whole life costing calculations for several products and materials in the case study of Camden Council)
- developing policies that are relevant to specific sustainability criteria (as in the case of developing the Biodiversity Action Plan and the Waste Minimisation Strategy in the case study of Camden Council)
- producing guidance which focuses on specific sustainability criteria (as shown in the case study of Nottinghamshire County Council)
- setting targets relevant to specific sustainability criteria in the organisation’s procurement strategy/policy (as in the case study of Camden Council)
- clarifying the regulations that are relevant to specific sustainability criteria (as discussed in relation to the issue of health and safety and the issue of pollution in the case study of Nottinghamshire County Council)
- clarifying measures to achieve specific sustainability objectives (as the case study of Camden Council shows in relation to taking measures to minimise energy use and taking measures to reduce water consumption)
- highlighting the use of environmentally and socially responsible goods and services as a main objective in the organisation’s policies (as discussed in relation to the issue of creating a healthy, non-toxic environment in the case study of Camden Council)
- showing the performance of alternative materials in relation to certain environmental issues (as shown in the discussion about creating a healthy, non-
toxic environment in the case study of Camden Council, particularly in relation to showing the performance of PVC, timber and aluminium)

- adopting standards in design that are related to specific sustainability criteria (as in the case of adopting standards in design that are related to reducing energy consumption in the case study of Nottinghamshire County Council)

- considering specific sustainability criteria within the organisation's contract strategy (as shown in the discussion provided in the case study of Camden Council in relation to the issues of stakeholders' involvement, consideration of user needs and satisfaction, and equality and diversity)

- including policy statements, within the instructions to tender, regarding specific sustainability criteria (as discussed in relation to reducing vehicle emissions in the case study of Camden Council)

- including requirements for contractors to deliver specific sustainability criteria in contract documents (as discussed in relation to reuse and recycling of construction waste in the case study of Camden Council)

- requiring tenderers to provide evidence demonstrating their organisations' commitment to delivering specific sustainability criteria (as discussed in relation to health and safety issues in the case study of Nottinghamshire County Council)

- including clauses in contracts that are related to delivering specific sustainability criteria (as in the case of the clauses requiring the employment of young trainees or unemployed people in the case study of Nottinghamshire County Council - such clauses are related to creating employment opportunities)

- preventing potential tenderers from being allowed to tender if they fail to comply with policies related to specific sustainability criteria (as discussed in relation to the equality policy in the case study of Nottinghamshire County Council)

- showing in OJEU that a successful contractor will be required to comply with additional questions about issues related to specific sustainability criteria (as discussed in relation to gender, race, disability and age in the case study of Nottinghamshire County Council)

- evaluating the tenderer's performance on specific sustainability criteria as one
of the elements included within the pre-qualification questionnaire (as discussed in relation to the issue of health and safety and the issue of equality and diversity in the case studies of Camden Council and Nottinghamshire County Council)

- promoting addressing specific sustainability criteria by the organisation’s vendors (as discussed in relation to promoting the use of local labour by the Council’s vendors in the case study of Camden Council)

- integrating the risks related to specific sustainability criteria within the risks that need to be managed (as discussed in the case study of Camden Council in relation to environmental risks, such as air, water and contamination of land)

- establishing linkages between procurement within the organisation and national agendas/initiatives focusing on specific sustainability criteria (as discussed in the case study of Nottinghamshire County Council in relation to linking procurement of the organisation to the principles of the Government’s Rethinking Construction)

- establishing commitment to targets which were set by the government and which are related to specific sustainability criteria (as discussed in the case study of Nottinghamshire County Council in relation to commitment to targets set by the government on use of previously developed land)

- liaising with the organisation’s officers and specialists to promote specific sustainability criteria (as in the case of liaising with the conservation officer to identify opportunities for promoting biodiversity in the case study of Camden Council).
Figure 10.2 - Incorporating the results obtained in Chapter 10 in the framework developed in this thesis and which is shown in Figure 11.1
Chapter 11: Conclusions and further research

11.1 Introduction

This research aimed at developing a theoretical framework to assist UK public clients in addressing sustainability issues in construction projects' procurement strategies. Six objectives were set to achieve this aim.

Achieving these objectives was described throughout the chapters of this thesis. This chapter summarises how the aim and the objectives were achieved, shows the contribution of this thesis to the existing body of knowledge and highlights its limitations. The chapter presents recommendations for the key parties which are able to advance the sustainable procurement agenda and provides recommendations for further research.

11.2 Achieving the aim and the objectives

11.2.1 Achieving the aim

As mentioned in Section 11.1, six objectives were set to achieve the aim of the thesis. For the needed framework to be helpful, public clients need to fully and clearly understand what sustainability considerations (whether social, economic or environmental) need to be addressed in their procurement strategies (objective 1 of this research). Once the considerations are identified, there is a need to identify what would enable them to address these considerations (e.g. regulatory factors, contractual factors, etc.) (objective 2). Several barriers however are expected. These barriers, in addition to the parties who are best placed to remove them, need to be identified (objectives 3 and 4). Moreover, there is a need to identify whether or not the different sustainability considerations are addressed in real practice to enable turning the focus to sustainability areas that are not receiving sufficient attention (objective 5). Finally, there is a need to provide examples and demonstrations from the "real world" about organisations demonstrating good practice in sustainable construction procurement (objective 6).

The objectives of the research were achieved (as shown throughout this thesis and as will be summarised in this chapter). The main results attained were incorporated in the framework shown in Figure 11.1; thereby the aim of this thesis was achieved.
Figure 11.1 – A framework for addressing sustainable construction in procurement strategies
11.2.2 Achieving the objectives

11.2.2.1 Achieving objective 1: To develop agreed sets of the major sustainability criteria that should be addressed by UK public clients in developing a procurement strategy

Achieving sub-objective 1a: To develop an agreed set of the major social sustainability criteria that should be addressed by UK public clients in developing a procurement strategy

The Delphi Exercise (described in Section 3.3.1) was used to achieve this sub-objective. The three rounds of Delphi led finally to identifying 16 social sustainability criteria that were confirmed by the respondents as important criteria (details were provided in Chapter 4). The criteria developed included:

- S1: Improving health and safety performance
- S2: Participation of stakeholders (including community involvement)
- S3: Social inclusion (including tackling poverty and social exclusion)
- S4: Seeking intergenerational equity by considering cost for future generations
- S5: Consideration of user needs and satisfaction (including accessibility)
- S6: Creating employment opportunities
- S7: Training and development of the workforce
- S8: Equality and diversity in the workplace
- S9: Improving workforce satisfaction
- S10: Improving working environment and conditions
- S11: Creating a positive impact on the local environment (e.g. local community, business, infrastructure)
- S12: Promoting ethical practices
- S13: Preservation of culture and heritage
- S14: Minimising the disruptive impacts of construction (e.g. noise)
- S16: Improving security and reducing crime
- S17: Building and maintaining social capital

In three of the techniques used in this research (the semi-structured interviews, the interviews included within the case studies, and the questionnaire directed to local
authorities in the questionnaire survey), the opportunity was given to the interviewees (12 interviewees in total), and the respondents to the questionnaire survey (132 respondents in total) to comment on any of the items included within the interview guide or the questionnaire. No negative comments by the interviewees or by the respondents were provided in relation to the social sustainability criteria. No additional social sustainability criteria were suggested.

Achieving sub-objective 1b: To develop an agreed set of the major economic sustainability criteria that should be addressed by UK public clients in developing a procurement strategy

As with sub-objective 1a, the Delphi Exercise was used to achieve sub-objective 1b. The three rounds of Delphi led finally to identifying 12 economic sustainability criteria that were confirmed by the respondents as important criteria (details were provided in Chapter 5). The criteria developed included:

- E1: Clear establishment of need and evaluation of alternative options
- E2: Whole life value for money
- E3: Supporting the regional/local economy (including stimulating demand for local labour, businesses, materials and services)
- E4: Creating employment opportunities
- E5: Fitness for purpose (including consideration of long term flexibility)
- E6: Consideration of whole life costing
- E7: Economic Key Performance Indicators (KPIs)
- E8: Waste minimisation and management
- E9: Improving the efficiency of the supply side
- E10: Financial affordability for intended beneficiaries
- E11: Competitiveness
- E12: Consideration of effective logistics strategies

As with achieving sub-objective 1a, no negative comments by the interviewees or by the respondents to the questionnaire survey were provided in relation to the economic sustainability criteria. No additional economic sustainability criteria were suggested.
Achieving sub-objective 1c: To develop an agreed set of the major environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy

As with sub-objectives 1a and 1b, the Delphi Exercise was used to achieve sub-objective 1c. The three rounds of Delphi led finally to identifying 13 environmental sustainability criteria that were confirmed by the respondents as important criteria (details were provided in Chapter 6). The criteria developed included:

- N1: Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)
- N2: Reducing energy consumption
- N3: Reducing water consumption
- N4: Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)
- N5: Reusing existing built assets
- N6: Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources
- N7: Minimising water, land and air pollution (including noise)
- N8: Preserving and enhancing biodiversity
- N9: Waste minimisation and management
- N10: Minimising negative visual impact
- N11: Creating a healthy, non-toxic environment (e.g. high indoor air quality)
- N12: Considering transport issues (e.g. public transport provision, reducing the need to travel)
- N13: Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)

As with achieving sub-objectives 1a and 1b, no negative comments by the interviewees or by the respondents to the questionnaire survey were provided in relation to the environmental sustainability criteria. No additional environmental sustainability criteria were suggested.
Achieving objective 2: To develop the factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy

While objective 1 focused on identifying what sustainability considerations should be addressed by public clients, objective 2 paid attention to what would enable UK public clients to better address these considerations. Adopting a triangulation approach, the factors which are important for UK public clients to better address sustainable construction in developing a procurement strategy were identified using the Delphi Exercise as well as semi-structured interviews/case studies. Adopting such an approach led to obtaining more confidence in the results as well as increasing reliability and validity (as shown in Section 3.4.3). In total, 41 factors were identified. Among these, 25 factors were obtained by both the Delphi Exercise and confirmed by interviews/case studies, 11 factors were obtained by the Delphi Exercise only, and 5 factors were obtained by the interviews/case studies only (details were provided in Chapter 7). The factors were categorised into 8 main categories (as was shown in Table 7.4). These included:

- Knowledge and perception factors
- Organisational and management factors
- Political and regulative factors
- Contractual factors
- Instrumental factors
- Logistical factors
- Strategic factors, and
- Financial factors

Knowledge and perception factors include the following:

- F1: Developing a common understanding of what constitutes sustainable development
- F4: Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors
- F5: Ensuring that client organisations have clear policies and guidelines
regarding the application of sustainability principles

- F13: Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions

- F18: Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)

- F25: Evaluating alternative procurement methods/routes in terms of their potential to deliver sustainability objectives

- F35: Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle

- F37: Demonstrating the business case for taking the sustainability route

- F42: Improving communication and knowledge sharing within the client organisation regarding sustainability implementation and best practice.

Organisational and management factors include the following:

- F2: Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)

- F6: Ensuring involvement of all project stakeholders and consideration of their needs

- F9: Emphasising that sustainability is not to be compromised in the search for efficiency

- F11: Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)

- F15: Ensuring transparency in procurement decision making

- F17: Ensuring the consideration of whole life costing/value

- F34: Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle

- F41: Facilitating publicity of actions taken by public procurers towards addressing the sustainability agenda.
Political and regulative factors include the following:

- F3: Highlighting the need for regulations and government policies that are more consistent with sustainability
- F38: Greater focus, joined up thinking, leadership, and commitment by the government
- F40: Introducing more mandatory influence

Contractual factors include the following:

- F10: Highlighting sustainability in the project brief as a primary aim
- F12: Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)
- F16: Emphasising the importance of sustainability in tender evaluation and selection procedures
- F19: Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation
- F20: Requiring the supply side to demonstrate capability of delivering sustainability requirements
- F21: Encouraging tenderers to suggest innovative solutions and approaches that support the client’s overall sustainability objectives
- F23: Requiring the employment of a properly trained workforce within the supply side
- F24: Ensuring that payment mechanisms take account of whether sustainability requirements are delivered
- F32: Provision of incentives and rewards based on sustainability performance throughout the project life cycle

Instrumental factors include the following:

- F14: Ensuring that sustainability requirements can be clearly assessed and measured
- F30: Encouraging the incorporation of sustainability issues into value management
- F31: Encouraging the incorporation of sustainability issues into risk management
- F33: Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM).

Logistical factors include the following:
- F7: Ensuring timely involvement of project stakeholders
- F8: Allowing sufficient time in the programme to address and assess sustainability issues

Strategic factors include the following:
- F22: Promoting Corporate Social Responsibility policy and implementation
- F27: Encouraging long term contractual arrangements through strategic partnering (covering a series of projects)
- F28: Encouraging integrated supply chains
- F29: Encouraging the adoption of lean construction techniques
- F36: Promoting cultural change towards sustainability throughout the industry

Financial factors include the factor
- F39: Availability of funding.

11.2.2.3 *Achieving objective 3: To identify the barriers to better addressing sustainable construction in developing a procurement strategy*

This objective was achieved using questions of open-ended nature in the interviews/case studies (as discussed in Chapter 8). The analysis of the answers obtained led to the identification of 12 barriers. The barriers included:

- B1: Lack of awareness, understanding, information and demand
- B2: Vagueness of definitions and diversity of interpretations
- B3: Insufficient/confusing guidance, tools, demonstrations and best practice
- B4: Insufficient/inconsistent policies, regulations, incentives and commitment by leadership
- B5: Lack of funding and restrictions on expenditure
- B6: Separation between capital budget and operational budget
- B7: General perception that addressing sustainability leads to incurring greater capital cost.
- B8: Lack of sufficient time to address sustainability issues
- B9: Resistance to change
- B10: Lack of long term perspective
- B11: Insufficient integration and link up in the industry
- B12: Insufficient research and development.

11.2.2.4 Achieving objective 4: To identify the parties which are most capable of removing such barriers

As with objective 3, objective 4 was achieved using questions of open-ended nature in the interviews/case studies (as discussed in Chapter 8). The analysis of the answers obtained led to the identification of 4 parties who were considered as the most capable parties of removing the barriers. The parties included:

- P1: Government and regulatory bodies (in particular, OGC, Treasury, and DTI/Constructing Excellence) and individual public sector organisations
- P2: Supply chain
- P3: Professional/educational bodies
- P4: Users.

11.2.2.5 Achieving objective 5: To identify whether or not local authorities in the UK are following/planning to follow policies or guidelines which indicate the need to have sustainability considerations addressed in construction projects' procurement strategies

This objective was achieved using the questionnaire survey which targeted the people responsible for or involved in construction procurement in local authorities in the UK. The findings indicate that the majority of local authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have most of the social and the economic sustainability considerations and all the environmental
considerations (which were included in the questionnaire) addressed in their construction projects’ procurement strategies or contracts. However, the extent of this majority varies from one consideration to another. The majority of the respondents responded with a positive answer in relation to 15 out of the 17 social sustainability criteria included in the questionnaire; to 9 out of the 10 economic sustainability criteria included; and to all the 13 environmental sustainability criteria included. The results obtained highlight the extent to which attention is paid to each sustainability criterion by this sector of public procurers. Hence the results indicate the criteria that need further attention (i.e. criteria with corresponding percentage of positive answers that is less than 80%). Criteria of social sustainability that received the lower responses involved:

- S3: Social inclusion (including tackling poverty and social exclusion)
- S4: Seeking intergenerational equity by considering cost for future generations
- S6: Creating employment opportunities
- S9: Improving workforce satisfaction
- S12: Promoting ethical practices
- S17: Building and maintaining social capital.

Criteria of economic sustainability that received the lower responses involved:

- E2: Whole life value for money
- E7: Economic Key Performance Indicators (KPIs)
- E9: Improving the efficiency of the supply side
- E10: Financial affordability for intended beneficiaries
- E12: Consideration of effective logistics strategies.

Criteria of environmental sustainability that received the lower responses involved:

- N1: Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)
- N8: Preserving and enhancing biodiversity
- N9: Waste minimisation and management
- N10: Minimising negative visual impact
- N11: Creating a healthy, non-toxic environment (e.g. high indoor air quality)
• N12: Considering transport issues (e.g. public transport provision, reducing the need to travel).

The results obtained through the questionnaire survey could be expected in the light of recognising that local authorities are left to produce their own guidance to the extent they chose and that they are becoming under increased pressure towards adopting procurement strategies, policies and procedures that are addressing sustainable development issues.

11.2.6 Achieving objective 6: To identify and demonstrate how public clients are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedures

This objective was achieved through conducting case studies about public clients who are addressing sustainability criteria in their procurement strategies, policies, guidelines or procedure. Two case studies were conducted: one case study was conducted about London Borough of Camden and the other was conducted about Nottinghamshire County Council (details were provided in Chapter 10). Interviews and document analysis were utilised as the main sources of data in conducting the case studies. The conclusions derived were divided into two sets. The first set of focuses on addressing sustainability in general while the other set focuses on addressing specific sustainability criteria. The two sets of conclusions are introduced below.

**Conclusions regarding how public clients are addressing sustainability in procurement strategies, policies, guidelines or procedures**

The case studies introduced in Chapter 10 show that public clients are addressing sustainability in their procurement strategies, policies, guidelines or procedures through:

- Emphasising the government approach to best value in procurement for sustainability
- Considering sustainability as a key objective in the organisation's high level strategic plans
- Developing an environmentally and socially responsible procurement policy
- Emphasising, in the organisation's procurement strategy/policy, the need to
conduct procurement with due regard to sustainability issues throughout the supply chain

- Emphasising commitment to sustainable construction in newsletters, at relevant meetings with consultants, contractors, residents and other stakeholders
- Conducting sustainability analysis within the organisation's contracting strategy (including environmental risk analysis, drawing up the results of such an analysis in the specifications and other documentation)
- Coordination of the work on sustainable procurement by a strategic procurement unit within the organisation to ensure that sustainability was embedded into all procurement practices
- Appointing a designated sustainable procurement officer.

Conclusions regarding how public clients are addressing specific sustainability criteria in procurement strategies, policies, guidelines or procedures

The case studies introduced in Chapter 10 show that public clients are addressing specific sustainability criteria in their procurement strategies, policies, guidelines or procedures through:

- Raising awareness of specific sustainability criteria among stakeholders
- Clarifying how specific sustainability issues can deliver savings on the long term
- Developing policies that are relevant to specific sustainability criteria
- Producing guidance which focuses on specific sustainability criteria
- Setting targets relevant to specific sustainability criteria in the organisation's procurement strategy/policy
- Clarifying the regulations that are relevant to specific sustainability criteria
- Clarifying measures to achieve specific sustainability objectives
- Highlighting the use of environmentally and socially responsible goods and services as a main objective in the organisation's policies
- Showing the performance of alternative materials in relation to certain environmental issues
- Adopting standards in design that are related to specific sustainability criteria
- Considering specific sustainability criteria within the organisation's contract strategy
- Including policy statements, within the instructions to tender, regarding specific sustainability criteria
- Including requirements for contractors to deliver specific sustainability criteria in contract documents
- Requiring tenderers to provide evidence that demonstrates their organisations' commitment to delivering specific sustainability criteria
- Including clauses in contracts that are related to delivering specific sustainability criteria
- Preventing potential tenderers from being allowed to tender if they fail to comply with policies related to specific sustainability criteria
- Showing in OJEU that a successful contract will be required to comply with additional questions about issues related to specific sustainability criteria
- Evaluating the tenderer's performance on specific sustainability criteria as one of the elements included within the pre-qualification questionnaire
- Promoting addressing specific sustainability criteria by the organisation's vendors
- Integrating the risks related to specific sustainability criteria within the risks that need to be managed
- Establishing linkages between procurement within the organisation and national agendas/initiatives focusing on specific sustainability criteria
- Establishing commitment to targets which were set by the government and are related to specific sustainability criteria
- Liaising with the organisation's officers and specialists to promote specific sustainability criteria.

11.3 The contribution of the study

The contribution of this thesis to the existing body of knowledge is threefold: academic, procedural and methodological, as discussed below.
This thesis contributes to the academic field by addressing significant research questions that have not been addressed before. As shown in Section 1.1, despite the production of several publications by governmental departments and organisations (such as DETR (2000), GCCP (2000), OGC (2005a), DEFRA (2006a), and HM Government and Strategic Forum for Construction (2008)), none of these publications provided agreed, comprehensive and evidence-based sets of social, economic and environmental sustainability criteria that should be addressed by UK public clients in developing a procurement strategy. While OGC (2005a) represented a significant development in this regard, the evidence base of the information reported in that publication was not clear. Similarly, the evidence base of the other publications mentioned above was not clarified. Moreover, although these publications have highlighted many useful sustainability principles in general, some of them have not embraced important principles mentioned in the literature (such as creating employment opportunities or social inclusion) and others have not specifically addressed the stage of developing a procurement strategy. Such inadequacies have been overcome in this thesis. The whole range of sustainability criteria that should be addressed by UK public clients in developing a procurement strategy was identified and validated in this thesis, without overlooking any principles. In this way, this thesis covered gaps that publications such as GCCP (2000), DEFRA (2006a), and HM Government and Strategic Forum for Construction (2008) had not covered. Although social, economic, and environmental criteria were distinguished in the thesis, the interrelationships between these dimensions were also recognised. Again, publications such as GCCP (2000), DEFRA (2006a), and HM Government and Strategic Forum for Construction (2008) have not provided such distinction. Such contributions have been achieved through the development of the evidence-based framework which was developed in this thesis and which drew its components from a thorough analysis of information obtained from a variety of sources (e.g. public sector practitioners, academics, professionals/consultants, and contractors) and through utilisation of a variety of methods and techniques. In this way the lack of evidence-based frameworks, such as the framework shown in OGC (2005), has been covered.

The existing literature has not addressed the enablers and the barriers to sustainable construction procurement. In addition, although targets have been set by certain publications such as GCCP (2000), DEFRA (2006a), and HM Government and Strategic Forum for Construction (2008), no publications have identified the public
sector procurers’ current progress in relation to the sustainable procurement agenda, resulting therefore in a failure to identify areas of sustainability that should receive further attention. These deficiencies have been overcome in this thesis. In relation to the enablers, for example, they have been identified as those factors that are important to public clients to better address sustainable construction in developing a procurement strategy; these have been categorised into knowledge and perception factors, organisational and management factors, political and regulative factors, contractual factors, instrumental factors, logistical factors, strategic factors and financial factors. As for the barriers, 12 main barriers have been identified. Among these are barriers related to vagueness and diversity of definitions and interpretations; insufficiency of guidance and tools; insufficiency and inconsistency of policies, regulations and commitment by leadership; lack of funding; and separation of capital and operational budgets. Current progress in the field within a major sector of public procurers (i.e. local authorities) has been identified and areas of sustainability which have not been receiving sufficient attention were highlighted and included social sustainability criteria (such as social inclusion, seeking intergenerational equity by considering cost for future generations, creating employment opportunities and improving workforce satisfaction), economic criteria (such as whole life value for money, improving the efficiency of the supply side, and financial affordability for intended beneficiaries) and environmental criteria (such as preserving and enhancing biodiversity, waste minimisation and management and minimising negative visual impact). Informed decisions about introducing potential improvements in addressing sustainability can be made based on these findings.

The need for case studies demonstrating good practice in relation to sustainability issues has been highlighted in the literature. This need has not been met in relation to sustainable procurement; no detailed case studies have been provided by the literature in this regard. The thesis responded to this need and presented two case studies about two public client organisations demonstrating good practice in sustainable procurement. Conclusions have been drawn regarding how public clients are addressing sustainability in general and certain sustainability criteria in particular in their procurement strategies, policies, guidelines or procedures. Other public client organisations should be able to learn from these demonstrations.

The findings obtained in this thesis have been brought together in a framework serving public clients who are in need of assistance to better address sustainable
construction in developing a procurement strategy (Figure 11.1). The framework has highlighted all the criteria, the factors, the barriers and the parties that are most capable of removing them, the demonstrations, and sustainability areas that are not receiving sufficient attention. The developed framework overcomes one of the major obstacles to obtaining sustainable procurement, which is the obstacle of confusion and disagreement regarding what needs to be addressed. Through the development of such a framework to assist public clients, the thesis has demonstrated its procedural contribution.

The methodological contribution has been made through both the use of triangulation and the Delphi Method. As shown in Section 3.4.3, triangulation is an appropriate research approach for extending the scope of theory in construction management research. It facilitates the attainment of convergence in the findings and therefore can improve the reliability and the validity of the results. Despite this, there has been reluctance in construction management research to mix methodologies (Love et al., 2002). This may be viewed as part of a bigger problem related to management research in general. It has been shown that management researchers were compromising triangulations and that internal, external and construct validity declined (Bryman and Bell, 2003). Management research may be moving even further away from rigour, and limiting the applicability of findings by failing to triangulate.

This thesis has contributed to overcoming the failure to triangulate in management and construction management research. This is one way through which this thesis has made methodological contribution. The thesis has employed more than one method and technique to achieve the project objectives and the triangulated approach was utilised within and across the methods adopted. The factors that are important for UK public clients to better address sustainable construction in developing a procurement strategy (objective 2) were established using the Delphi Exercise, semi-structured interviews and case studies. The barriers to better addressing sustainable construction by UK public clients (objective 3) were developed using semi-structured interviews and case studies. The parties that are most capable of removing these barriers were also identified through semi-structured interviews and case studies (objective 4).

The other way through which this thesis has made methodological contribution is by means of employing the Delphi Method (presented in detail in Section 3.3.1). This method seeks to achieve a reliable consensus of opinion among experts and to maximise the advantages and minimise the disadvantages associated with using
committees. Its “hybrid” position within the qualitative/quantitative debate places it in an ideal situation for use; Delphi is primarily a qualitative tool that provides a rich context-based knowledge but has the potential to provide quantitative results. Delphi has been widely used in different fields and for different purposes. Despite this and despite its powerfulness, it has been rarely used in construction management research. This thesis has contributed in methodological terms to the development of the field of construction management by providing a comprehensive review of the Delphi method (Section 3.3.1) and implementing the method successfully, demonstrating thereby the potential of its use in construction management research.

11.4 The limitations of the study

This study has certain limitations. These are related to the number of interviews conducted, the main question of the questionnaire survey, the number of factors that were identified as important to better address sustainable construction in procurement strategies and the lack of analysis of the answers provided by the local authorities (which were contacted in the questionnaire survey) to identify any “regional trends” among these authorities. These limitations are introduced below.

The first limitation is related to the number of interviews conducted. As shown in Section 3.3.2.4, nine interviews were conducted with experts and professionals in a variety of professional and public sector organisations. The limited number of the interviewees can be attributed to two main reasons. Firstly, the type of information needed required special expertise in sustainable construction procurement within the public sector and as such, it was difficult to find many experts in the field of study (taking into account that many other experts had already participated in the Delphi Exercise). Secondly, as the interviews focused on confirming the results obtained from the Delphi Exercise and the case studies (which also involved some other interviews), the role of the interviews was therefore mainly complementary within a research design that involved the use of several methods and techniques.

A second limitation of this research is related to the main question of the questionnaire survey. This involved asking the respondents about whether or not their authorities follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have sustainability criteria addressed in their construction projects’ procurement strategies or contracts. The results of the analysis of the answers to this question have shown the percentages of the authorities which provided
positive, negative and “don’t know/no opinion” answers. However, the results of the questionnaire survey do not show the extent to which these authorities’ policies, strategies, guidelines or procedures require a particular criterion to be addressed and in what way. One authority replying with a positive answer in relation to a certain criterion may have policies, strategies, guidelines, or procedures which indicate the need to have that criterion addressed in its construction projects’ procurement strategies or contracts in a very comprehensive way. Another authority replying with a positive answer in relation to the same criterion may also have policies, strategies, guidelines, or procedures which indicate the need to have that criterion addressed in its construction projects’ procurement strategies or contracts but in a much less comprehensive manner.

A third limitation is related to the number of factors that were identified as important to better address sustainable construction in procurement strategies (Chapter 7). As a large number of factors have been identified through the Delphi Exercise, it might be argued that these factors could be condensed to result in a more concise list. However, there are two reasons behind that. Firstly, the author of this thesis took the view that his role as a moderator should involve minimum interference in relation to representing the panel of experts’ points of views and as such, a long list of factors has been obtained as a result of the analysis. Secondly, the author took the view that any list of factors resulting from the analysis would be validated throughout the different rounds of the Delphi Exercise and through the interviews/case studies; it was estimated that this would give the respondents the opportunity to omit any factors by identifying them as factors which have no importance, to make any comments on any of the factors included or to identify new factors.

One way to deal with the problem of having a long list of factors was to categorise them. This categorisation was undertaken after conducting the Delphi Exercise. However, it might have been more appropriate to categorise the factors throughout the Delphi Exercise as this could have provided the respondents with a clearer presentation of the factors.

Some local authorities are based in regions that have certain regional policies in relation to sustainability and this may have an impact on these authorities’ individual policies. A final limitation of this thesis is that no analysis was conducted on the answers provided by the local authorities (which were contacted in the questionnaire survey) to identify any “regional trends” among these authorities. However,
conducting such an analysis was seen to be somewhat difficult in the light of the reluctance of some of the respondents to provide details about the locations of their authorities. Had such an analysis been conducted, it could have provided the potential to identify whether there is a relationship between the regional location of a particular authority and the existence of organisational policies or guidelines indicating the need to have sustainability considerations addressed in this authority’s construction procurement strategies.

11.5 Recommendations and further Research

Based on the findings obtained in this thesis, recommendations are presented below for the key parties which are able to advance the sustainable procurement agenda. These parties include government and regulatory bodies, individual public sector organisations (such as local authorities), professional and educational bodies as well as users, and the supply chain. Recommendations are also introduced for further research.

11.5.1 Recommendations for government and regulatory bodies

The government and regulatory bodies are probably the parties who are most capable of advancing the sustainable construction procurement agenda. They should show more commitment, leadership and accountability in relation to advancing the sustainability agenda.

Further attention should be given to the government’s publications which address sustainability, not only in terms of the quality of these publications but also in terms of their quantity. The number of publications which addressed sustainability and were produced by the government within the last few years was overwhelming. New definitions and requirements for sustainable construction have been introduced within a short period of time, adding therefore to the existing confusion among practitioners. In addition, it is doubtful whether the content of these publications has met the needs of practitioners in the public sector, who have been seeking a simple and clear guidance that explains “what needs to be done” and “how to do it” and who needed simple but comprehensive tools and techniques to deal with situations where sustainability needs to be assessed.

The new strategy for sustainable construction (HM Government and Strategic Forum for Construction, 2008) has highlighted the actions and deliverables which contribute to the overarching target of procurement. Among the actions and the deliverables that
were highlighted in the new strategy was the development of "how to" guidance for clients. It is not clear yet whether this relates to the needs of the practitioners mentioned above. If it does, such a step would represent a significant development.

Government and regulatory bodies should re-consider the financial restrictions imposed on public clients' spending, in order to facilitate the investment in sustainable solutions, and should remove any inconsistencies in their policies and regulations. It has been widely recognised that investing in sustainable solutions may imply a higher capital cost, although this is not always the case. As such, public clients may find themselves in a difficult situation. On the one hand, greater capital cost may have to be incurred by public clients with the increasing demand on them to integrate sustainability within their procurement policies, procedures and practices. On the other hand, existing regulations and government policies exert pressure on these clients through measures such as imposing financial restrictions on spending by the Treasury and requiring local councils to achieve 2.5% annual savings.

The government should also consider how to deal with the problem of separation between the capital budget and the operational budget. This separation means that the party that would invest in sustainable solutions would not be the same party that would obtain the benefits from the investment, resulting therefore in a reluctance to make such investments.

Currently, more mandatory influence is needed. Most of the current codes of practice are of voluntary nature, and therefore the incorporation of sustainability issues in these codes becomes optional. As shown in Section 9.2.7, regulatory bodies should consider extending the scope of regulations to incorporate a wider range of sustainability issues (Constructing Excellence, 2005c). Until this happens, these issues cannot be enforced. Camden Council is an example that was mentioned in Section 9.2.7 of local authorities which are ahead on the agenda but are restricted by legislation from doing more.

11.5.2 Recommendations for individual public sector organisations

Individual public sector organisations, such as local authorities, have to comply with legislation, regulations and government policies with regards to sustainability. Such compliance is compulsory and public sector organisations have no option but to comply. This establishes only the minimum expectations from public sector organisations. However, there is a great scope for these organisations to exceed
compliance requirements and do more, if they wish. For example, the Race Relations Act gives local councils the legal duty to eliminate unlawful discrimination and to promote equality of opportunity and good relations between people of different racial groups. All local councils have no choice but to comply with the Act. However, local councils have a choice in relation to whether or not, for example, they wish to invite bidders for partnerships to include in their offers, optional and priced proposals, into which equality issues may be incorporated (if relevant to the contract).

Training on sustainability issues at all levels, and particularly at the level of senior procurement decision makers, needs to be provided in public sector organisations. This needs to involve breaking down the sustainability concept from the abstract level, making more use of examples that could facilitate better understanding of the concept, and providing simpler and more structured guidance.

Public sector organisations should ensure timely involvement of all project stakeholders, whether internal or external. Communication and knowledge sharing within the client organisation regarding sustainability implementation and best practice have to be improved. Links between sustainability and procurement professionals working within the same organisation should be well established.

Work undertaken by public clients in relation to addressing sustainable development in their construction projects should enjoy good publicity as this can motivate these clients and other clients to adopt similar approaches.

Within their contractual procedures, public client organisations should emphasise sustainability in their project brief, contract specifications and conditions, and evaluation and selection procedures. They should encourage the attainment of innovative solutions and approaches from tenderers and should link payment mechanisms to whether sustainability requirements are delivered or not. They should also encourage further integration in the supply chain and promote the adoption of lean construction techniques.

11.5.3 Recommendations for professional bodies, educational bodies and users

Professional and educational bodies have an important role to play with regards to increasing the awareness of the society as a whole in relation to sustainable development. In today's commercial environment, which is largely dominated by economic measures, social and environmental values may not be as appreciated as
they should be. Change in people’s attitudes can be partly driven by professional and educational institutions. Values of sustainability can be integrated not only in governmental policies and guidelines but also in educational and professional curricula. This can have a much needed positive impact on people’s attitudes towards sustainability and can stimulate users’ demand for sustainable products.

11.5.4 Recommendations for the supply chain

The supply chain can help in attaining a more sustainability-oriented procurement. A contractor recognising and adopting the concept and the practices of corporate social responsibility and bidding for a public client’s construction contract can help that client in ensuring and demonstrating that sustainability is addressed in that contract procurement. As shown throughout Chapter 4, one way of delivering certain sustainability criteria, such as equality and diversity, improving health and safety, and reducing disruption to the local community, is through adopting the concept and the practices of corporate social responsibility and registering with schemes such as the Considerate Constructors Scheme.

The supply chain should take a more proactive approach and should move away from the current passive culture of resisting change unless it is deemed necessary by the client. The supply chain should also consider more integration within itself. As shown in Section 7.5.7, a fragmented industry which consists of small firms achieving small profits may not be able to think beyond short term interest and is unlikely to consider a long term perspective that facilitates the consideration of sustainable construction issues.

11.5.5 Further research

Further research involves three types:

(1) Research that needs to fill in the knowledge gaps identified primarily from the literature review. These knowledge gaps and the need for further research in relation to them were discussed in Section 2.7. To avoid duplication, they will not be discussed in this section.

(2) Research that needs to fill in the knowledge gaps that were identified from the literature review and developed throughout the stages of data collection and analysis of this research. This involves research that is needed to fill in the gap of assessing the potential of the different procurement systems in attaining the objectives of the
different dimensions of sustainability. As discussed in Sections 2.7.6 and 7.5.1, procurement systems/routes (e.g. traditional, design and build, prime contracting, etc.) may have different potential in relation to attaining sustainability objectives. This is confirmed by the findings the questionnaire survey undertaken in this research. These findings indicate that a large majority of the respondents (78.0%) agree (strongly or not) with the statement that there can be differences among procurement routes in terms of their potential to deliver sustainable construction. Further research to assess this potential is needed.

(3) Research that needs to fill in particular knowledge gaps that were identified and developed primarily throughout the stages of data collection and analysis of this research. This research involves:

- Developing a decision support system to assist integrating sustainability in pre-qualification and selection procedures

There is a need to develop a decision support system to assist UK public clients in integrating sustainability in contractors’ pre-qualification and selection procedures. Development of such a system need to provide decision makers in the public sector with a clear vision about sustainability considerations that should be addressed in the pre-qualification and selection procedures and their indicators. The system could serve as a structured instrument through which more objective and precise results can be obtained. The design of such a system needs to take into account the need for flexibility so that it can be adapted according to the priorities and the needs of public sector procurers. In addition, such a system would provide a valuable tool for accountability of public procurement decision making.

- Case studies demonstrating good practices in sustainable construction procurement

Further research is still needed in relation to gaining in-depth information about best practice focusing on addressing sustainability criteria in construction procurement. The information needed may be drawn at both the organisational level and the project level. Such an investigation could make use of the case studies introduced in this research (Chapter 10) as a starting point.

- Establishing the potential conflict with regulation and policies

Further research is needed in relation to establishing the potential conflict between the demands on addressing sustainability on the one hand and certain regulations and
policies on the other. Aspects related to such a problem were introduced in detail in Sections 8.3.1.4 and 8.3.1.5.

- Assessment of operational costs and social costs

As shown in Section 8.3.1.12, although a great deal of research has been conducted in relation to the capital costs of the facilities, there is little work done in relation to their operational costs, the interrelationship between the capital costs and the operational costs, and the measurement of the social costs/benefits associated with both the capital and operational costs. Further work in relation to these areas is still needed.
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Appendices

Appendix A: Delphi Exercise
Appendix B: Interviews
Appendix C: Case studies
Appendix D: Questionnaire survey
Appendix A: Delphi Exercise

A1: List of Experts participating in the Delphi panel
A2: Invitation letter to participate in the Delphi Exercise (Round 1)
A3: Round 1 questionnaire
A4: Reminder letter for non-respondents (Round 1)
A5: Invitation letter to participate in the Delphi Exercise (Round 2)
A6: Round 2 questionnaire
A7: Invitation letter to participate in the Delphi Exercise (Round 3)
A8: Round 3 questionnaire
A9: Definitions and Clarifications attached with Delphi Questionnaire (Round 3) [note that most of the definitions and clarifications introduced in Round 3 were also introduced in Round 1 and Round 2. Therefore it was seen more appropriate to include in the Appendix the list of definitions and clarifications introduced in Round 3 as this was the most inclusive list. This is due to the fact that as the Exercise proceeds, more terms and definitions are used]
A10: Relevant tests
A1: List of Experts participating in the Delphi Exercise

- Dr. David Crowhurst, Director, Centre for Sustainable Construction-BRE; Member of the editorial panel of Engineering Sustainability; Member of the Sustainable Construction Task Group

- Ms Liz Peace Chief Executive; British Property Federation

- Mr David Mathieson, Property & Construction Policy Development, The Office of Government Commerce (OGC)

- Dr. Gordon Murray, Programme Manager, Procurement, Improvement and Development Agency (IDeA)

- Ms Lorraine Brayford, Sustainable Development Policy Manager, NHS Estates

- Mr Martin Hunt, CIRIA Associate; Member of “Environment and Sustainability Board”, ICE

- Ms Sue Innes, Director of Sustainability and East of England Centre Co-Ordinator, Constructing Excellence

- Mr Don Ward Chief Executive of Be and Operations Director of CWC; CE of Construction Industry Board (formerly) and at the Design and Build Foundation; Member of the Sustainable Construction Task Group

- Professor Quentin Leiper, Director for Engineering and the Environment, Carillion plc, Wolverhampton, UK; Chairman and Honorary Editor, Engineering Sustainability; Member of “Environment and Sustainability Board”, ICE

- Mr Neil Moore, Environmental Health & Safety Manager for Skanska UK

- Mr Gary Thomas, Senior Technical Adviser, Highways Agency

- Mr Andrew Kinsey, Senior Environmental Manager, Bovis Lend Lease EMEA

- Professor Andrew Price, Loughborough University

- Mr Stephen Hunt, Head of Environment & Sustainability, Taylor Woodrow

- Dr. Matin Sexton, Director of Organisational Development, School of Construction and Property Management; Deputy Director of the Research Institute of the Built and Human Environment, University of Salford

- Mr Stephen Bathorpe, Senior Lecturer, University of Glamorgan

- Professor John Hopson, Former Construction Director, DTI; Member of the Sustainable Construction Task Group; Chair of the GCCP Sustainability Action Group; Visiting Professor at Salford University
A2: Invitation letter to participate in the Delphi Exercise
(Round 1)

Dear .................,

Addressing sustainable construction in UK public procurement

The above topic is currently being investigated at Loughborough University. It is part of a research project about realising sustainable construction through procurement strategies. Details of the project can be found at: http://www.lboro.ac.uk/departments/cv/research/profile/student/102.html

The research involves a Delphi Exercise, which is a systematic procedure to evoke expert opinion. Its intended outcome is to achieve a reliable consensus of opinion among a selected panel of experts. The Delphi Exercise undertaken in this research project involves selected experts in sustainable construction who will respond to a small series of questionnaires (3 rounds are expected). The objectives of the exercise are:

- To develop the major criteria representing the social, the economic, and the environmental dimensions of sustainable construction that should be addressed by UK public clients in developing a procurement strategy.
- To identify the ways through which UK public clients can better address sustainable construction in developing a procurement strategy.

The time needed to respond to the questionnaires will not be excessive (perhaps up to 30 minutes at each successive stage). The responses will be treated in strict confidence. Following the exercise, copies of a report summarising the findings of the study will be sent to the panel members. More details on the Delphi Exercise are provided in the attachment.

I would be grateful if you could accept my invitation to be a member of the selected panel of experts in the Delphi Exercise mentioned. To indicate your acceptance, just respond to the first questionnaire (attached) and send it back by e-mail or post (email and postal addresses are given below). Following the analysis of the responses, another questionnaire will be developed and sent to you.

If you require any further information, please do not hesitate to contact me.

Your time and cooperation are greatly appreciated.

Yours sincerely,

Amr Sourani
Department of Civil and Building Engineering
Loughborough University, Loughborough, Leicestershire
LE11 3TU
UK
Tel: +44 (0) 1509 228 796 or 269 084
Fax: +44 (0) 1509 223 945
E-mail: A.I.Sourani@lboro.ac.uk
A3: Round 1 questionnaire
Addressing sustainable construction in UK public procurement

Amr Sourani, Department of Civil and Building Engineering, Loughborough University

This page provides information about conducting the Delphi Exercise, completing the questionnaire and returning it. The actual questionnaire, which consists of two parts, is provided in the pages that follow. Any comments regarding the questionnaire are welcome.

The Delphi Exercise

The Delphi Exercise is a systematic procedure to evoke expert opinion. Its intended outcome is to achieve a reliable consensus of opinion among a selected panel of experts. This Delphi Exercise involves selected experts in sustainable construction who will respond to a small series of questionnaires (about 3 rounds are expected). The objectives of the exercise are:

- To develop the major criteria representing the social, the economic, and the environmental dimensions of sustainable construction that should be addressed by UK public clients in developing a procurement strategy.
- To identify the ways through which UK public clients can better address sustainable construction in developing a procurement strategy.

The panel members will remain unknown to each other and their interaction will be managed in a totally anonymous way. Following each round, the investigator will analyse the responses and develop a new questionnaire based on the analysis. The iterative nature of the exercise will provide the panel members with feedback involving new information in each round. They, therefore, will be able to revise and change the information they provided in previous rounds. Following the exercise, a report summarising the findings of the study will be prepared and copies of it will be sent to the panel members.

The time needed to respond to the questionnaires will not be excessive (perhaps up to 20-30 minutes at each successive stage). The responses will be treated in strict confidence. The names and the completed questionnaires will not be made available to anyone. No source will be identified or comment attributed without clear permission from the originator.

Completing and returning the questionnaire

The questionnaire may be completed electronically (in Microsoft Word) or written by hand (after printing it out).

Please return the completed questionnaire within two weeks, in one of the following ways:
- Email your electronically completed questionnaire to A.I.Sourani@lboro.ac.uk
- Mail your printed version of the completed questionnaire to:
  Amr Sourani, Department of Civil and Building Engineering, Loughborough University, Loughborough, Leicestershire, LE11 3TU, UK.

Thank you very much for your time and effort.
Delphi Round 1: Questionnaire

Your Name:

Part 1: Criteria representing the dimensions of sustainable construction

A. Social Sustainability

Please identify five major criteria representing the social dimension of sustainable construction that you believe should be addressed by UK public clients in developing a procurement strategy.
(You are welcome to provide more than five criteria.)

B. Economic Sustainability

Please identify five major criteria representing the economic dimension of sustainable construction that you believe should be addressed by UK public clients in developing a procurement strategy.
(You are welcome to provide more than five criteria.)
C. Environmental Sustainability

Please identify five major criteria representing the environmental dimension of sustainable construction that you believe should be addressed by UK public clients in developing a procurement strategy.
(You are welcome to provide more than five criteria.)

Part 2: Ways of addressing sustainable construction

Please identify the ways through which UK public clients can better address sustainable construction (i.e. social, economic and environmental sustainability) in developing a procurement strategy.
Reminder letter to participate in the Delphi Exercise (Round 1)

Dear ..........,

Reminder: Invitation to a Panel of Experts in Sustainable Construction

You may remember that an invitation to a panel of experts in sustainable construction was sent to you about two weeks ago. The invitation, accompanied with a questionnaire, is sent again with this e-mail. Definitions are attached for clarification. The time needed to respond to the questionnaire will not be excessive (perhaps up to 20-30 minutes).

I would be grateful if you could accept my invitation by responding to the questionnaire and sending your reply by e-mail or post.

YOUR EXPERTISE IS EXTREMELY IMPORTANT TO THE STUDY.

Your time and cooperation are greatly appreciated.

Amr Sourani
Department of Civil and Building Engineering
Loughborough University, Loughborough, Leicestershire
LE11 3TU
UK
Tel: +44 (0) 1509 228 796 or 269 084
Fax: +44 (0) 1509 223 945
E-mail: A.I.Sourani@lboro.ac.uk
Dear ...........

I would firstly like to thank you for accepting the invitation to participate in the panel of experts in sustainable construction (Delphi Exercise) and for your valuable contribution. A second round questionnaire, which provides feedback involving new information, was developed based on the analysis of responses to the first round.

I shall be grateful if you could complete the second round questionnaire (attached) and return it by e-mail or post (addresses are given below). The time needed to respond will not be excessive (perhaps up to 20-25 minutes). The responses will be treated in strict confidence. Your time and cooperation are greatly appreciated.

Yours sincerely,

Amr Sourani
Department of Civil and Building Engineering, Loughborough University, Loughborough, Leicestershire, LE11 3TU, UK
Tel: +44 (0) 1509 228 796 or 269 084
Fax: +44 (0) 1509 223 945
E-mail: A.I.Sourani@lboro.ac.uk

Note: your first round response in addition to a document for definitions and clarifications are attached for your reference.
A6: Round 2 questionnaire

Addressing sustainable construction in UK public procurement
Delphi Round 2: Questionnaire

The second round questionnaire of the ongoing Delphi Exercise is based on the analysis of the experts' responses to the first round questionnaire (including your own response). The second round questionnaire, which provides the experts with feedback involving new information, tries to obtain the experts' views regarding the level of importance of certain criteria and factors. It offers the opportunity to add issues which are not listed and to provide any comments. Additional sheets may be used if required. Thank you very much for your time and effort.

Your Name:

Part 1: Criteria representing the dimensions of sustainable construction*

A. Social Sustainability

How important is each of the following criteria among the criteria of social sustainability which should be addressed by UK public clients in developing a procurement strategy* (please put a tick in the appropriate box). You can add criteria which are not listed and identify their level of importance. Any comments are welcome.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>Analysed set of criteria based on responses received in Round 1</td>
<td></td>
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</tr>
<tr>
<td>Improving health and safety performance</td>
<td>1</td>
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</tr>
<tr>
<td>Participation of stakeholders* (including community involvement)</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>Social inclusion (including tackling poverty and social exclusion)*</td>
<td>1</td>
<td>2</td>
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</tr>
<tr>
<td>Seeking intergenerational equity by considering cost for future generations</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Consideration of user needs and satisfaction (including accessibility)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Creating employment opportunities</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Training and development of the workforce</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Equality and diversity in the workplace</td>
<td>1</td>
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</tr>
<tr>
<td>Improving workforce satisfaction</td>
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<td>5</td>
</tr>
<tr>
<td>Improving working environment and conditions</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
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<tr>
<td>Creating a positive impact on the local environment (e.g. local community, business, infrastructure)</td>
<td>1</td>
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<td>5</td>
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<tr>
<td>Promoting ethical practices</td>
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<tr>
<td>Preservation of culture and heritage</td>
<td>1</td>
<td>2</td>
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</tr>
<tr>
<td>Minimising the disruptive impacts of construction (e.g. noise)</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Other criteria suggested by the literature</td>
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<tr>
<td>Promoting equitable distribution of costs and benefits (at local, regional and international levels)</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td>Other criteria which are not listed above (Please specify and identify level of importance)</td>
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<td>3</td>
</tr>
</tbody>
</table>

Please add any comments you would like to make:

1 Social sustainability refers to the social dimension of sustainable construction.

2 Clarification regarding the term / statement under consideration is provided in the attached document.
B. Economic Sustainability

How important is each of the following criteria among the criteria of economic sustainability which should be addressed by UK public clients in developing a procurement strategy (please put a tick in the appropriate box). You can add criteria which are not listed and identify their level of importance. Any comments are welcome.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Analysed set of criteria based on responses received in Round 1</td>
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<tr>
<td>Clear establishment of need and evaluation of alternative options</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Whole life value for money</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Supporting the regional/local economy (including stimulating demand for</td>
<td>1</td>
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<tr>
<td>local labour, businesses, materials and services)</td>
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<tr>
<td>Creating employment opportunities</td>
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</tr>
<tr>
<td>Fitness for purpose (including consideration of long term flexibility)</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>Consideration of whole life costing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Economic Key Performance Indicators (KPIs)*</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Waste minimisation and management</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>Improving the efficiency of the supply side</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other criteria suggested by the literature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial affordability for intended beneficiaries</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Competitiveness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other criteria which are not listed above (Please specify and identify</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>level of importance)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please add any comments you would like to make:

C. Environmental Sustainability

How important is each of the following criteria among the criteria of environmental sustainability which should be addressed by UK public clients in developing a procurement strategy (please put a tick in the appropriate box). You can add criteria which are not listed and identify their level of importance. Any comments are welcome.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysed set of criteria based on responses received in Round 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable land use and re-use (including giving priority to re-using</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>previously-developed land and reducing consumption of undeveloped land)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reducing energy consumption</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Reducing water consumption</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Selection and use of materials (including specifying low environmental</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>impact materials, re-use and recycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reusing existing built assets</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

* Economic sustainability refers to the economic dimension of sustainable construction.
* Environmental sustainability refers to the environmental dimension of sustainable construction.
* Clarification regarding the term / statement under consideration is provided in the attached document.
### C. Environmental Sustainability – Continued

#### Analysed set of criteria based on responses received in Round 1

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimising water, land and air pollution (including noise)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preserving and enhancing biodiversity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste minimisation and management</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Minimising negative visual impact</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Creating a healthy, non-toxic environment (e.g. high indoor air quality)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Considering transport issues (e.g. public transport provision, reducing the need to travel)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Other criteria suggested by the literature**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Other criteria which are not listed above (Please specify and identify level of importance)**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

Please add any comments you would like to make:

### Part 2: Ways of addressing sustainable construction

How important is each of the following factors for UK public clients to better address sustainable construction (i.e., social, economic and environmental sustainability) in developing a procurement strategy (please put a tick in the appropriate box). You can add factors which are not listed and identify their level of importance. Any comments are welcome.

#### Factor

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing a common understanding of what constitutes sustainable development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highlighting the need for regulations and government policies that are more consistent with sustainability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensuring that client organizations have clear policies and guidelines regarding the application of sustainability principles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensuring involvement of all project stakeholders and consideration of their needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensuring timely involvement of project stakeholders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowing sufficient time in the programme to address and assess sustainability issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emphasising that sustainability is not be compromised in the search for efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highlighting sustainability in the project brief as a primary aim</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part 2- Continued

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ensuring that sustainability requirements can be clearly assessed and measured</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ensuring transparency in procurement decision making</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Emphasising the importance of sustainability in tender evaluation and selection procedures</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ensuring the consideration of whole life costing / value</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Requiring the supply side to demonstrate capability of delivering sustainability requirements</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging tenderers to suggest innovative solutions and approaches that support the client's overall sustainability objectives</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Promoting Corporate Social Responsibility* policy and implementation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Requiring the employment of a properly trained workforce within the supply side</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ensuring that payment mechanisms take account of whether sustainability requirements are delivered</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Evaluating alternative procurement methods/routes* in terms of their potential to deliver sustainability objectives</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging the use of target cost contracts*</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging long term contractual arrangements through strategic partnering* (covering a series of projects)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging integrated supply chains*</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging the adoption of lean construction techniques</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging the incorporation of sustainability issues into value management</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging the incorporation of sustainability issues into risk management</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Provision of incentives and rewards based on sustainability performance throughout the project life cycle</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Utilisation/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM*)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Promoting cultural change towards sustainability throughout the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Other criteria which are not listed above** (Please specify and identify level of importance)

| 1 | 2 | 3 | 4 | 5 |

| Please add any comments you would like to make: |

Thank you very much for your time and effort.

* Clarification regarding the term / statement under consideration is provided in the attached document.
A7: Invitation letter to participate in the Delphi Exercise (Round 3)

Dear .............,

You may remember that a while ago you sent me your response to the second round questionnaire of the ongoing Delphi Exercise "addressing sustainable construction in UK public procurement". I would firstly like to thank you for your response and for your valuable contribution. The responses received from you and from other experts in the panel were analysed and a third round questionnaire was developed based on the analysis.

The third round is the FINAL round in the exercise. I would be grateful if you could complete the third round questionnaire (attached) and return it by e-mail or post (addresses are given below). The responses will be treated in strict confidence. If you require any further information, please do not hesitate to contact me. Your time and cooperation are greatly appreciated.

Yours sincerely,
Amr Sourani
Department of Civil and Building Engineering,
Loughborough University, Loughborough, Leicestershire, LE11 3TU
Mob: 078 6750 4427
Tel: 01509 228 796 or 269 084
Fax: 01509 223 945
E-mail: A.I.Sourani@lboro.ac.uk

Note: a document for definitions and clarifications is attached for your reference.
A8: Round 3 questionnaire

Addressing sustainable construction in UK public procurement
Delphi Round 3: Questionnaire

The third round questionnaire of the ongoing Delphi Exercise is based on the analysis of the experts’ responses to the second round questionnaire (including your own response). The questionnaire provides participating experts with feedback from the second round and gives them the opportunity to revise and change the information they provided in that round.

The feedback involves presenting each item in this questionnaire with two scores indicating its level of importance.

- The first score is “Your Score” and is presented in column “C”. This is the score that you provided in round 2 regarding the level of importance of the item.
- The second score is the “Mean Score” and is presented in column “D”. This is the mean (the average) of the scores provided by all the experts participated in round 2 regarding the level of importance of the item.

In this round, you have the opportunity to reconsider the scores you provided in round 2, using the scale provided below.

For each item and using the scale shown below, please enter your “Reconsidered Score” in the corresponding box in column “E” if it is different from “Your Score” (i.e. to indicate new level of importance). Otherwise, please leave the corresponding box in column “E” blank to indicate that your “Reconsidered Score” is the same as “Your Score” (i.e. to indicate no change to the level of importance you provided in round 2).

Scale:

1 = Not Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

Your Name:
Part 1: Criteria representing the dimensions of sustainable construction

A. Social Sustainability

The table below shows both "Your Score" and the "Mean Score" regarding how important each of the following criteria is among the criteria of social sustainability which should be addressed by UK public clients in developing a procurement strategy* (Columns "C" and "D").

For each of the criteria and using the scale shown below, please enter your "Reconsidered Score" in the corresponding box in column "E" if it is different from "Your Score" (i.e. to indicate new level of importance). Otherwise, please leave the corresponding box in column "E" blank to indicate that your "Reconsidered Score" is the same as "Your Score" (i.e. to indicate no change to the level of importance you provided in round 2).

**Scale:** 1 = Not Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
<th>Column D</th>
<th>Column E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Criteria</td>
<td>Your Score</td>
<td>Mean Score</td>
<td>Reconsidered Score</td>
</tr>
<tr>
<td>S1</td>
<td>Improving health and safety performance</td>
<td>5</td>
<td>4.47</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>Participation of stakeholders* (Including community involvement)</td>
<td>5</td>
<td>4.13</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>Social inclusion (Including tackling poverty and social exclusion)*</td>
<td>3</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>Seeking intergenerational equity by considering cost for future generations</td>
<td>3</td>
<td>3.40</td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>Consideration of user needs and satisfaction (Including accessibility)</td>
<td>4</td>
<td>4.47</td>
<td></td>
</tr>
<tr>
<td>S6</td>
<td>Creating employment opportunities</td>
<td>3</td>
<td>3.67</td>
<td></td>
</tr>
<tr>
<td>S7</td>
<td>Training and development of the workforce</td>
<td>3</td>
<td>3.93</td>
<td></td>
</tr>
<tr>
<td>S8</td>
<td>Equality and diversity in the workplace</td>
<td>3</td>
<td>3.53</td>
<td></td>
</tr>
<tr>
<td>S9</td>
<td>Improving workforce satisfaction</td>
<td>3</td>
<td>3.33</td>
<td></td>
</tr>
<tr>
<td>S10</td>
<td>Improving working environment and conditions</td>
<td>4</td>
<td>3.79</td>
<td></td>
</tr>
<tr>
<td>S11</td>
<td>Creating a positive impact on the local environment (e.g. local community, business, infrastructure)</td>
<td>4</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>S12</td>
<td>Promoting ethical practices</td>
<td>3</td>
<td>3.87</td>
<td></td>
</tr>
<tr>
<td>S13</td>
<td>Preservation of culture and heritage</td>
<td>4</td>
<td>3.40</td>
<td></td>
</tr>
<tr>
<td>S14</td>
<td>Minimising the disruptive impacts of construction (e.g. noise)</td>
<td>2</td>
<td>3.87</td>
<td></td>
</tr>
<tr>
<td>S15</td>
<td>Promoting equitable distribution of costs and benefits (at local, regional and international levels)</td>
<td>2</td>
<td>2.93</td>
<td></td>
</tr>
</tbody>
</table>

The following criteria were not included in the second round. Therefore, no mean scores are available regarding their levels of importance. However, they are included in this round based on experts' suggestions made in the second round. Using the scale shown above, please enter your score to identify how important each of the following criteria among the criteria of social sustainability which should be addressed by UK public clients in developing a procurement strategy*.

|          |          |          |          |          |
| S16      | Improving security and reducing crime | N/A |          |          |
| S17      | Building and maintaining social capital* | N/A |          |          |

---

1. Social sustainability refers to the social dimension of sustainable construction.
2. Clarification regarding the term/ statement under consideration is provided in the attached document.
B. Economic Sustainability

The table below shows both the "Your Score" and the "Mean Score" regarding how important is each of the following criteria among the criteria of economic sustainability which should be addressed by UK public clients in developing a procurement strategy* (Columns "C" and "D").

For each of the criteria and using the scale shown below, please enter your "Reconsidered Score" in the corresponding box in column "E" if it is different from "Your Score" (i.e. to indicate new level of importance). Otherwise, please leave the corresponding box in column "E" blank to indicate that your "Reconsidered Score" is the same as "Your Score" (i.e. to indicate no change to the level of Importance you provided in round 2).

Scale: I = Not Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Clear establishment of need and evaluation of alternative options</td>
</tr>
<tr>
<td>E2</td>
<td>Whole life value for money</td>
</tr>
<tr>
<td>E3</td>
<td>Supporting the regional / local economy (including stimulating demand for local labour, businesses, materials and services)</td>
</tr>
<tr>
<td>E4</td>
<td>Creating employment opportunities</td>
</tr>
<tr>
<td>E5</td>
<td>Fitness for purpose (including consideration of long term flexibility)</td>
</tr>
<tr>
<td>E6</td>
<td>Consideration of whole life costing</td>
</tr>
<tr>
<td>E7</td>
<td>Economic Key Performance Indicators (KPIs)*</td>
</tr>
<tr>
<td>E8</td>
<td>Waste minimisation and management</td>
</tr>
<tr>
<td>E9</td>
<td>Improving the efficiency of the supply side</td>
</tr>
<tr>
<td>E10</td>
<td>Financial affordability for intended beneficiaries</td>
</tr>
<tr>
<td>E11</td>
<td>Competitiveness*</td>
</tr>
<tr>
<td>E12</td>
<td>Consideration of effective logistics strategies*</td>
</tr>
</tbody>
</table>

The following criterion was not included in the second round. Therefore, no mean score is available regarding its level of importance. However, it is included in this round based on experts' suggestions made in the second round. Using the scale shown above, please enter your score to identify how important is the following criterion among the criteria of economic sustainability which should be addressed by UK public clients in developing a procurement strategy*.

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>E12</td>
<td>Consideration of effective logistics strategies*</td>
</tr>
</tbody>
</table>

* Economic sustainability refers to the economic dimension of sustainable construction.
* Clarification regarding the term / statement under consideration is provided in the attached document.
C. Environmental Sustainability

The table below shows both "Your Score" and the "Mean Score" regarding how important each of the following criteria among the criteria of environmental sustainability which should be addressed by UK public clients in developing a procurement strategy* (Columns "C" and "D").

For each of the criteria and using the scale shown below, please enter your "Reconsidered Score" in the corresponding box in column "E" if it is different from "Your Score" (i.e. to indicate new level of importance). Otherwise, please leave the corresponding box in column "E" blank to indicate that your "Reconsidered Score" is the same as "Your Score" (i.e. to indicate no change to the level of importance you provided in round 2).

Scale: 1 = Not Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Criteria</th>
<th>Your Score</th>
<th>Mean Score</th>
<th>Reconsidered Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)</td>
<td>5</td>
<td>4.13</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Reducing energy consumption</td>
<td>4</td>
<td>4.40</td>
<td></td>
</tr>
<tr>
<td>N3</td>
<td>Reducing water consumption</td>
<td>6</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>N4</td>
<td>Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)</td>
<td>4</td>
<td>4.27</td>
<td></td>
</tr>
<tr>
<td>N5</td>
<td>Reusing existing built assets</td>
<td>4</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td>N6</td>
<td>Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources</td>
<td>4</td>
<td>4.27</td>
<td></td>
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<tr>
<td>N7</td>
<td>Minimising water, land and air pollution (including noise)</td>
<td>5</td>
<td>4.53</td>
<td></td>
</tr>
<tr>
<td>N8</td>
<td>Preserving and enhancing biodiversity</td>
<td>4</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>N9</td>
<td>Waste minimisation and management</td>
<td>4</td>
<td>4.36</td>
<td></td>
</tr>
<tr>
<td>N10</td>
<td>Minimising negative visual impact</td>
<td>3</td>
<td>3.60</td>
<td></td>
</tr>
<tr>
<td>N11</td>
<td>Creating a healthy, non-toxic environment (e.g. high indoor air quality)</td>
<td>5</td>
<td>4.38</td>
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</tr>
<tr>
<td>N12</td>
<td>Considering transport issues (e.g. public transport provision, reducing the need to travel)</td>
<td>3</td>
<td>4.07</td>
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</tr>
<tr>
<td>N13</td>
<td>Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)</td>
<td>4</td>
<td>4.21</td>
<td></td>
</tr>
</tbody>
</table>

* Environmental sustainability refers to the environmental dimension of sustainable construction.
* Clarification regarding the term / statement under consideration is provided in the attached document.
Part 2: Ways of Addressing sustainable construction

The table below shows both “Your Score” and the “Mean Score” regarding how important each of the following factors for UK public clients to better address sustainable construction (i.e. social, economic and environmental sustainability) in developing a procurement strategy (Columns “C” and “D”).

For each of the factors and using the scale shown below, please enter your “Reconsidered Score” in the corresponding box in column “E” if it is different from “Your Score” (i.e. to indicate new level of importance). Otherwise, please leave the corresponding box in column “E” blank to indicate that your “Reconsidered Score” is the same as “Your Score” (i.e. to indicate no change to the level of importance you provided in round 2).

Scale: 1 = Not Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

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<thead>
<tr>
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<th>Column D</th>
<th>Column E</th>
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</thead>
<tbody>
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<td>Item Code</td>
<td>Factor</td>
<td>Your Score</td>
<td>Mean Score</td>
<td>Reconsidered Score</td>
</tr>
<tr>
<td>F1</td>
<td>Developing a common understanding of what constitutes sustainable development</td>
<td>5</td>
<td>3.93</td>
<td></td>
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<tr>
<td>F2</td>
<td>Ensuring compliance with regulations and government policies (e.g. Sustainable and Secure Buildings Act 2004)</td>
<td>4</td>
<td>4.20</td>
<td></td>
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<tr>
<td>F3</td>
<td>Highlighting the need for regulations and government policies that are more consistent with sustainability</td>
<td>4</td>
<td>3.87</td>
<td></td>
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<tr>
<td>F4</td>
<td>Raising awareness/providing training regarding sustainability issues and its implementation among the public and the private sectors</td>
<td>3</td>
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<td>F5</td>
<td>Ensuring that client organizations have clear policies and guidelines regarding the application of sustainability principles</td>
<td>3</td>
<td>4.20</td>
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<tr>
<td>F6</td>
<td>Ensuring involvement of all project stakeholders and consideration of their needs</td>
<td>5</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td>Ensuring timely involvement of project stakeholders</td>
<td>5</td>
<td>4.33</td>
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<tr>
<td>F8</td>
<td>Allowing sufficient time in the programme to address and assess sustainability issues</td>
<td>5</td>
<td>4.27</td>
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<td>F9</td>
<td>Emphasising that sustainability is not be compromised in the search for efficiency</td>
<td>3</td>
<td>3.73</td>
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<tr>
<td>F10</td>
<td>Highlighting sustainability in the project brief as a primary aim</td>
<td>5</td>
<td>3.60</td>
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<tr>
<td>F11</td>
<td>Ensuring the consideration of complete range of options to meet the need (e.g. refurbishment, new build)</td>
<td>5</td>
<td>4.27</td>
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<tr>
<td>F12</td>
<td>Integrating sustainability requirements into contract specifications and conditions (including specifying any project specific sustainability requirements)</td>
<td>5</td>
<td>4.53</td>
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<tr>
<td>F13</td>
<td>Adopting a balanced approach that ensures the explicit consideration of all sustainability dimensions</td>
<td>5</td>
<td>4.36</td>
<td></td>
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<tr>
<td>F14</td>
<td>Ensuring that sustainability requirements can be clearly assessed and measured</td>
<td>3</td>
<td>4.33</td>
<td></td>
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<tr>
<td>F15</td>
<td>Ensuring transparency in procurement decision making</td>
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<tr>
<td>F16</td>
<td>Emphasising the importance of sustainability in tender evaluation and selection procedures</td>
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<tr>
<td>F17</td>
<td>Ensuring the consideration of whole life costing / value</td>
<td>5</td>
<td>4.20</td>
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* Clarification regarding the term / statement under consideration is provided in the attached document.
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<th>Column C</th>
<th>Column D</th>
<th>Column E</th>
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</thead>
<tbody>
<tr>
<td>F18</td>
<td>Ensuring the competency of the people responsible for implementing and assessing sustainability issues (in both the client organisation and the supply side)</td>
<td>4</td>
<td>4.20</td>
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<tr>
<td>F19</td>
<td>Requirement/incentive for the supply side to demonstrate commitment to sustainable development through policy and implementation</td>
<td>4</td>
<td>3.80</td>
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<tr>
<td>F20</td>
<td>Requiring the supply side to demonstrate capability of delivering sustainability requirements</td>
<td>3</td>
<td>3.80</td>
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<tr>
<td>F21</td>
<td>Encouraging tenderers to suggest innovative solutions and approaches that support the client's overall sustainability objectives</td>
<td>4</td>
<td>4.20</td>
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<tr>
<td>F22</td>
<td>Promoting Corporate Social Responsibility* policy and implementation</td>
<td>2</td>
<td>3.50</td>
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<tr>
<td>F23</td>
<td>Requiring the employment of a properly trained workforce within the supply side</td>
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<td>3.87</td>
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<tr>
<td>F24</td>
<td>Ensuring that payment mechanisms take account of whether sustainability requirements are delivered</td>
<td>4</td>
<td>3.57</td>
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<td></td>
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<tr>
<td>F25</td>
<td>Evaluating alternative procurement methods/routes* in terms of their potential to deliver sustainability objectives</td>
<td>3</td>
<td>3.71</td>
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<tr>
<td>F26</td>
<td>Encouraging the use of target cost contracts*</td>
<td>1</td>
<td>3.07</td>
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<tr>
<td>F27</td>
<td>Encouraging long term contractual arrangements through strategic partnering* (covering a series of projects)</td>
<td>1</td>
<td>3.84</td>
<td></td>
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<td>F28</td>
<td>Encouraging integrated supply chains*</td>
<td>1</td>
<td>3.64</td>
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<tr>
<td>F29</td>
<td>Encouraging the adoption of lean construction techniques</td>
<td>1</td>
<td>3.79</td>
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<tr>
<td>F30</td>
<td>Encouraging the incorporation of sustainability issues into value management</td>
<td>4</td>
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<td>F31</td>
<td>Encouraging the incorporation of sustainability issues into risk management</td>
<td>3</td>
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<tr>
<td>F32</td>
<td>Provision of incentives and rewards based on sustainability performance throughout the project life cycle</td>
<td>4</td>
<td>3.57</td>
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<tr>
<td>F33</td>
<td>Utilization/enhancement of existing assessment and measurement techniques and tools to consider sustainability (e.g. BREEAM*)</td>
<td>4</td>
<td>4.29</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>F34</td>
<td>Requiring reviews to be conducted to monitor the delivery of sustainability requirements throughout the project life cycle</td>
<td>5</td>
<td>4.14</td>
<td></td>
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<tr>
<td>F35</td>
<td>Encouraging the supply side to improve communication and knowledge sharing with all stakeholders throughout the project life cycle</td>
<td>4</td>
<td>3.79</td>
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<tr>
<td>F36</td>
<td>Promoting cultural change towards sustainability throughout the industry</td>
<td>3</td>
<td>4.14</td>
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</tbody>
</table>

The following factor was not included in the second round. Therefore, no mean score is available regarding its level of importance. However, it is included in this round based on experts' suggestions made in the second round. Using the scale shown above, please enter your score to identify how important is the following factor for UK public clients to better address sustainable construction (i.e. social, economic and environmental sustainability) in developing a procurement strategy*.

F37 Demonstrating the business case for taking the sustainability route | N/A |

Thank you very much for your time and effort.

* Clarification regarding the term / statement under consideration is provided in the attached document.
A9: Definitions and Clarifications attached with Delphi Questionnaire (Round 3)

Addressing sustainable construction in UK public procurement
Delphi Exercise

Definitions and Clarifications

Public clients

Public clients are "clients who are sponsors of construction work but who are part of a local authority or central public-funded body where there are particular constraints affecting procurement practices, including EU procurement regulations. Typically local authorities initiating capital expenditure where local standing orders or EU rules restrict some of the procurement strategies which can be adopted, but where improvements to current practices are being explored."


Sustainable construction

Sustainable construction describes the application of sustainable development to the construction industry.

The construction industry is defined as "all who produce, develop, plan, design, build, alter, or maintain the built environment, and includes building materials manufacturers and suppliers as well as clients and end use occupiers."

Sustainable development is "all about ensuring a better quality of life for everyone, now and for generations to come, through:

- social progress which recognises the needs of everyone
- maintenance of high and stable levels of economic growth and employment, whilst protecting, and if possible enhancing, the environment, and
- using natural resources prudently

Sustainable development embraces the three broad themes of environmental, social and economic accountability, often known as the 'triple bottom line'."


Developing a procurement strategy

The procurement strategy "identifies the best way of achieving the objectives of the project and value for money, taking account of the risks and constraints, leading to
decisions about the funding mechanism and asset ownership for the project. The aim of a procurement strategy is to achieve the optimum balance of risk, control and funding for a particular project. " Source: OGC (2003; p. 2)

Key tasks in developing a procurement strategy include: producing outline business case; determining procurement route (including contract strategy); producing output-based specification and criteria for selection and award; OJEU advertisement if required.


Stakeholders

"The stakeholders are the named individuals and groups who have an interest in, or are involved in, or who are affected by, the activities and outcomes of a change initiative." 


Social exclusion

"Social exclusion includes poverty and low income, but is a broader concept and encompasses some of the wider causes and consequences of deprivation. The Government has defined social exclusion as: 'A shorthand term for what can happen when people or areas suffer from a combination of linked problems such as unemployment, poor skills, low incomes, unfair discrimination, poor housing, high crime, bad health and family breakdown.' "


Social Capital

"Social Capital: concerns the structures that help maintain & develop human capital in partnership eg families, communities, businesses, trade unions, schools & voluntary organisations."

Economic Key Performance Indicators (KPIs)

Economic Key Performance Indicators (KPIs) include the following:

- Client satisfaction - product
- Client satisfaction - service
- Defects
- Safety
- Predictability - cost (design and construction)
- Predictability - time (design and construction)
- Construction cost
- Construction time
- Profitability
- Productivity

Sources:

http://www.constructingexcellence.org.uk/shop/product_variations.jsp?id=3
[Accessed: 25 April 2005]

[Accessed: 27 April 2005]

Competitiveness

Competitive: “involving, offered for, or by competition”
In the context of the Delphi Exercise, therefore, competitiveness refers to maintaining the element of competition (e.g. as in competitive tendering).

Logistics strategies

Logistics strategies refer to strategies concerned with managing the flow of goods, materials, equipment and people from their point of origin direct to the point of use, helps ensure that the right products reach the right place in the right quantity at the right time to satisfy customer demand.

Corporate Social Responsibility

Corporate Social Responsibility (CSR) “...is about how business takes account of its economic, social and environmental impacts in the way it operates”
CSR is about “...the voluntary actions that business can take, over and above compliance with minimum legal requirements, to address both its own competitive interests and the interests of wider society.”

Source:
BREEAM

BREEAM (BRE Environmental Assessment Method) "assesses the performance of buildings in the following areas:
- management: overall management policy, commissioning site management and procedural issues
- energy use: operational energy and carbon dioxide (CO2) issues
- health and well-being: indoor and external issues affecting health and well-being
- pollution: air and water pollution issues
- transport: transport-related CO2 and location-related factors
- land use: greenfield and brownfield sites
- ecology: ecological value conservation and enhancement of the site
- materials: environmental implication of building materials, including life-cycle impacts
- water: consumption and water efficiency"

"Credits are awarded in each area according to performance. A set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is then rated on a scale of PASS, GOOD, VERY GOOD or EXCELLENT"


Procurement routes

"the procurement route delivers the procurement strategy. It includes the contract strategy that will best meet the client's needs"

"the contract strategy determines the level of integration of design, construction and ongoing maintenance for a given project, and should support the main project objectives in terms of risk allocation, delivery, incentivisation and so on."

Procurement routes include, among others, PFI, Prime Contracting, Design & Build, and traditional procurement routes.

Source:

Target cost contracts

"Target cost contracts are a development of the reimbursable type of contract. The promoter and contractor enter into a reimbursable contract, but also agree a probable (or target) cost for the probable scope of work, together with an incentive payment mechanism which deals with any difference between actual outturn and target cost. The contractor's actual costs are monitored and reimbursed under the reimbursable contract. Any difference between the final actual cost and the final target cost is then shared by the promoter and the contractor in accordance with
incentive mechanism .......... A fee, which is paid separately, covers the contractor’s overheads, and any other costs specified in the contract documents as not being allowable under actual cost and contractor’s profit.” (Wright, 2002; p. 199)

The target cost may be adjusted for major changes in the work and cost inflation.

Source:

Strategic Partnering

“Strategic partnering involves the integrated supply team and the client organisation working together on a series of construction projects to promote continuous improvement............With this kind of arrangement a contract or framework agreement is awarded to an integrated supply team for a specified period of time; the team prices individual projects within the contractual arrangement.”

Source:

Integrated supply chains

“A supply chain is made up of all the parties responsible for delivering a product or service. An integrated supply chain is responsible for delivering the whole project, and sometimes a whole programme of projects”

Source:
A10: Relevant tests

Calculation of internal consistency reliability through calculating Cronbach’s coefficient alpha (using SPSS) – Delphi Round 3

Reliability

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| Missing Value Handling | Definition of Missing Cases Used | User-defined missing values are treated as missing. Statistics are based on all cases with valid data for all variables in the procedure. |

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| Split File | <none> |

**N of Rows in Working Data File:** 13

**Matrix Input Handling:**

- Definition of Missing Cases Used: User-defined missing values are treated as missing.
- Statistics are based on all cases with valid data for all variables in the procedure.

**Syntax**

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**Resources**

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| Largest Contiguous Area | 524288 bytes |
| Workspace Required | 656 bytes |

#### Warnings

The space saver method is used. That is, the covariance matrix is not calculated or used in the analysis.

#### Case Processing Summary

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* Listwise deletion based on all variables in the procedure.

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343
Appendix B: Interviews

B1: Information about the interviews conducted
B2: Invitation letter to participate in the interviews
B3: Interview Guide
B1: Information about the interviews conducted

<table>
<thead>
<tr>
<th>ID</th>
<th>Type of interview agreed</th>
<th>Date of Interview</th>
<th>Time of interview</th>
<th>Place of Interview</th>
<th>Title and name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Telephone</td>
<td>6 Dec. 2005</td>
<td>09:30 a.m.</td>
<td></td>
<td>Ms Annie Hall</td>
<td>Head of Sustainability, CITB-Construction Skills</td>
</tr>
<tr>
<td>2</td>
<td>Personal</td>
<td>12 Dec. 2005</td>
<td>08:30 a.m.</td>
<td>DTI, 151 Buckingham Palace Rd, SW1W 9SS, London</td>
<td>Mr John Newman</td>
<td>DTI contact under &quot;Regulation and Sustainability&quot; for Sustainable construction policy; Constructing Excellence liaison; Member, Sustainability Forum</td>
</tr>
<tr>
<td>3</td>
<td>Personal</td>
<td>24 Nov. 2005</td>
<td>3:45 p.m.</td>
<td>OGC's offices, 30 Gt Peter St., SW1P 2BY, London</td>
<td>Mr Phil Heenan</td>
<td>Policy Team Leader, Smarter Construction, OGC</td>
</tr>
<tr>
<td>4</td>
<td>Telephone</td>
<td>23 Nov. 2005</td>
<td>04:00 p.m.</td>
<td></td>
<td>Mr George Martin</td>
<td>Director of Sustainability, BRE; Associate Director, Forum for the Future; Associate Director, Willmott Dixon Construction; Commissioner, Warwickshire Sustainability Commission; Chairman, Sustainable Development Foundation; Trustee, Friends of the Lake District</td>
</tr>
<tr>
<td>5</td>
<td>Telephone</td>
<td>16 Nov. 2005</td>
<td>02:30 p.m.</td>
<td></td>
<td>Mr Jon Bootland</td>
<td>MD, Sustainable Development Corporation</td>
</tr>
<tr>
<td>6</td>
<td>Telephone</td>
<td>23 Nov. 2005</td>
<td>02:30 p.m.</td>
<td></td>
<td>Mr John Hoyland</td>
<td>Sustainability Manager, Property Services, East Sussex County Council</td>
</tr>
<tr>
<td>7</td>
<td>Telephone</td>
<td>5 Dec. 2005</td>
<td>09:30 a.m.</td>
<td></td>
<td>Mr John Porter</td>
<td>City Architectural Services Officer, Public Sector Sustainable Construction Forum, Dundee City Council</td>
</tr>
<tr>
<td>8</td>
<td>Personal</td>
<td>12 Dec. 2005</td>
<td>01:00 p.m.</td>
<td>Institute of Directors, Pal Mall, London</td>
<td>Ms Milica Kitson</td>
<td>Chief Executive, Constructing Excellence in Wales</td>
</tr>
<tr>
<td>9</td>
<td>Personal</td>
<td>24 Nov. 2005</td>
<td>1:30 p.m.</td>
<td></td>
<td>Mr Richard Chamberlain</td>
<td>Senior Policy Advisor, Construction Procurement and Clients, Construction Sector Unit, DTI</td>
</tr>
</tbody>
</table>
Dear ........,

A research project about realising sustainable construction through procurement strategies is currently being undertaken at Loughborough University (details are provided in the link below). The project involves interviews with experts and professionals who can give insights to the following:

- What factors are important for UK public clients to better address sustainable construction in developing construction projects' procurement strategies?

- What are the barriers to better addressing sustainable construction by UK public clients in developing construction projects' procurement strategies? Who would be most capable of removing them?

The interview, which is expected to take 15-20 minutes, could be conducted either face to face or over the telephone. Responses will be treated in strict confidence. Following the study, a report summarising its results will be sent to the participants.

You have valuable expertise to the research project and I would very much like to know your views about the subject. I would be grateful if you could inform me whether it is possible to conduct an interview with you at your some time convenient to you. Thank you very much.

Yours sincerely,

Amr Sourani
Research Scholar (PhD)
Department of Civil and Building Engineering,
Loughborough University, Loughborough, Leicestershire, LE11 3TU
Mob: 078 6750 4427
Tel: 01509 269 084 or 228 796
Fax: 01509 223 945
E-mail: A.I.Sourani@lboro.ac.uk
http://www.lboro.ac.uk/departments/cv/research/profile/student/102.html
B3: Interview Guide

Realising sustainable construction through procurement strategies: Interviews

To clarify some of the terms used (or which can be used during the interview), some clarifications and definitions are introduced below (pages 1 and 2). This is followed by interview questions (pages 3 and 4).

Definitions and Clarifications

**Sustainable construction and its social, economic, and environmental dimensions**

Sustainable construction describes the application of sustainable development to the construction industry.

Sustainable development is "all about ensuring a better quality of life for everyone, now and for generations to come, through:

- social progress which recognises the needs of everyone
- maintenance of high and stable levels of economic growth and employment, whilst
- protecting, and if possible enhancing, the environment, and
- using natural resources prudently

Sustainable development embraces the three broad themes of environmental, social and economic accountability, often known as the 'triple bottom line'."


An ongoing research project, undertaken at Loughborough University, and aims at identifying major criteria representing the social, the economic, and the environmental dimensions of sustainable construction that should be addressed by UK public clients in developing a procurement strategy, indicates that such criteria could be as follows:

**Social Sustainability Criteria:**
- Improving health and safety performance
- Participation of stakeholders (including community involvement)
- Social inclusion (including tackling poverty and social exclusion)
- Seeking intergenerational equity by considering cost for future generations
- Consideration of user needs and satisfaction (including accessibility)
- Creating employment opportunities
- Training and development of the workforce
- Equality and diversity in the workplace
- Improving workforce satisfaction
- Improving working environment and conditions
- Creating a positive impact on the local environment (e.g. local community, business, infrastructure)
- Promoting ethical practices
- Preservation of culture and heritage
- Minimising the disruptive impacts of construction (e.g. noise)
- Promoting equitable distribution of costs and benefits (at local, regional and international levels)
- Improving security and reducing crime
- Building and maintaining social capital

**Economic Sustainability Criteria:**
- Clear establishment of need and evaluation of alternative options
- Whole life value for money
- Supporting the regional / local economy (including stimulating demand for local labour, businesses, materials and services)
- Creating employment opportunities
- Fitness for purpose (including consideration of long term flexibility)
- Consideration of whole life costing
- Economic Key Performance Indicators (KPIs)
- Waste minimisation and management
Improving the efficiency of the supply side
Financial affordability for intended beneficiaries
Competitiveness
Consideration of effective logistics strategies

Environmental Sustainability Criteria:
- Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)
- Reducing energy consumption
- Reducing water consumption
- Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)
- Reusing existing built assets
- Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources
- Minimising water, land and air pollution (including noise)
- Preserving and enhancing biodiversity
- Waste minimisation and management
- Minimising negative visual impact
- Creating a healthy, non-toxic environment (e.g. high indoor air quality)
- Considering transport issues (e.g. public transport provision, reducing the need to travel)
- Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)

Procurement strategy
The procurement strategy “identifies the best way of achieving the objectives of the project and value for money, taking account of the risks and constraints, leading to decisions about the funding mechanism and asset ownership for the project. The aim of a procurement strategy is to achieve the optimum balance of risk, control and funding for a particular project.”
Key tasks in developing a procurement strategy include: producing outline business case; determining procurement route (including contract strategy); producing output-based specification and criteria for selection and award; OJEU advertisement if required.

Public clients
Public clients are “clients who are sponsors of construction work but who are part of a local authority or central public-funded body where there are particular constraints affecting procurement practices, including EU procurement regulations. Typically local authorities initiating capital expenditure where local standing orders or EU rules restrict some of the procurement strategies which can be adopted, but where improvements to current practices are being explored.”
## Interview Questions

**1. General Information**

<table>
<thead>
<tr>
<th>Your name:</th>
<th>Name of your organisation:</th>
<th>Your occupation:</th>
</tr>
</thead>
</table>

*Relevant Experience in the fields of sustainability and construction procurement:*

---

**2. What factors are important for UK public clients to better address sustainable construction in developing construction projects' procurement strategies?**
3. What are the barriers to better addressing sustainable construction UK public clients in developing construction projects' procurement strategies? Who would be most capable of removing them?

4. Please add any comments you would like to make:

Thank you very much for your time and effort.
Appendix C: Case studies

- C1: Information about interviews conducted within the London Borough of Camden case study and within the Nottinghamshire County Council case study

- C2: Request to conduct a case study about London Borough of Camden

- C3: Interview guide used with the interviews conducted within the case studies of 'London Borough of Camden case study and within the Nottinghamshire County Council Case study

- C4: Documents used for document analysis in the London Borough of Camden case study and in the Nottinghamshire County Council case study
C1: Information about interviews conducted within the London Borough of Camden case study and within the Nottinghamshire County Council case study

<table>
<thead>
<tr>
<th>ID</th>
<th>type of interview agreed</th>
<th>Date of Interview</th>
<th>time of interview</th>
<th>Place of Interview</th>
<th>Title and name</th>
<th>Position</th>
<th>Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>personal</td>
<td>12 Oct. 2005</td>
<td>02:30 p.m. - 03:30 p.m.</td>
<td>London Borough of Camden, Clifton House, 83-117 Euston road, NW1 2RA, London</td>
<td>Mr Chit Chong</td>
<td>Sustainability Officer, Housing Energy &amp; Sustainability Unit, London Borough of Camden</td>
<td>London Borough of Camden</td>
</tr>
<tr>
<td>2</td>
<td>personal</td>
<td>12 Dec. 2005</td>
<td>11:18 a.m. - 12:03 p.m.</td>
<td>London Borough of Camden, Finance Department, Argyle Street, WC1H 8EQ, London</td>
<td>Ms Katherine Adams</td>
<td>Sustainable Procurement Officer, London Borough of Camden</td>
<td>London Borough of Camden</td>
</tr>
<tr>
<td>3</td>
<td>personal</td>
<td>18 Nov. 2005</td>
<td>02:00 p.m. - 04:00 p.m.</td>
<td>Nottinghamshire County Council, Trent Bridge House, Fox Rd West, Bridgford, NG2 6BJ, Nottingham</td>
<td>Mr Nicholas Brown</td>
<td>Environmental Strategy Group Manager, Nottinghamshire County Council</td>
<td>Nottinghamshire County Council</td>
</tr>
</tbody>
</table>
C2: Request to conduct a case study about London Borough of Camden

Dear ............,

A research project about realising sustainable construction through procurement strategies is currently being undertaken at Loughborough University (details are provided in the link below). One part of the project is conducting case studies about public clients' organisations which are demonstrating good practice in terms of addressing sustainable construction in their construction projects' procurement strategies. Camden Council is expected to be among such organisations.

I hope you are able to help and would be grateful if you could inform me whether it is possible to conduct a case study about Camden Council. The main aim of the study, which will depend mainly on some interviews with relevant people in the organisation, is to identify how the organisation is addressing sustainable construction in its construction projects' procurement strategies.

If you require any further information, please do not hesitate to contact me. Thank you very much.

Yours sincerely,

Amr Sourani
Research Scholar (PhD)
Department of Civil and Building Engineering,
Loughborough University, Loughborough, Leicestershire, LE11 3TU
Tel: 01509 269 084 or 228 796 Mob: 078 6750 4427 Fax: 01509 223 945
E-mail: A.I.Sourani@lboro.ac.uk
http://www.civil-at-lboro.co.uk/research/profile/student/102.html
C3: Interview guide used with the interviews conducted within the case studies of London Borough of Camden case study and within the Nottinghamshire County Council Case study

<table>
<thead>
<tr>
<th>Part 1: General Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Your name:</td>
</tr>
<tr>
<td>1.3 Name of your organisation:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1.5 Your organisation is located in (please circle the right answer):</td>
</tr>
<tr>
<td>a. England</td>
</tr>
<tr>
<td>b. Scotland</td>
</tr>
<tr>
<td>c. Wales</td>
</tr>
<tr>
<td>d. Northern Ireland</td>
</tr>
<tr>
<td>1.7 Is your Authority a Beacon Local Authority (for local authorities)?</td>
</tr>
<tr>
<td>1.8 Number of years of experience you have in construction procurement and allied fields:</td>
</tr>
<tr>
<td>(including the number of years in construction procurement and allied fields in any other organisations for which you might have worked before)</td>
</tr>
<tr>
<td>1.10 Sizes of construction projects in which the organisation is involved:</td>
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</table>
Part 2: Addressing Sustainability

(See note below)

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<th>Item code</th>
<th>Criteria / Consideration</th>
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<tbody>
<tr>
<td></td>
<td>2.1 Is the criteria/consideration perceived by the organisation as a criteria/consideration that the organisation should address in developing its construction projects' procurement strategies or contracts? If the answer is &quot;yes&quot;, it will be useful if you could mention &quot;how&quot; the criteria/consideration is addressed or if you could guide the investigator about relevant documents or material showing &quot;how&quot; the criteria/consideration is addressed (e.g. through certain contract conditions and specifications, through integration of criteria/consideration into contractors selection and award procedures etc. - see also clarification regarding this question in the attached sheet for definitions and clarification)</td>
</tr>
</tbody>
</table>

### Social

- **s1** Improving health and safety performance
- **s2** Participation of stakeholders* (including community involvement)
- **s3** Social inclusion (including tackling poverty and social exclusion)*
- **s4** Seeking intergenerational equity by considering cost for future generations*
- **s5** Consideration of user needs and satisfaction (including accessibility)
- **s6** Creating employment opportunities
- **s7** Training and development of the workforce
- **s8** Equality and diversity in the workplace
- **s9** Improving workforce satisfaction*
- **s10** Improving working environment and conditions
- **s11** Creating a positive impact on the local environment (e.g. local community, business, infrastructure)
- **s12** Promoting ethical practices*
- **s13** Preservation of culture and heritage
- **s14** Minimising the disruptive impacts of construction (e.g. noise)
- **s15** Promoting equitable distribution of costs and benefits (at local, regional and international levels)
- **s16** Improving security and reducing crime
- **s17** Building and maintaining social capital*
**Economic**

| E1  | Clear establishment of need and evaluation of alternative options |
| E2  | Whole life value for money |
| E3  | Supporting the regional / local economy (including stimulating demand for local labour, businesses, materials and services) |
| E4  | Fitness for purpose (including consideration of long term flexibility) |
| E5  | Consideration of whole life costing |
| E6  | Economic Key Performance Indicators (KPIs) * |
| E7  | Improving the efficiency of the supply side |
| E8  | Financial affordability for intended beneficiaries |
| E9  | Competitiveness* |
| E10 | Consideration of effective logistics strategies* |

**Environmental**

| N1  | Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land) |
| N2  | Reducing energy consumption |
| N3  | Reducing water consumption |
| N4  | Selection and use of materials (including specifying low environmental impact materials, re-use and recycling) |
| N5  | Reusing existing built assets |
| N6  | Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources |
| N7  | Minimising water, land and air pollution (including noise) |
| N8  | Preserving and enhancing biodiversity |
| N9  | Waste minimisation and management |
| N10 | Minimising negative visual impact |
| N11 | Creating a healthy, non-toxic environment (e.g. high indoor air quality) |
| N12 | Considering transport issues (e.g. public transport provision, reducing the need to travel) |
| N13 | Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas) |
| 2.2 | Identify other major criteria/considerations which are not listed above but are perceived by the organisation as "sustainable construction/sustainability" that should be addressed in developing its construction projects' procurement strategies or contracts? |

| 2.3 | What factors are important for the organisation to better address sustainable construction in developing its construction projects' procurement strategies? |

| 2.4 | What are the barriers to better addressing sustainable construction by the organisation in developing its construction projects' procurement strategies? Who would be most capable of removing them? |

| 2.5 | Is there any remarks related to addressing sustainable construction in procurement strategies? For example, these could include:  
- Any issues regarding how the organisation is addressing sustainable construction in its construction projects' procurement strategies but are not mentioned above  
- What policies, strategies, processes and procedures are the organisation following to better address sustainable construction in its construction projects' procurement strategies  
- Whether addressing sustainable construction and/or individual sustainability considerations are essential or desirable  
- Any related remarks or comments the interviewer would like to make. |
C4: Documents used for document analysis in the London Borough of Camden case study and in the Nottinghamshire County Council case study

London Borough of Camden (undated-2) PQQ.


London Borough of Camden (2005b) SPU toolkit.


Nottinghamshire County Council (2005c) Pre-Qualification Questionnaire - The provision of consultant property design and management services to Nottinghamshire County Council and certain other local authorities. Nottinghamshire County Council.

Nottinghamshire County Council (2005b) Pre-Qualification Questionnaire - The provision of construction services to Nottinghamshire County Council and other contracting authorities and other contracting authorities. Nottinghamshire County Council.


Appendix D: Questionnaire survey

D1: Invitation letter to participate in the survey
D2: Reminder letter sent to non-respondents
D3: Questionnaire sent to local authorities
D4: Information about the questionnaire (sent with the questionnaire)
D5: Questions included in pilot testing of the questionnaire
D1: Invitation letter to participate in the survey

Name and address of respondent

Amr Sourani
Department of Civil and Building Engineering, Loughborough University, Loughborough, Leicestershire, LE11 3TU, England
E-mail: A.I.Sourani@lboro.ac.uk
Tel: 01509 269 084 or 228 796
Fax: 01509 223 945

Date

Dear ..........,

Addressing sustainable construction in UK public procurement

A research project about realising sustainable construction through procurement strategies is currently being undertaken at Loughborough University. One part of the project is a questionnaire survey that aims to identify the views of construction procurement professionals in local authorities in the UK about sustainability in construction procurement. The outcome of the survey can provide helpful guidance on making public procurement more consistent with the principles of sustainable development.

You have valuable expertise to the research project. I hope you are able to help in the survey and would be grateful if you could complete the attached questionnaire and return it using the stamped addressed envelope (enclosed). A reply within two weeks would be helpful. Completing the questionnaire is expected to take 10-15 minutes. All responses will be treated in strict confidence. The information provided will only be used for the research project purposes. Neither individuals nor their organisations will be identified in any results produced. Following the survey, a report summarising its results will be sent to the participants.

If you require any further information, clarifications or if you require further copies of the questionnaire, please do not hesitate to contact me. All contact details are shown above.

Thank you very much for your time and cooperation.

Yours sincerely,

Amr Sourani
Research Scholar (PhD)
Department of Civil and Building Engineering, Loughborough University
Name and address of respondent

Amr Sourani  
Department of Civil and Building Engineering, Loughborough University, Loughborough, Leicestershire, LE11 3TU, England  
E-mail: A.I.Sourani@lboro.ac.uk  
Tel: 01509 269 084 or 228 796  
Fax: 01509 223 945

Dear ..........,

**Addressing sustainable construction in UK public procurement**

A research project about realising sustainable construction through procurement strategies is currently being undertaken at Loughborough University. One part of the project is a questionnaire survey that aims to identify the views of construction procurement professionals in local authorities in the UK about sustainability in construction procurement. The outcome of the survey can provide helpful guidance on making public procurement more consistent with the principles of sustainable development.

I hope you are able to help in the survey and would be grateful if you could complete the attached questionnaire and return it using the stamped addressed envelope (enclosed). A reply within two weeks would be helpful. Completing the questionnaire is expected to take 10-15 minutes. All responses will be treated in strict confidence. The information provided will only be used for the research project purposes. Neither individuals nor their organisations will be identified in any results produced. Following the survey, a report summarising its results will be sent to the participants.

If you require any further information, clarifications or if you require further copies of the questionnaire, please do not hesitate to contact me. All contact details are shown above.

Thank you very much for your time and cooperation.

Yours sincerely,

Amr Sourani  
Research Scholar (PhD)  
Department of Civil and Building Engineering, Loughborough University

**P. S.** Please do not respond to the attached questionnaire if you have already responded to the copy that was sent to you before or if you have passed that copy to another colleague (as such colleague might have already responded). Thank you very much.
D3: Questionnaire sent to local authorities

Addressing sustainable construction in UK public procurement: Questionnaire

Dear Respondent,

All responses to this questionnaire will be treated in strict confidence. The information provided will only be used for the research project purposes. Neither individuals nor their organisations will be identified in any results produced. Further information about completing and returning the questionnaire can be found in the document titled "Addressing sustainable construction in UK public procurement: Information about the questionnaire" (enclosed). Please return the completed questionnaire using the enclosed stamped addressed envelope. Thank you very much for your time and effort.

Part 1: General Information

1.1 Your name (optional): .........................................
1.2 Your occupation (optional): .................................................................
1.3 Name of your authority (optional): ........................................
1.4 Type of your authority: .......................................... (e.g. County Council, City Council etc.)
1.5 Your authority is based in: England Scotland Wales Northern Ireland
   (Please tick the appropriate box)
1.6 Region in which your authority operates: ....................................
1.7 Is your authority a Beacon local authority* = Yes
   (e.g. East Midlands) (Please tick the appropriate box) , = No
1.8 Number of years of experience you have in construction procurement and allied fields: ............

Part 2: Considerations

Clarification:
This part provides the respondents with three sets of sustainability considerations (social, economic and environmental) that emerged from previous research. It asks the respondent about whether or not his/her authority follows (or plans to follow) policies, strategies, guidelines, or procedures which indicate the need to have the considerations addressed in its construction projects' procurement strategies or contracts (i.e. procurement strategies or contracts that the respondent's authority adopts in its construction projects).

A sustainability consideration can be addressed in construction projects' procurement strategies or contracts by different means. Such means could include (but not limited to) any of the following: requiring the tenderers to demonstrate commitment to delivering the consideration through policy and implementation, integrating the consideration into criteria of selection and award, building the consideration into contract conditions and specifications, or encouraging tenderers to suggest innovative solutions and approaches that support the attainment of the consideration.

Does your authority follow (or plan to follow) policies, strategies, guidelines, or procedures which indicate the need to have the following considerations addressed in its construction projects' procurement strategies or contracts?

Please put a tick in the appropriate box to indicate your response, using the following scale:
1 = Yes (i.e. my authority either follows or plans to follow policies, strategies, guidelines, or procedures which indicate the need to have the consideration addressed in its construction projects' procurement strategies or contracts).
2 = No (i.e. my authority neither follows nor plans to follow policies, strategies, guidelines, or procedures which indicate the need to have the consideration addressed in its construction projects' procurement strategies or contracts).
3 = Don't Know / No Opinion

Considerations

<table>
<thead>
<tr>
<th>Considerations</th>
<th>1 Yes</th>
<th>2 No</th>
<th>3 Don't Know / No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving health and safety performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation of stakeholders* (including community involvement)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social inclusion (including tackling poverty and social exclusion)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeking intergenerational equity by considering cost for future generations*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Clarification / Definition regarding the term or the statement under consideration is provided in the attached document.
<table>
<thead>
<tr>
<th>Considerations</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Social considerations – Continued</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Consideration of user needs and satisfaction (including accessibility)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Creating employment opportunities</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Training and development of the workforce</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Equality and diversity in the workplace</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Improving workforce satisfaction*</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Improving working environment and conditions</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Creating a positive impact on the local environment (e.g. local community, business, infrastructure)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Promoting ethical practices*</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Preservation of culture and heritage</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Minimising the disruptive impacts of construction (e.g. noise)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Promoting equitable distribution of costs and benefits (at local, regional and international levels)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Improving security and reducing crime</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Building and maintaining social capital*</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>B. Economic considerations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear establishment of need and evaluation of alternative options</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Whole life value for money</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Supporting the regional / local economy (including stimulating demand for local labour, businesses, materials and services)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Fitness for purpose (including consideration of long term flexibility)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Consideration of whole life costing</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Economic Key Performance Indicators (KPIs)*</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Improving the efficiency of the supply side</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Financial affordability for intended beneficiaries</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Competitiveness*</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Consideration of effective logistics strategies*</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>C. Environmental considerations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable land use and re-use (including giving priority to re-using previously-developed land and reducing consumption of undeveloped land)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Reducing energy consumption</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Reducing water consumption</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Selection and use of materials (including specifying low environmental impact materials, re-use and recycling)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Reusing existing built assets</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Considering the use of renewable resources (e.g. renewable energy) and reducing the use of non-renewable resources</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Minimising water, land and air pollution (including noise)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Preserving and enhancing biodiversity</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

* Clarification / Definition regarding the term or the statement under consideration is provided in the attached document.
Part 2 – Continued

<table>
<thead>
<tr>
<th>Considerations</th>
<th>1  Yes</th>
<th>2  No</th>
<th>3 Don't Know / No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Environmental considerations – Continued</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste minimisation and management</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimising negative visual impact</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creating a healthy, non-toxic environment (e.g. high indoor air quality)</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Considering transport issues (e.g. public transport provision, reducing the need to travel)</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protecting and enhancing sensitive landscapes (e.g. valuable scenic and cultural areas)</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part 3: Statements

The following are statements in the context of sustainable construction* and procurement. Please indicate the extent of your agreement / disagreement with each of these statements.

(Please put a tick in the appropriate box to indicate your response on the scale from 1 to 5 provided)

<table>
<thead>
<tr>
<th>Statement</th>
<th>1 Strongly Disagree</th>
<th>2 Disagree</th>
<th>3 Neither Agree nor Disagree</th>
<th>4 Agree</th>
<th>5 Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a low level of effective awareness among practitioners in the UK construction industry regarding sustainable construction issues</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevant regulations and government policies are sufficiently consistent with the objective of achieving sustainable construction</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting sustainable construction requirements should be emphasised as a primary objective in tender evaluation and contractor selection procedures</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There can be differences among procurement routes* (e.g. traditional, design and build, prime contracting etc.) in terms of their potential to deliver sustainable construction</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In evaluating tenders in my authority, there is a difficulty in assessing sustainable construction issues</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In my authority, tenderers are encouraged to suggest innovative solutions and approaches that support the attainment of sustainable construction</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part 4: Comments

Please add any comments you would like to make regarding any of the items in the questionnaire. It will be also helpful if you could provide any details regarding any cases of local authorities where sustainable construction has been addressed adequately.

Thank you very much for your time and effort

---

* Clarification / Definition regarding the term or the statement under consideration is provided in the attached document.
Addressing sustainable construction in UK public procurement: Information about the questionnaire

The Questionnaire

The aim of the questionnaire is to identify the views of the people who are responsible for - or involved in - construction procurement in local authorities in the UK about addressing sustainability in construction projects' procurement strategies or contracts. All responses will be treated in strict confidence. The information provided will only be used for the research project purposes. Neither individuals nor their organisations will be identified in any results produced. The outcome of the questionnaire survey can provide helpful guidance on making public procurement more consistent with the principles of sustainable development.

Part 1 of the questionnaire asks the respondents to provide general information about themselves and their organisations.

Part 2 provides the respondents with sets of sustainability considerations that emerged from previous research. Three sets of considerations are presented: social, economic and environmental. This part asks the respondent about whether or not his/her authority follows (or plans to follow) policies, strategies, guidelines, or procedures which indicate the need to have the considerations addressed in its construction projects' procurement strategies or contracts.

Part 3 seeks to obtain the respondents' views about statements in the context of sustainable construction and procurement.

Part 4 allows the respondents to add any comments they would like to make.

Guidance on completing and returning the questionnaire

- The questionnaire involves questions which ask the respondents to put a tick in the appropriate box to indicate their response. For example, if the respondent's response regarding the consideration "improving health and safety performance" is "yes", then his/her response will appear as shown below (the respondent can use the mark ✓ or any other mark to indicate the response).

<table>
<thead>
<tr>
<th>Considerations</th>
<th>1 Yes</th>
<th>2 No</th>
<th>3 Don't Know / No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving health and safety performance</td>
<td>✓</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

- Definitions and clarifications are provided below to clarify some of the terms / statements used in the questionnaire.
- Additional sheets may be used if required.
- Please return the completed questionnaire using the stamped addressed envelope (enclosed).
- A reply within two weeks would be helpful.
- If you require any further information, clarifications or if you require further copies of the questionnaire, please do not hesitate to contact me using any of the following:
  Mailing Address: Amr Sourani, Department of Civil and Building Engineering, Loughborough University, Loughborough, Leicestershire, LE 11 3TU, England.
  E-mail: A.I.Sourani@lboro.ac.uk Tel: 01509 269 084 or 228 796 Fax: 01509 223 945

Definitions and Clarifications

Beacon Council Scheme

"The Beacon Council Scheme was set up to disseminate best practice in service delivery across local government. Each year, the Government selects themes for the beacon scheme. Themes are chosen because of their importance in the day-to-day lives of the public and are key to improving the quality of life in all our communities. The themes are announced one or two years in advance and some themes will be repeated in future rounds.

All best value authorities can apply to become a beacon, the final decision is made by government ministers based on recommendations made by an independent advisory panel. Once selected as beacons, authorities hold beacon status for a year."

"Beacon status is granted to those authorities who can demonstrate a clear vision, excellent services and a willingness to innovate within a specific theme."


Competitiveness

Competitive: "involving, offered for, or by competition"


In the context of this questionnaire, therefore, competitiveness refers to maintaining the element of competition (e.g. as in competitive tendering).
Economic Key Performance Indicators (KPIs)

Economic Key Performance Indicators (KPIs) include the following:

- Client satisfaction - product
- Client satisfaction - service
- Defects
- Safety
- Predictability - cost (design and construction)
- Predictability - time (design and construction)
- Construction cost
- Construction time
- Profitability
- Productivity

Sources:

Ethical practices

The following clarification regarding ethics in the context of procurement is provided by IDeA website.

"Ethics and fraud prevention
Procurement in any organisation can be the target of fraudulent and corrupt activities. Authorities should take steps to minimize the opportunities for these. The provision of clear policy statements and codes of conduct, which are easily accessible by staff, are a basic requirement. The requirements should be described in the following:
- mandatory code of conduct for members
- mandatory employee code of conduct
- a policy statement on fraud
- financial regulations, contract standing orders, schemes of delegation.

These should emphasize that it is the duty of all members of staff involved in procurement to behave in a professional and honest manner (including adherence to rules on the acceptance of gifts and hospitality) and to treat all suppliers equally. They must report any conflicts of interest and any breaches of procurement procedures. These requirements should be embodied in the authority's procurement policies and procedures (see above).

Training on these rules should be provided for new staff in particular and on an ongoing basis if the codes/rules change. The procurement function should work closely with internal audit to monitor their application. A policy on procurement ethics will assist authorities in a number of ways. It will help to ensure that conduct is fair, honest, efficient and professional and that decisions are made on the basis of best value for money alone. Importantly, it will ensure that the reputation of the authority remains good within the market. An authority with poor procurement ethics will attract suppliers with similarly poor ethics, with reduced opportunity for productive working relationships”.


Improving workforce satisfaction

This refers to attending to the issues that affect the quality of the construction workforce’s working life – of working conditions, reward, quality of the management and the training on offer.

Source: Workforce Satisfaction Toolkit, Available from:

Logistics strategies

Logistics strategies refer to strategies concerned with managing the flow of goods, materials, equipment and people from their point of origin direct to the point of use and ensuring that the right products reach the right place in the right quantity at the right time to satisfy customer demand.

Seeking intergenerational equity by considering cost for future generations

This refers to attempting to achieve equity between generations and ensuring that significant social, biophysical and financial costs of current construction are not passed on to future generations.

Social Capital -
“Social Capital: concerns the structures that help maintain & develop human capital in partnership eg families, communities, businesses, trade unions, schools & voluntary organisations.”

Social exclusion

"Social exclusion includes poverty and low income, but is a broader concept and encompasses some of the wider causes and consequences of deprivation. The Government has defined social exclusion as: 'a shorthand term for what can happen when people or areas suffer from a combination of linked problems such as unemployment, poor skills, low incomes, unfair discrimination, poor housing, high crime, bad health and family breakdown.'"


Stakeholders

"The stakeholders are the named individuals and groups who have an interest in, or are involved in, or who are affected by, the activities and outcomes of a change initiative."


Sustainable construction

Sustainable construction describes the application of sustainable development to the construction industry. The construction industry is defined as "all who produce, develop, plan, design, build, alter, or maintain the built environment, and includes building materials manufacturers and suppliers as well as clients and end use occupiers."

Sustainable development is "all about ensuring a better quality of life for everyone, now and for generations to come, through:

- social progress which recognises the needs of everyone
- maintenance of high and stable levels of economic growth and employment, whilst
- protecting, and if possible enhancing, the environment, and
- using natural resources prudently

Sustainable development embraces the three broad themes of environmental, social and economic accountability, often known as the 'triple bottom line'."


Procurement routes

"the procurement route delivers the procurement strategy. It includes the contract strategy that will best meet the client's needs" 

"the contract strategy determines the level of integration of design, construction and ongoing maintenance for a given project, and should support the main project objectives in terms of risk allocation, delivery, incentivisation and so on."

Procurement routes include, among others, Prime Contracting, Design & Build, and traditional procurement routes.


Procurement strategy

The procurement strategy "identifies the best way of achieving the objectives of the project and value for money, taking account of the risks and constraints, leading to decisions about the funding mechanism and asset ownership for the project. The aim of a procurement strategy is to achieve the optimum balance of risk, control and funding for a particular project."

Key tasks in developing a procurement strategy include: producing outline business case; determining procurement route (including contract strategy); producing output-based specification and criteria for selection and award; OJEU advertisement if required.


Value for money

"the optimum combination of whole-life cost and quality (or fitness for purpose) to meet the user's requirement"


Whole life costs

"The whole life costs of a built asset facility include (1) the acquisition costs, including consultancy, design, construction and equipment, (2) the operating costs including utilities, renovation, and repair and maintenance through to disposal, and (3) internal resources and overheads, risk allowances, predicted alterations for known changes in business requirements, refurbishment costs and the costs associated with sustainability and health and safety aspects."

D5: Questions included in pilot testing of the questionnaire

Addressing sustainability in construction procurement: Questionnaire Pilot Testing

1. How long the questionnaire will take to complete?

2. Are the instructions clear?

3. Which questions were unclear or ambiguous?

4. Which questions the respondent felt uneasy about answering?

5. In your opinion, were there any significant topic omissions?

6. Was the layout clear and attractive?

7. Any other comments?