Evaluating Relationships between Organisational Core Competences and Individuals' Competencies

by

Essmail Ali Essmail

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Abstract

Determining core competence has been increasingly considered as a vital strategic approach towards a sustainable competitive advantage by researchers and decision-makers. Although its importance is widely recognised, the identification process appears complex. Therefore, sound theoretical systematic identification processes are still sought. In addition, the underlying components of core competence such as individuals' competencies have implications and need to be investigated. The contribution made by individuals' competencies in the content and form of organisational core competences is critical.

In response, this research aims to examine the potential link between core competences and individuals' competencies. To meet this goal, this thesis complements and extends a previous work (Hafeez *et al.*, 2002a-c) which introduced a structured framework to identify core competence. In particular, it intends to develop the Hafeez *et al.* (2002a) core competence identification framework at the individuals' level. In addition, the CIPD (2004) competency headings framework comprising seven competencies is used. Therefore, an integrated structured framework to link the relevant individuals' competences with the identified core competences is developed.

The context of this study is the utility, construction, oil services, and manufacturing industries. A combined methodology of structured questionnaire-based interviews and a postal survey involving fifteen organisations is performed. Data is at times subjectively collected and analysed. However, the AHP technique with its related software (EXPERT CHOICE) is used through all the stages of the proposed framework to eliminate subjective inconsistencies and enable this author to obtain solid results and conclusions.

The study recognised that the composition of core competences for the majority of surveyed organisations leans towards the human contribution. In addition, individuals' competencies influence and contribute towards the core competences. This confirms a strong relationship between individuals' competencies and core competences. However, the relative importance of the examined individuals' competencies against the identified core competences was rather different. On average, the prevalence of Team orientation followed by People management competencies was relatively the highest. The research concluded that the nature of the industry and the organisation's context has an impact on the portfolio of individuals' competencies to be linked with core competences.

This research has made four main contributions to knowledge. First, the Hafeez *et al.* (2002a-c) framework is re-tested within other industries, namely, utility, construction, oil services, and manufacturing. Second, the framework is developed at the individuals' competencies level. Third, the composition of identified core competences in terms of human, organisational, and technological contributions is evaluated. Fourth, the relevant portfolio of related individuals' competencies to be linked with core competences is determined. The outcomes of this research may help organisations to make key strategic decisions such as how to invest to develop particular organisational core competences and individuals' competencies.

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Dedication

This thesis is dedicated to my parents; my wife, Fatma; my daughters, Ambarka, Arieg, Farah, and Emtinan; my brothers and sisters and family members ... This achievement is ours.

List of Publications

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Statement of Authentication

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not presented this material, either in part or whole, for a degree at this or any other institution.

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Ch. One: Introduction

1.1 Overview of the Chapter

This Chapter primarily discusses the context of this research which is to explore the issues associated with identifying and analysing the structure of core competence. The aims of the research are addressed and the objectives are then delineated. Finally, the structure of the thesis is outlined.

1.2 The Research Background

In an ever-increasingly turbulent, chaotic, and unstable world, dramatic changes in the basic principles of conducting business occur (Hagan and Miami, 1996). Extreme business competition is forcing organisations to re-shape and rapidly adopt effective strategic actions. Hamel and Prahalad (1990; 1994) argue that focusing on traditional strategic thinking theory in today's complex and unsettled globe would cause organisations to be left behind. New management theories have argued to develop business strategies around their competences and streamline their portfolio of products and services. The competence-based competition theory asserts that core competences are the source of sustainable competitive advantage (Hafeez *et al.*, 2002a).

The core competence notion first surfaced in Parahald and Hamel's milestone article "Core Competence of the Corporation", published in Harvard Business Review in 1990. Since then it has attracted an enormous amount of interest from academics and decision-makers and is now at the heart of competence-based competition theory in the art of achieving competitive advantage. Although the concept of core competence is relatively recent, it has gained considerable attention from both researchers and practitioners. Considered as a critical strategic constituent to achieve a competitive advantage, the core competence approach has been successfully pursued by several multinational manufacturers such as Honda, Kodak, 3M, Sony, Sharp and NEC (Gorman and Thomas in Whitehill, 1997; Gilgeous and Parveen, 2001). Hafeez *et al.*, (2002a) go further and argue that a company can determine its future business directions according to the strength of its competences.

There has been unanimity that the competitiveness of an organisation relies on the core competences it possesses. The core competences approach is an outcome of a deliberate management strategy. Many practitioners value these concepts as a way of developing new businesses in response to modern customers. The core competence perspective makes it possible to build a framework which addresses key dimensions of strategic management and competition (Drejer, 2000; Godbout, 2000; Post, 1997).

Whilst there are compelling reasons to adopt the core competences theory, there is some ambiguity in the literature regarding how it can be defined and identified (Tampoe, 1994; Post, 1997). This author believes that the importance of core competence is widely recognised, but its identification process is complex and many challenges still exist relating to how such competences can systematically be evaluated. It is argued that the competence literature lacks structured organisational processes to identify core competences of organisation, although much debate has been addressed to its importance (Javidan, 1998). Core competences are difficult to identify and even more difficult to measure (Unland and Kleiner, 1996). Tampoe (1994) emphasises that despite compiling arguments regarding the use of core competences, only a limited amount of literature relating to the identification process is available. The underlying process of evaluating the architecture of core competence still, in fact, poses a large challenge. Academic literature on the subject is fraught with overlapping and at times conflicting views. It is difficult (Hafeez *et al.*, 2002a) to find any widely accepted definition of the related terms such as resource, capability, competence and core competence. A systematic methodology that connects the building blocks of a competence-based organisation is, therefore, widely sought. Hafeez *et al* (2002a-c) draw our attention to the fact that it is imperative to clearly define and link within a conceptual framework some key terms pertaining to competence-based theory such as resources, assets, capabilities, and competences in order to systematically identify core competences.

The core competence literature, nevertheless, witnesses many attempts to bridge the gap by introducing consistent and systematic processes to investigate core competence. Several key related components and issues are considered. For instance, during the process of evaluating core competence, the importance of the role of human resources as intangible assets emerges. It is argued that organisations should pay an equivalently considerable amount of attention to its employees' competencies once it starts to embark on the core competences path (Bergenhenegouwen *et. al,* 1996). Core competence is created when distinctive activities and tasks are performed well by individuals and groups (Post, 1997). The effective performance of individuals resulting from their distinguished competencies which are manifested in their use of resources and technology is critical to form their organisation's core competence. Petts (1997), therefore, maintains that core competence can be recognised as a unique combination of technologies, knowledge, and skills possessed by one company in a market.

The structure of core competence is often equally recognised in the form of tangible and intangible assets. In addition, the role of human resources or what many writers refer to as intellectual assets is extensively debated. With regard to this, Godbout (2000) defines the resulting organisational competences as a combination of business specialisation and economic utilisation of human skills. Core competences are built on individual intangible assets that constitute the organisation's capabilities, skills, knowledge, and employees' experience. They are the optimum mix between core technologies and core skills that would enhance the organisation's competitiveness (Gilgeous and Parveen, 2001; Baker *et al.*, 1997).

Core competence is often a blend of intangible assets such as culture and personal knowledge, and tangible assets such as technology. However, the intangibles' contribution when value-added to competitive advantage is much more critical and influential (Hafeez and Abdelmeguid, 2003). Whitehill (1997) goes further and stresses the significance of the role of intangible assets, as he points out that tangible assets offer a decreasing competitive advantage against intangible assets and, therefore, organisations must focus on their intangible assets. He adds that patents, brands, organisational or process knowledge as other faces of intellectual capital represent a benchmark to build up competitive advantage.

This researcher acknowledges that the role of individuals' competencies to build core competences is central once they are appropriately explored and exploited. Competency is all about performance (Weightman, 1994). A person's competency is a set of skills that should be possessed in order to be capable of satisfactorily performing a specified job (Baker *et al.*, 1997). Therefore, it is imperative to specify the portfolio of related individuals' competencies that shape and enhance the identified core competences for business success. Godbout (2000) advocates that employee's talents; skills and motivation are key elements in developing core competence and consequently achieving the organisation's objectives because knowledge is performed through human resources. The expertise and knowledge, and skills and motivation of employees, and the degree to which they are appreciated by management are key elements to drive the maximum benefits of the organisation's objectives and its core competence content (Bergenhenegouwen *et al.,* 1996). Core competences are the result of a joint learning process throughout the organisation and they shape products in which internal and external business strategies, production logistics and individual's competencies can be reflected and accounted. Core competences are therefore (Godbout, 2000) considered and related to the organisation's characteristic areas of expertise and involve the synergy of intellectual assets such as motivation, employee effort, technological and professional expertise, relationships and management processes.

This research is focusing on identifying core competences as a structured process and then determining the most appropriate corresponding individuals' competencies. The structure of identified core competences is investigated considering three key elements, namely, human, organisational, and technological contributions. In addition, the potential link between organisational competences and individuals' competencies is explored.

1.3 Aims of the Research

The overall aim of this research is to evaluate the relationship between core competences and individuals' competencies. To achieve this goal, it is planned to complement and extend previous work (Hafeez *et al.*, 2002a-c-c) which introduces a structured framework to identify core competence. Specifically, this work intends to develop the Hafeez *et al.* (2002a-c) core competence identification framework at the individuals' level. The CIPD (2004) competency headings framework comprising seven competencies is utilised to meet this goal. The aims of the research are summarised in Figure 1.1.

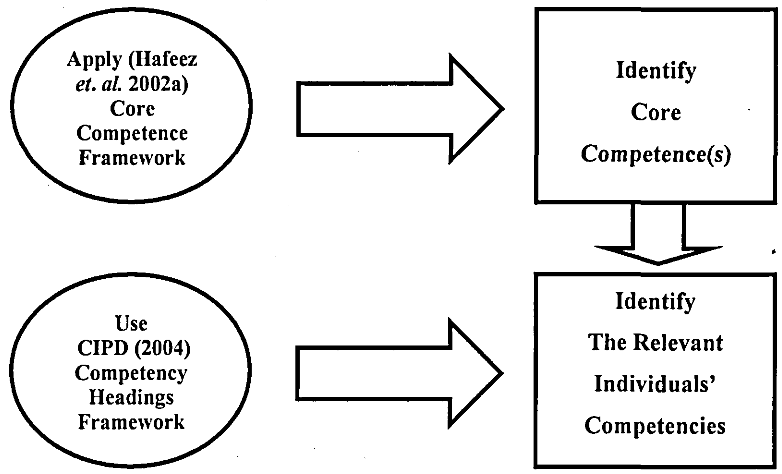


Fig. 1.1: The aims of the research.

1.4 The Research Objectives

The former study focused on testing the framework mainly in manufacturing and services industries. This research, on the other hand, extends the field study to involve construction, utility, and oil services, in addition to manufacturing industries. Subsequently, an integrated framework to link the appropriate portfolio of individuals' competencies that can be linked with identified core competences is proposed.

In accordance with the aim of the research stated in the previous Section, there are several particular objectives it attempts to achieve. These objectives are to:

1. Test the Hafeez *et al.* (2002a-c) core competence identification framework using secondary data, as a pilot case study, to become familiarised with the process.
2. Test the Hafeez *et al.* (2002a-c) core competence identification framework in the construction, utility, oil services, and manufacturing industries.
3. Develop a competence identification framework at the individual competency level using the CIPD (2004) competency headings framework and link it with the core competence model.
4. Develop an integrated framework to determine the most relevant individuals' competencies to be linked with the identified core competences.
5. Test the proposed integrated framework in the industries indicated in the second objective and make comparisons.

6. Use the Analytic Hierarchy Process (AHP) technique at multiple levels as a research method to ensure relatively more robust analysis than previous research.

In order to fulfil the research objectives, several key tasks are performed. These tasks stem from both the Hafeez *et al.* (2002a-c) and the CIPD (2004) frameworks with their roots originated in the literature review. A particular set of conjectures are, therefore, advanced and tested. The tasks to be performed are:

1. Mapping and analysing capabilities.
2. Determining key capabilities.
3. Determining competences.
4. Identifying core competences.
5. Evaluating the composition of core competences.
6. Evaluating the contribution of individuals' competencies towards core competences.
7. Determining the most relevant individuals' competencies to be linked with identified core competences.

The conjectures this research attempts to explore are:

1. Capabilities are composed from tangible and intangible assets with different scales according to the nature and infrastructure of business.
2. The organisation's financial and non-financial performance can distinguish between key capabilities and capabilities.
3. Competences can be determined by assessing the collectiveness and uniqueness of key capabilities.
4. Core competences can be identified by assessing the strategic flexibility of competences.
5. Core competence is a combination of human, organisational, and technological contributions.
6. The influence and contribution of individuals' competencies on organisational competences and core competences is associated with the nature of business and form of core competence.
7. There is a specific relative priority of importance for the seven individuals' competencies investigated with respect to each identified core competence.

1.5 The Structure of the Thesis

The overall research process is presented in this thesis in eight chapters. A brief concerning the content of each chapter is reviewed.

1.5.1 Chapter One

This Chapter commences with presenting the research context and then the aim of the research, its objectives and the structure of the thesis are outlined.

1.5.2 Chapter Two

The literature review on organisational competence and individuals' competencies is considered in this Chapter. Two conceptual models to identify core competences, in addition to the Hafeez *et al.*, (2002a-c) framework, are discussed and evaluated. Also, the individuals' competencies issue is discussed and its association with core competences is explored. The CIPD (2004) competency headings framework is presented to establish an integrated framework to link core competences with individuals' competencies.

1.5.3 Chapter Three

This Chapter concerns the research methodology and some key related concepts and issues. In particular, the methodology adopted to conduct this research is discussed and justified. Also, the research method and process used for data collection and analysis are outlined. The AHP applications are explained, and then the field study and research sample are described.

1.5.4 Chapter Four

In this Chapter, the Hafeez *et al.* (2002a-c) core competence identification framework is tested by conducting a pilot case study at Celltech - a UK-based global pharmaceutical company. A secondary data-based approach is used for this study.

1.5.5 Chapter Five

This Chapter focuses on testing the Hafeez *et al.* (2002a-c) core competence identification framework in the utility industry. Two case studies involving a Water and sewerage services company (WSSC) and an Electricity supply company (ESCA) are analysed and discussed. Important lessons are drawn.

1.5.6 Chapter Six

This Chapter is designed to evaluate the individuals' competencies topic using subjective value analysis as a qualitative approach. The three key stages with respect to this objective, namely, the core competence composition, the individuals' competencies contribution towards core competences, and the most relevant individuals' competencies, are examined. Two case studies are presented. The CIPD (2004) competency framework is considered for this evaluation. The Whiddett and Hollyforde (1999) technique of pair-wise comparison is used to evaluate the appropriate individuals' competencies.

1.5.7 Chapter Seven

This Chapter constitutes the main contribution this thesis adds to the literature. In essence, the Chapter presents the proposed integrated framework to identify core competences and their related individuals' competencies using AHP throughout all stages.

1.5.8 Chapter Eight

This Chapter discusses the outcomes of the research process. The main findings and lessons learnt are evaluated. The research deliverables and conclusions are presented. In addition, issues and factors that have an impact on the research process are considered. Finally, the Chapter finishes with a summary of the research limitations and recommendations for future work.

Ch. Two: Competence and Competency

2.1 Introduction

This Chapter reviews the literature on competence at the organisational and individual levels. The theory of competence-based competition is briefly reviewed and the concept of core competence is discussed. Two conceptual models to identify core competences, in addition to the Hafeez *et al.*, (2002a-c) framework, are evaluated. Also, the individuals' competencies subject is discussed and its association with core competences is explored. In addition, the (CIPD, 2004) competency framework is addressed to establish an integrated framework to link core competences with individuals' competencies.

2.2 Distinction between Competence and Competency

Despite the plethora of academic literature on the importance of competence, vague definitions and exchangeable usage of the relevant term commonly exists amongst academics and practitioners. Hafeez *et al.* (2002a, 200b) and Hafeez, Essmail and Siddiqi (2004) emphasise that it is difficult to discover any widely accepted definition of competence, and therefore a systematic methodology connecting the building blocks of a competence-based organisation is critical. Javidan (1998) stresses that although there is much discussion regarding how important it is for a corporation to understand its core competences, little information on how to do that; who in the organisation should be involved; and what particular actions should be taken to identify and successfully exploit the opportunities. Furthermore, the present author draws attention to the matter of the linguistically exchangeable use of the terms "competence" and "competency" and, hence, it is imperative to clearly distinguish the lingual meaning of both terms before commencing the theoretical perspective.

The competence glossary has been increasingly growing and the relevant jargons have become ever more mystifying (Wynne and Stringer, 1996). Literature often shows conflicting definitions about competence. It has been defined from several points of view and much ink has been spilt on deciding an accurate distinction between competence/ competences and competency/ competencies (Hoffman, 1999; Weightman, 1994).

Competence in the Longman Dictionary of Contemporary English (1995: p.270) is defined as "the ability and skill to do what is needed". Competency may be defined as the necessary knowledge, skills, experience and attributes to carry out a defined function effectively, whilst competence means those things the whole organisation must be good at to outperform its competitors (Mackay, 2003). At the individual level, competencies mean skills, traits, characteristics and behaviours that distinguish an individual, whereas at the organisational level, competences are those activities that an organisation has the capability to effectively perform given the required skills and knowledge (Hafeez, Essmail and Siddiqi, 2005). According to Armstrong (2003), whilst competency is a person-related concept, competence is a work-related concept. For this work, this author uses Whiddet and Hollyforde's (1999) definition where competence refers to an ability based on work tasks and functions; and competency refers to an ability based on personal behaviour.

Term (singular form)	Term (plural form)	The Unit of Analysis	Definition	Examples
Competence	Competences	Organisation	A key capability which is highly collective and unique in competition (Hafeez *et. al.* 2002)	Product development
Competency	Competencies	Individual	The core attributes of a person (Hoffmann, 1999)	Knowledge, Skills, Traits

Table 2.1: The definition of competence and competency.

2.3 Theory of Competence-Based Competition

The competence-based competition theory has appeared in the strategic management literature since the second half of the 20th century. It has enormously attracted academics and decision-makers' attention and interest as a strategy that can enable the organisation to achieve competitive advantage. The theory argues that, in order to achieve and sustain competitiveness, the organisation should establish its corporate and business objectives and values on the strengths of core competences it owns (Hafeez *et al.* 2002a; 2002b; 2002c). The theory has evolved through three main approaches which are a resource-based view, a dynamic capabilities approach, and a core competence-based perspective.

2.3.1 Resource-Based View (RBV)

The Resource-based view has been present in literature since the 1950s, however it became more prominent in the 1980s (Hafeez *et al.,* 2004). With this approach, the firm is seen as a bundle of resources and capabilities, and competitive advantage is gained by accumulating strategic assets and capabilities. The approach argues that firms are heterogeneous because they possess some unique assets and/or capabilities. These unique assets and capabilities, which are often called strategic resources, can make all the difference in creating competitive advantage for a firm. It is then a management duty to focus efforts toward nurturing and exploiting these strategic resources (Barney, 1991; Wernerfelt, 1984).

2.3.2 Dynamic Capabilities Approach

The dynamic capabilities approach does not consider a firm's assets to be the direct source of competitive advantage. It argues that the competitive advantage can be achieved by leveraging the managerial and organisational processes of the firm, and is formed by the strategic positioning of its assets and available paths. In addition, the firm's long-term competitiveness largely depends upon its dynamic "capabilities" (Teece *et al.,* 1997). They define "dynamic" as the capacity to renew competences in order to cope and achieve congruence within a turbulent business environment. Teece *et al.*, (1990) consider the ability of a firm to continuously generate new forms of competitive advantage is greatly influenced by its current competence endowment.

2.3.3 Core Competence-Based Perspective

The Core Competence-based perspective argues that it is the core competences of the firm, not discrete or individual assets, which are the source of sustainable competitive advantage (Prahalad and Hamel, 1990). Core competences are usually the result of "collective learning" processes and are manifested in business activities and processes. Core competences are those unique capabilities which usually span over multiple products and markets (Hamel, 1994; Bogner and Thomas, 1994; Sanchez and Heene, 1997). Compared with the resource-based approach, the core competence-based perspective emphasises the development of the right competences for the long-term success of a firm. A summary of the main phases of competence-based competition theory is presented in Table 2.2.

Terms/ Concepts	Resource-Based View (RBV) (1980s)	Dynamic Capabilities Approach (1990s)	Core Competence-Based Perspective (1990s)
Concept of a Firm	A bundle of resources and capabilities comprising: • Tangible assets • Intangible assets • Capabilities Activities	A system formed by processes, routines, and resources comprising: • Tangible assets • Intangible assets • Capabilities Organisational/ Managerial process	An open system of asset stocks and flows comprising: • Tangible assets • Intangible assets • Capabilities Managerial process
Competitive strategy	Controlling and exploiting strategic resources manifested in assets or capabilities	Deploying and exploiting capabilities embedded in processes, and continual reshaping of assets portfolio	Deploying, protecting and developing competences resulted from the integration of assets and capabilities
Attributes of resources / competences	• Valuable • Rare • Inimitable • Non-substitutable	• Valuable • Rare • Inimitable • Non-substitutable • Dynamic	• Valuable • Rare • Inimitable • Non-substitutable • Robust (for new market)
Development method	Development of intangible assets	Development and integration of intangible assets and capabilities	Development and integration of intangible assets and capabilities
Development environment	Internal	Internal and external	Internal and external
Authors	Barney (1991) and Wernerfelt (1984).	Teece, Pisano, and Shuen (1990; 1997).	Prahalad and Hamel (1990) and Sanchez and Heene (1997).

Table 2.2: A Comparison of the contemporary strategic management approaches. *Source: (Hafeez et al., 2002a).*

The above summary clearly illustrates that there are common elements amongst these management approaches (See Table 2.2). For instance, they all claim that the competitive strategy is shaped by exploiting or redeploying the resources or competences. However, there are some differences. The resource based approach, for example, focuses upon controlling and exploiting the resources themselves, whereas the other two approaches consider resources are part of capabilities or competences. In addition, while the resource-based view suggests that the development of assets is in-house, core competence and dynamic capability perspectives argue that the internal and external cooperation is equally important for developing or acquiring these competence/ capabilities.

2.4 What Is Core Competence?

Prahalad and Hamel (1990; 1994) argue that core competences of organisations are those specific capabilities that represent the "collective learning" of an organisation and provide it with real competitive advantage. They are the organisation's areas of strength (Javidan, 1998) and areas where it performs very well. The core competence approach is viewed as a principal management strategy that enables an organisation to cope with its environment and develop a unique business policy (Godbout, 2000). Many practitioners value these concepts as a way of developing new businesses in response to modern customers. The core competence concept explores how competitive advantage is linked to unique resources and firm special assets which constitute the basis of the value-added process (Post, 1997). Hayes (2003) simply defines core competence as a unique capability that creates some type of competitive advantage.

2.5 The Importance of Core Competence

Since 1990, the term “core competence” has been on the scene of the strategic management field attracting the attention of academics and practitioners. It was introduced in an article by Prahalad and Hamel (1990) to deal with capabilities within diversified firms. Since then, many global giant manufacturers such as Honda, Sony, Canon, Kodak, Sharp, 3M and NEC have progressively pursued this path to gain core competence (Gilgeous and Parveen, 2001). Each of these world-class organisations has been successful in a specific business area (e.g. Sony in miniaturisation, Honda in engine-related technologies) which has resulted in significant profits (Gorman and Thomas, 1997).

What distinguishes core competences from a bundle of abstract resources or capabilities is that they are a complex combination of knowledge and skills which outlast individual products and services with the slow pace of change over time (Van den Berghe, 2003). The core competence perspective can, to a great extent, contribute towards an organisation's competitive advantage and address key dimensions of strategic management. It works to explore how competitive advantage can be associated with unique resources and basic value-creation processes (Post, 1997).

2.6 The Characteristics of Core Competence

A broad number of definitions and views regarding the core competence concept can be considered. On the one hand, it demonstrates the amount of interest and awareness this concept has and, on the other hand, the inconsistent basis of analysis and aims due to divergent view points. Several factors such as the nature of industry, nature of business, organisational structure, organisation strategic goals, and degree of competition may lead to these divergent thoughts. However, some common characteristics can be distinguished from these definitions.

There are some explanations which complement Prahalad and Hamel's 1990's definition of core competence. For example, Petts (1997) believes that core competence is a unique combination of technologies, knowledge and skills possessed by one company in the market. It has a variety of attributes such as complexity, invisibility, inimitability, durability, appropriatability, superiority, and non-substitutability. Whitehall, (1997) turns the focus to the importance of invisibility of core competence which makes it hard for competitors to replicate it. He considers core competence as the intangible assets that can not be easily copied by competitors, and which are difficult to replace if lost or damaged. With its roots established in Prahalad and Hamels's concepts, Gilgeous and Parveen (2001) emphasize that a core competence should:

- **i.** Allow the organisation to access a wide variety of markets.
- **ii.** Make a significant contribution to the customer perception.
- **iii.** Be difficult for the competitors to imitate.

In addition, Armstrong (2000) supposes that there are three fundamental questions needing to be tackled in order to analyse core competence of an organisation, namely:

- **i.** What are the organisation's core values in such specific areas as performance, capability, innovation, customer service, quality, teamwork and development of people?
- **ii.** What are the unique tasks the organisation should perform to achieve a sustained competitive advantage?
- **iii.** What, in general, the organisation has to be competent at while performing its activities to achieve its business objectives?

2.7 Examples of Core Competences

Core competence is not something that can be touched or pointed out. However, as will be explained in the next sections, core competence can be identified through a sequential structured process where it will be seen as an outcome of the capacity of using certain value-added capabilities. For instance, Javidan (1998) states that the Caterpillar company has become a leader in the heavy construction equipment industry due to its after sale support and service capability which enables it to supply spare parts and service personnel within 24 hours any where in the world. In addition, Toyota's position in the auto manufacturing industry is a result of its just-in-time inventory (JIT), self-managing teams, and quality circles embedded in its flexible manufacturing capabilities. Furthermore, Walt Disney's core competence in entertaining families is developed by providing video channels, movie studios, and amusement parks (Ibid, 1998). Whitehill (1997) adds that 3M is famous for its creativity and innovation culture owing to its strategy to allow staff to spend up to 15% of their time on their own chosen innovation. However, one may argue that the same core competence may be repeated in more than one organisation. For example, Sony's core competence of miniaturisation can be seen in JVC's hand-held camcorders. However, it is how core competence can be protected, directed to other products, and sustained through experience and knowledge and intellectual patents that can make the difference. A brief account of some world class organisations' core competences is illustrated in Table 2.3 (Yeung, 2004).

Organisation	Organisational Core Competence
Honda	Light and powerful engines
Intel	Processors
Sharp	LCD technology
McDonalds	Food preparation process
Dell	Supply chain management

Table 2.3: Examples of some global manufacturers' core competences (Yeung, 2004).

2.8 Implications in Core Competence Identification

There is now unanimity that the competitiveness of the organisation rests on those core competences it possesses (Drejer, 2000). Many organisations and cases witness successful changes and evolving due to concentrating on the core competence approach. Core competences are considered as an outcome of a deliberate management strategy by which they can be recognised and developed over time (Godbout, 2000). However, the underlying process for evaluating the structure of core competence still poses a challenge for academics and practitioners alike. In spite of compelling arguments regarding using core competences (Tampoe, 1994), a limited amount of literature about the identification process is available. Javidan (1998) writes that although it is understandable how important the core competences concept is; a structured organisational process to identify it is not provided. Unland and Kleiner (1996) also maintain that identifying core competences is not an easy task and is indeed a complicated mission. Overlapping and some times conflicting views on a methodology to link basic related terms such as resource, capability, and competence to core competence are prevalent (Hafeez, Essmail and Siddiqi, 2004).

Javidan (1998) draws the attention that in spite of the significant contributions Prahalad and Hamel's (1990) definition of core competence as a "collective learning process" made, further explanation about the mechanism to identify it is required. He adds that there is limited information on what organisational process a company can implement and who should be involved in it. Also, Unland and Kleiner (1996) indicate that although this definition of core competence is wide spread, its model does not provide details how core competences can be built and developed. It is difficult to identify core competences and even more difficult to measure it.

2.9 Core Competence Evaluation

Although in practice, implementing a detailed systematic process to evaluate core competences does not always exist, literature demonstrates some attempts by researchers and academics to close the gaps. In response, since the core competence notion emerged during the last decade, several researchers have introduced conceptual frameworks attempting to assist practitioners to evaluate core competences of their businesses (Gorma and Thomas, 1997; Tampoe, 1994; Javidan 1998). In the next sections, two models available in the literature aim to evaluate competences are summarised. In addition, two other important models intend to evaluate core competences are studied to pave the way to discuss a structured core competence identification framework (Hafeez *et al.*, 2002a-c) - the theme of this thesis.

2.9.1 Previous Research on Competence Identification

The literature witnessed some attempts by several academics and practitioners to introduce conceptual models to evaluate the competences of their businesses. Four models are briefly summarised and discussed.

2.9.1.1 Production Competence Model

Cleveland *et al.* (1989) developed a conceptual model to identify competence by linking production process with business strategy (Zhang, 1999). In this model, production competence is defined as the capability to perform a particular business strategy against nine key areas of production performance such as quality, delivery, lead time, etc. The strengths of these performance areas are evaluated against the degree of production process sophistication, and simultaneously the importance of the process capabilities is assessed against alternative business strategy.

2.9.1.2 Manufacturing Competence Model

This model was developed by (Kim and Arnold, 1992) to illustrate the concept of manufacturing competences using competitive priorities and business strategies as measure (Zhang, 1999). They view that manufacturing competence is represented by the degree of consistency between the importance of capability to the firm and the firm's strength with respect to that particular capability. The capabilities used for the assessment are quality, cost, flexibility, and delivery. Based upon the management perceptions, the manufacturing competences are determined against the strength in capabilities and importance of capabilities to the firm.

2.9.1.3 Evaluation of the Models

The present author recognises that both models have common elements with regard the assumptions on which they are built on. For instance, they consider capability as the basic unit of analysis which is assessed using quantitative and qualitative techniques. The criteria they used for evaluating the capability is its importance to the company and its strength in the competition. Although the production and manufacturing models added important contribution to competence determination, there have some limitations. For instance, both models can only be used within manufacturing industry and lack of a systematic procedure to determine competences.

2.9.2 The Technical Subsystem Model (Tampoe, 1994)

Tampoe (1994, p. 69) defines an organisation's core competence as "a technical or management subsystem which integrates diverse technologies, processes, resources and know-how to deliver products and services which confer sustainable and unique competitive advantage and added value to an organisation". He advocates that core competence can be reflected on the organisation technical system which comprises both the creative and the implementation capability. To be a core, a competence should meet the following criteria:

- essential to business survival in the short and long term,
- invisible to competitors,
- difficult to imitate,
- unique to the organisation,
- comprises skills, resources, and processes,
- has a degree of durability,
- greater than an individual's competencies,
- essential to developing both core products and end products,
- essential to implementing the organisation's strategic vision,
- essential to the organisation's strategic decisions,
- has market and commercial value,
- few in number.

Based on his view, he proposed a hierarchical framework that aims to identify and exploit core competence in a structured manner. The sequence of steps in the Tampoe (1994) model (See Fig. 2.1) is explained as follows.

The identification process starts by establishing the organisation revenue stream and the products and services it offers. Only those products which make a significant contribution to the organisation's revenue, profit and strategic targets are determined and selected for analysis. Those candidate products are then analysed to identify core products and services which are then further separated into essential components to determine the basic technologies, people skills, processes and strategic assets that play an important role to create them. At the end of this stage, the core competences of the organisation become apparent, as shown in Fig. 2.1. The findings are consequently tested against secondary products and services to ascertain whether they are generated from the identified core competences and whether there are new markets in which these skills can be deployed. If, for instance, the test results do not appear associated with the determined core competences, then they would be potentially subject to divestment or disposal (Tampoe, 1994).

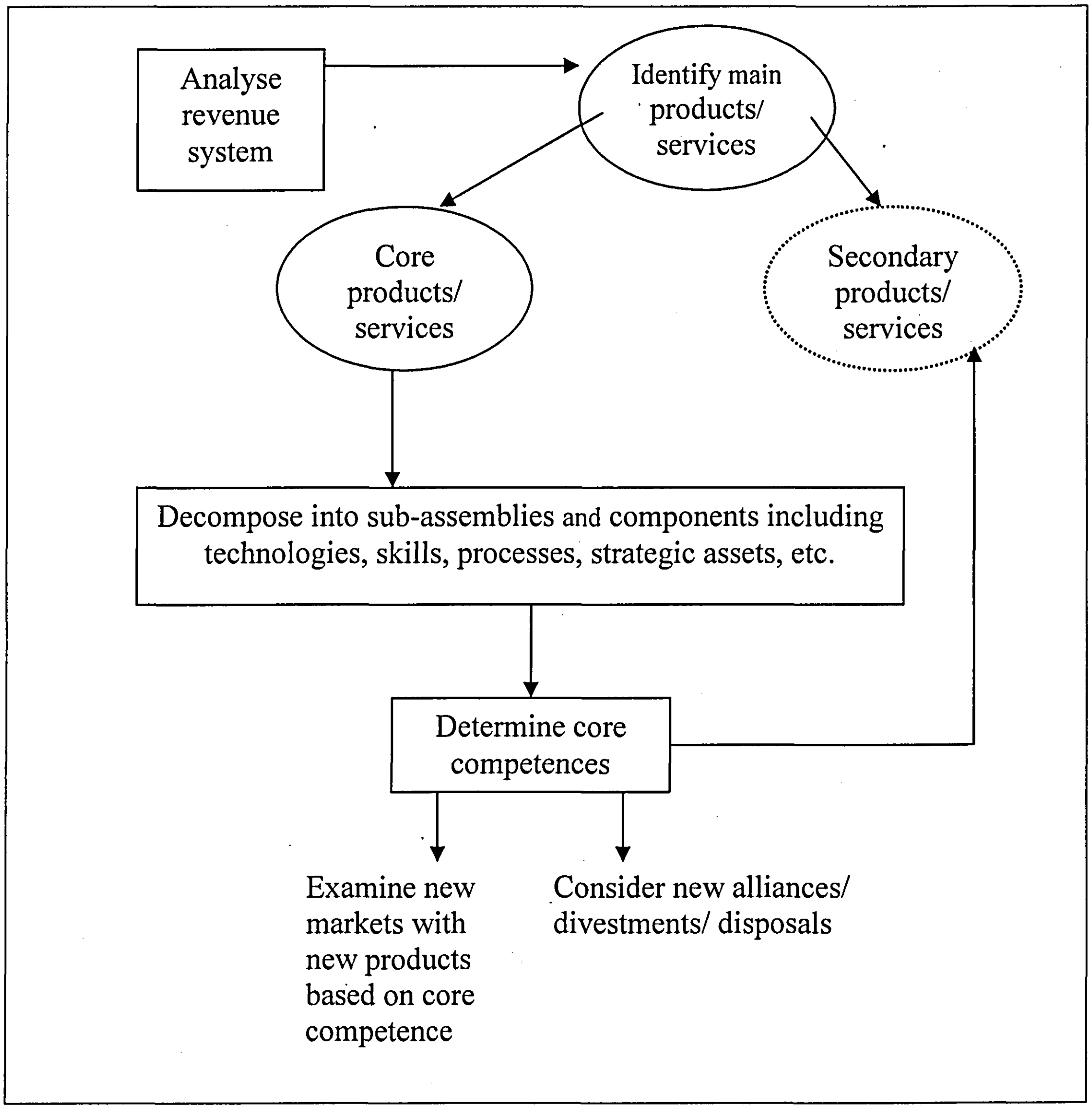


Figure 2.1: Exploiting core competences (Tampoe, 1994).

2.9.2.1 Evaluation of Tampoe (1994)

With reviewing the Tampoe (1994) model, the present author argues that it has an important contribution to the core competence determination subject as it introduces a structured process to achieve this goal. One of its key features is to commence with a clear starting point which is identifying the main products or services stem from analysing the revenue system. In addition, the model incorporates a list of essential measures stem from other theoretical frameworks to determine core competence such as invisibility to competitors, difficulty to imitate, uniqueness, durability ... etc. However, there are several limitations that can be highlighted. The model shows that the main products/services are decided on according to the revenue which means a wide reliance on financial dimension. In the present author's view, since the analysis towards identifying core competence starts with determining the main products/services, it is very likely, therefore, the selected products/services would be affected by the market forces and customer perception. In today's dynamic business environment the value of products are liable to market influence and competition. It can be also argued that this approach is based on an outside-in process corresponding to Porter's Model (Hafeez *et al.*, 2002) which challenges the concept of core competence proposed by Prahalad and Hamel as an inside-out perspective (Javidan, 1998). Core competence is built from within those resources the organisation own (Post, 1997). The main shortcomings of this model can be summarised as follows:

- It largely considers the financial performance (revenue system) ignoring the non-financial measures to differentiate the selected main products and services.
- Whilst it proposes a structured process to identify core competence, it lacks for more details about the stages and hierarchy of the process.
- It is essentially depends on particular recognised products which can be easily imitated and copied by competitors.

2.9.3 The Hierarchical Framework

In a study including several executive groups belonging to different companies in a variety of industries, Javidan (1998) introduces a hierarchical process aimed to define and identify the core competences of a corporation. He argues that in order to successfully identify and exploit a company's core competences, it is essential to create a universal understanding at all management levels regarding the identification process.

The resources located at the lowest level of the model (Fig. 2.2) are considered to be the building blocks of competences and the inputs into the organisation's value chain. Resources are categorised into three groups: physical resources (plant, equipment, location); human resources (work force, experience, training, management team); and organisational resources (culture, reputation). They all are seen as either tangible or intangible. At the second level of the model are capabilities which refer to the organisation's ability to exploit its resources. Capabilities consist of a series of business processes and routines that organise the interaction and relationships amongst resources. The main distinguishing characteristic of capabilities is that they are functional based. At the third level are competences which constitute the cross-functional integration and co-ordination of capabilities. They result from interfaces and integration among the SBU's (Strategic Business Unit) functional capabilities. Lastly, at the top level of the model, are core competences. Core competences cross the boundaries of SBU and result from the interaction between different SBUs' competences. Simply, a core competence is a collection of skills and knowledge that is shared across business units and results from the integration of a SBUs' competences.

There are several interesting aspects associated with the hierarchical model of core competences. First, each level in the hierarchy is based on the level below. It results from the integration of the elements in the lower level. Secondly, each level incorporates a higher value than the preceding level in terms of value added to the organisation. For instance, resources add little value on their own to the organisation. Functional capabilities' value is created by resources deployment. Competences, in return, add greater value because they expand the boundaries of capabilities. Finally, core competences add the greatest value as they exploit resources and capabilities at the broadest level and across the organisation as a whole (Javidan, 1998).

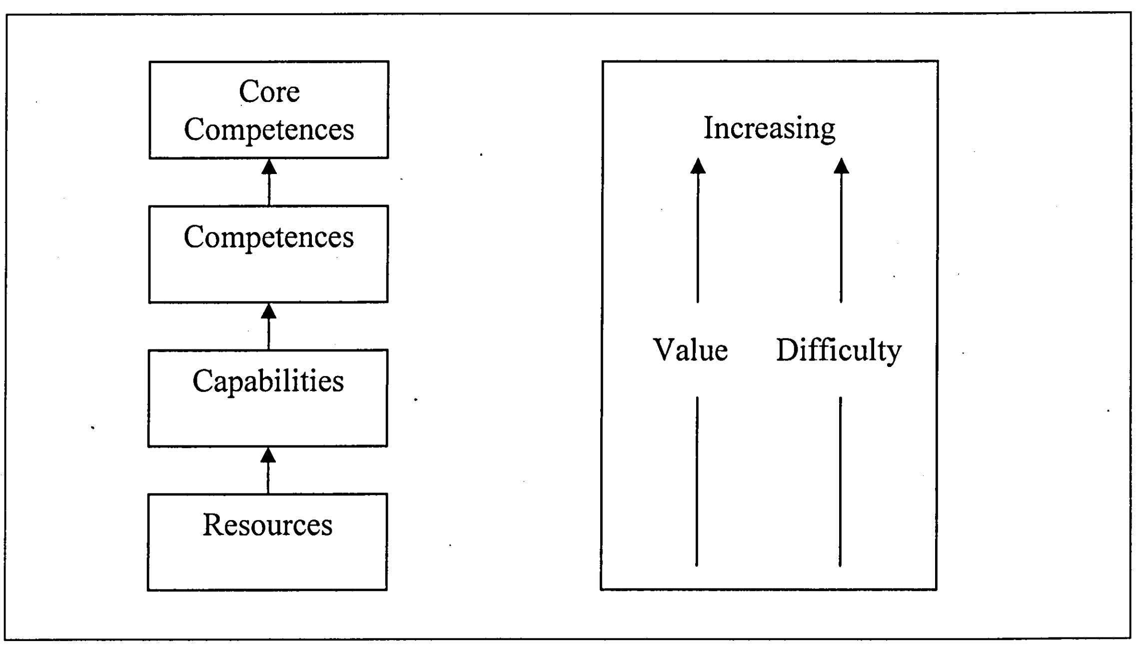


Figure 2.2: The competences hierarchy model (Javidan, 1998).

2.9.3.1 Evaluation of Javidan (1998) Framework

Compared with Tampoe (1994) model, this framework tends to be more structured and consistent. It is designed on a sequential process using resources as the baseline towards identifying core competence. This is in fact in line with the theory as core competence approach is considered a development of Resource-based view (Gilgeous and Parveen, 2001). Given the complexity of core competence, it is essential for managers to commence the identification process with resources as they can be physically seen (Gorman and Howard in Whitehill, 1997).

The framework reasonably illustrates that core competences can be recognised as they have the most value than capabilities and resources. It shows also that the difficulty increases towards core competences. However, the methodology lacks for specific criteria and measures to distinguish each stage's components. For instance, it is not clear how to isolate capabilities from resources; competences from capabilities; and core competences from competences. In addition, the framework needs further explanation with regard how value is increased towards core competences and how the identification process becomes more difficult.

2.10 A Structured Framework for Identifying Core Competence

Hafeez *et al.* (2002a; 2002b) proposed a structured framework to identify core competence by providing a linking mechanism between the building blocks of core competence: assets, resources, capabilities, and competences. They suggest that the framework is generic in nature and applicable to benchmark a manufacturing, public, or service sector organisation. The model was tested primarily in the manufacturing sector by conducting 5 case studies and a questionnaire-based survey responded to by 42 organisations (Zhang, 1999).

The framework illustrates a sequential link between assets, resources, capabilities, competences, and core competences (See Fig. 2.3). The methodology is based on isolating those collective, unique, and strategically flexible capabilities throughout sequential stages to be candidates for company core competences. It comprises three key stages working as a filtration process within which particular measures are employed to evaluate potential candidates of core competence(s).

Fig. 2.3 shows how the core competence components may be interlinked. In brief, company resources are considered the inputs to capabilities. Some capabilities play a more important and distinctive role than others in achieving the business objectives of a company. These are called key capabilities. Competences are those key capabilities which are both relatively highly collective in operation and unique in competition. Core competences, subsequently, are those dynamic and strategically flexible competences which are an integral part of the organisational learning and competence building process.

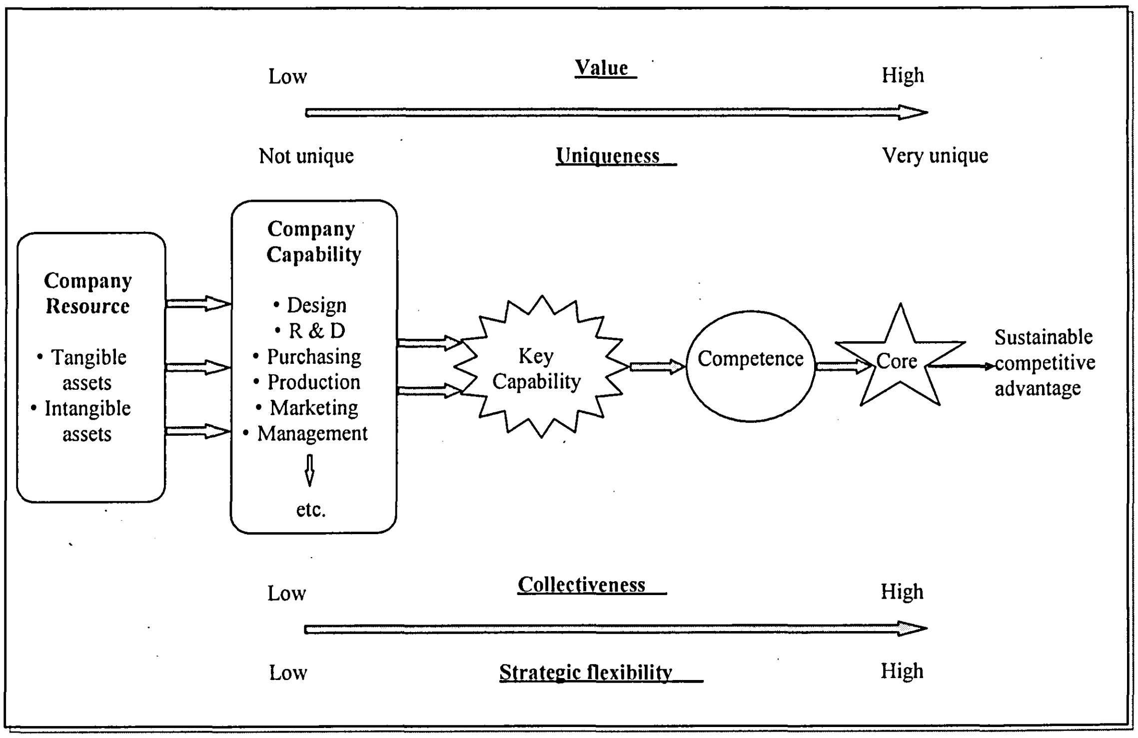


Fig. 2.3: The architecture of core competences (Hafeez *et al.*, 2002a-c).

2.10.1 Core Competence Identification

The model suggests that core competence can be identified through a structured process comprising three main stages (See Fig. 2.4). In the first stage, resources are split into static tangible and intangible assets as seen in Fig. 2.5. Capability is seen as the dynamic mix of these assets for imparting business operations. Capabilities and therefore key capabilities determination is deemed the most important step in the process. Key capabilities can be determined by applying value analysis or relying on experiential knowledge of the company. This may involve benchmarking internally the key business functions, such as general management, financial management, marketing, R&D, purchasing, etc. It is vital to take into account both financial and non-financial measures for valuing key capabilities, such as return on capital employed and new product introduction. It is increasingly argued that assessing business performance through merely financial measures may have implications (Hafeez *et al.,* 2001; Zhang, 1999) as they reflect the figure of the outcome but not the process of achieving it. Thus, a specific model is introduced to evaluate a company's capabilities and then isolate key capabilities using six particular financial and non-financial measures (See Fig. 2.6). These measures are presented and defined in Table 2.4.

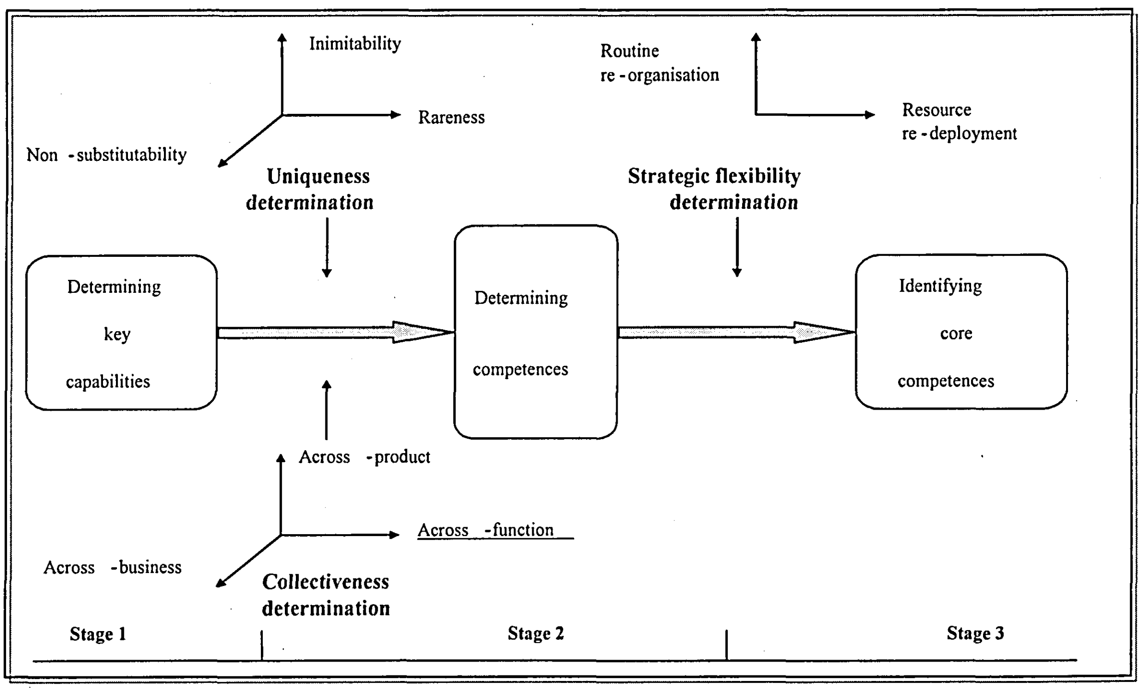


Fig. 2.4: The core competence identification framework (Hafeez *et al.*, 2002a-c).

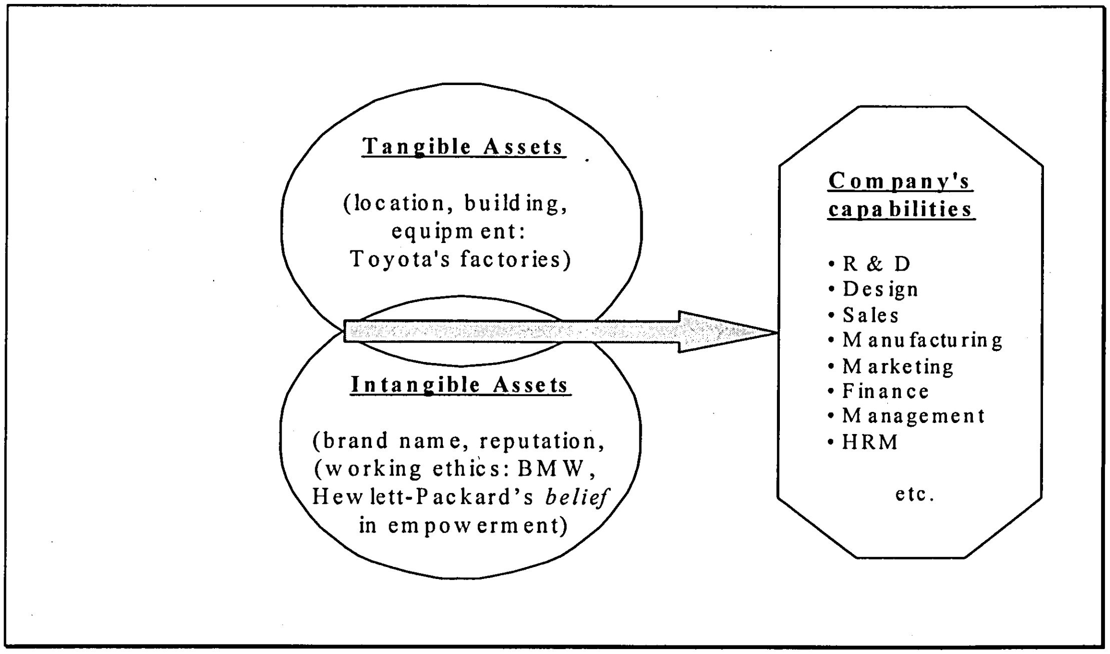


Fig. 2.5: Relationship between resources (assets) and capabilities (Hafeez *et al.*, 2002a-c).

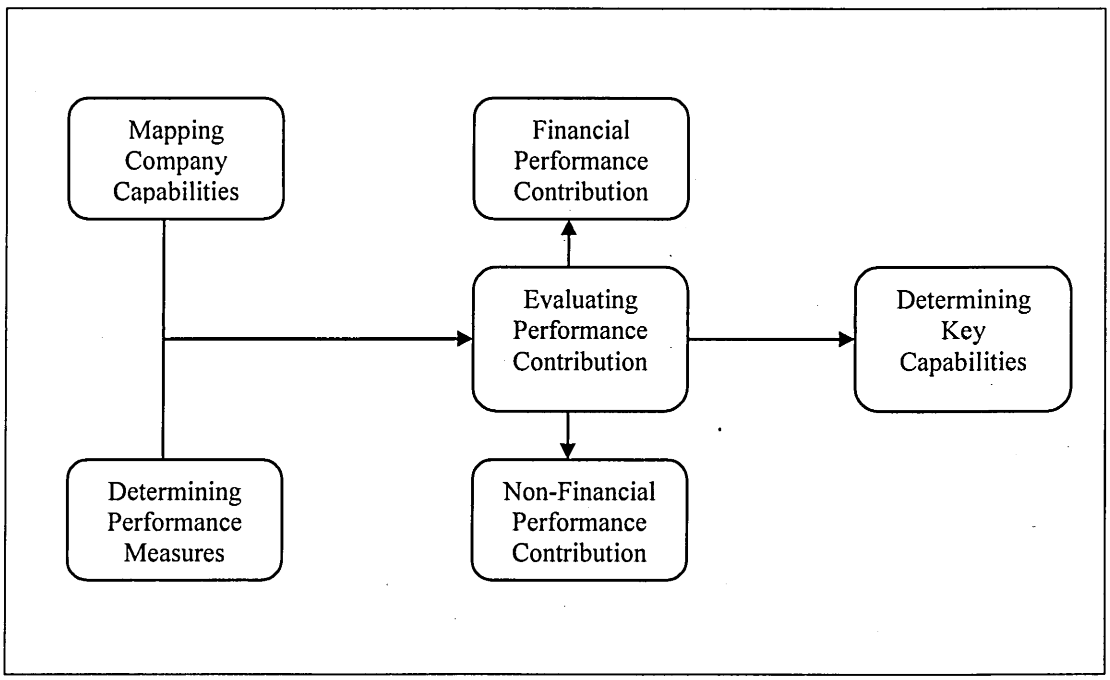


Fig. 2.6: The key capability determination model (Hafeez *et al.*, 2002a-c).

Financial Measures	Non-financial Measures
Sales Growth	Customer Satisfaction
Operating Profit	Market Share
Return On Capital Employed (ROCE)	New Product Introduction

Table 2.4: The financial and non-financial measures used to evaluate business performance (Hafeez *et al.*, 2002a-c).

In the second stage, once key capabilities are determined, a two-dimensional quantitative assessment process based on weighing these capabilities in terms of their internal integration (collectiveness) and external differentiation (uniqueness) is performed to determine competences. Collectiveness refers to the operational flexibility of the company and is assessed by gauging the integration: across-function, across-product, and across-business. Uniqueness is associated with an external analysis of the company environment as some knowledge of rivals is crucial. It is assessed against three attributes namely: rareness, inimitability, and non-substitutability. For both collectiveness and uniqueness, each attribute is measured on a scale between 1 and 4 (See Tables 2.5 and 2.6 respectively). Descriptions of elements of competences' attributes with related examples are presented in Tables 2.7 and 2.8.

Measures of Collectiveness	Degree of Collectiveness	Score
1. Across-product 2. Across-function 3. Across business	No Collectiveness	1
	Low Collectiveness	2
	Medium Collectiveness	3
	High Collectiveness	4

Table 2.5: Degree of integration.

Measures of Uniqueness	Degree of Uniqueness	Score
1. Rareness 2. Inimitability 3. Non-substitutability	No Uniqueness	1
	Some level of Uniqueness	2
	Medium level of Uniqueness	3
	High Uniqueness	4

Table 2.6: Degree of uniqueness attribution.

It is necessary to point out that the (1-4) scores method is used to demonstrate the weights of the examined candidates against the applied criteria. The research assumes that the intervals between scores are equal and scores are independently treated. It is intended to apply these discrete values to facilitate the benchmarking process which is based on calculating the mean value for each exercise. The method was explained to respondents who were made known of it. There are three main reasons of using this method. First, it is simple to use and the results can be easily analysed. Second, the subjective evaluations are turned into quantitative results. Third, once similar scores are applied at all exercises and for all surveyed organisations; general trends about the outcomes can be obtained and studied.

Elements of Collectiveness	Description	Examples
Across-function	The degree to which a capability is a vital element of one or more cross-functional processes	Nissan's cost control for its efficient logistics and production processes
Across-product	The extent to which a capability is shared by various products	Canon's optical technology used in image systems, copiers and cameras
Across-business	The extent to which a capability is a vital element of various business units	Operations management of *KFC* fast food producer for its world-wide outlets

Table 2.7: Examples of the elements of collectiveness *(Adapted from Hafeez et al., 2002a).*

Elements of Uniqueness	Description	Examples
Rareness	The degree to which a particular capability is distinctive in competition	Sony's capability of miniaturisation of technological products
Inimitability	The degree to which a particular capability is inimitable by competitors	Honda's expertise in engine design
Non-substitutability	The degree to which a particular capability cannot be replaced or substituted by other capabilities	Microsoft's marketing ability in gaining market share

Table 2.8: Examples of the elements of uniqueness *(Adapted from Hafeez et al., 2002a).*

Lastly, in stage three, a strategic flexibility assessment for competence candidates in terms of resource re-deployment and routine re-organisation measures is then conducted to identify the company core competence. Similar to the quantitative method used earlier, the two elements of strategic flexibility analysis are evaluated on a scale of 1 to 4 as illustrated in Table 2.9 (Hafeez *et al.* 2002a; 2002b; 2004). The attributes of strategic flexibility are described with relevant examples in Table 2.10.

Measures of Flexibility	Degree of Flexibility	Score
1. Resource redeployment 2. Routine re-organisation	No Flexibility	1
	Low Flexibility	2
	Medium Flexibility	3
	High Flexibility	4

Table 2.9: Degrees of flexibility.

Elements of Strategic Flexibility	Description	Examples
Resource re-deployment	The ease with which competences may be re-deployed to develop new capabilities for potential business	• Honda's competence in producing high quality car engines has been deployed to produce mowers and heavy machines engines • A construction firm's competence in building shopping malls can be re-deployed in constructing leisure complexes
Routines re-organisation	The ease with which the manifested routines may be re-organised to support future business development	• Disney's competence in entertaining families has been reorganised to other businesses such as hotels, video channels and movies • Cannon's set of routines for its product development competence that combines employees' skills and production activities is flexibly reorganised to deliver innovative products such as cameras and copiers.

Table 2.10: Examples of the elements of strategic flexibility *(Adapted from Hafeez et al., 2002a).*

Finally, the identification of core competence is illustrated as a filtration process demonstrating the basic steps and the applied measures (See Fig. 2.7). It is essential to indicate that considering the core competence identification as a filtration process stems from the assumptions on which the framework is established. As explained earlier, the mechanism of the framework suggests a sequential process to link capabilities, key capabilities, competences, and core competences respectively (See Figs. 2.3 and 2.4). Such structured order is adopted because of the definition of each component and stage of the process. In addition, the evaluation of each stage's candidates depends on the outcomes of the preceding stage. In brief, a capability may be isolated to become a key capability, then a competence, and therefore a core competence if it meets the criteria within the evaluation process. However, it should be mentioned that the internal analysis of competence determination (collectiveness and uniqueness exercises) and core competence identification (strategic flexibility exercise) are simultaneously performed. This point is further explained in the next Section.

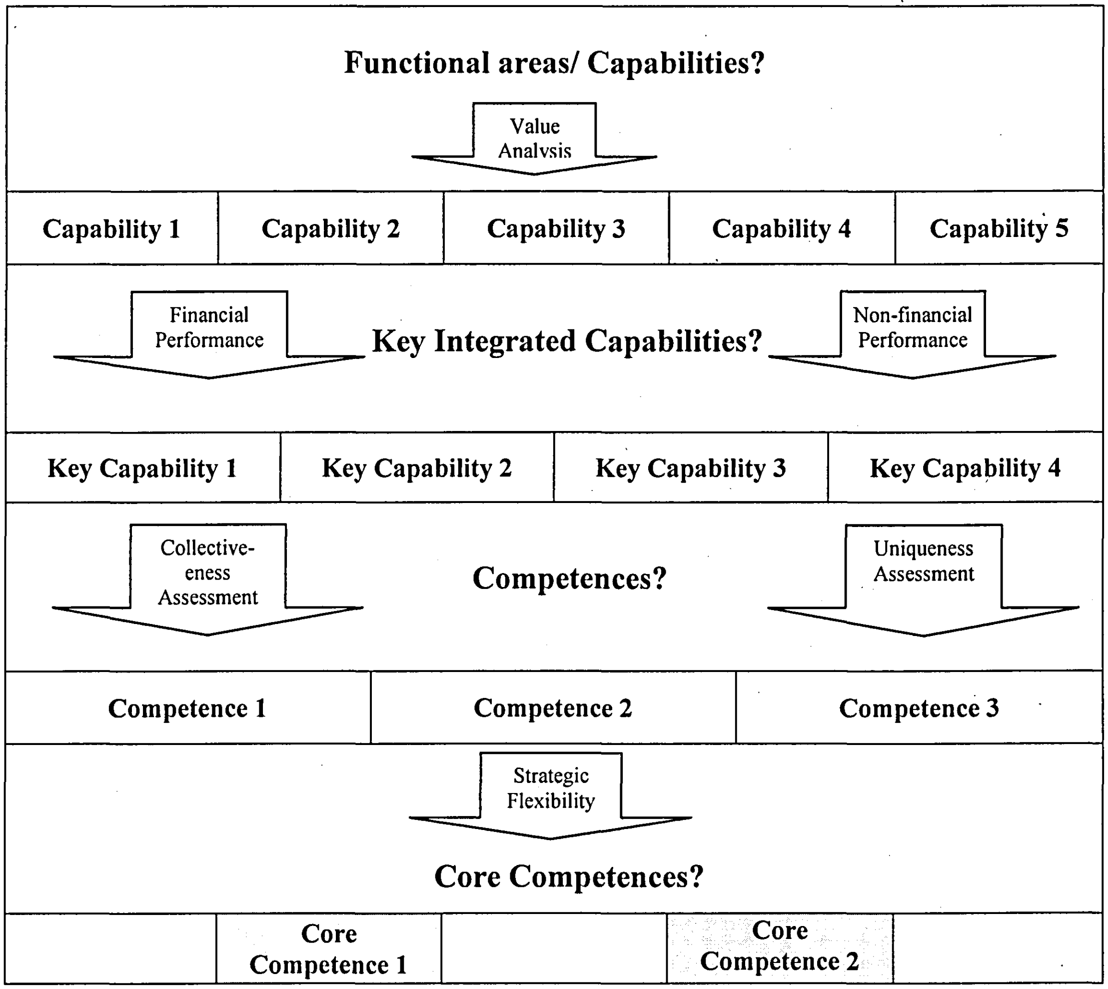


Fig. 2.7: The filtration process of identifying core competences.

2.10.2 Implementing the Framework

In a detailed study the framework was implemented (Zhang, 1999; Hafeez *et al.*, 2002a, 2002b, 2002c) in the manufacturing and service sectors in the UK using a case study and questionnaire-based survey approach. More than 40 companies participated in the study with different responses and perspectives. Based on data collected, these researchers argue that the framework is robust and practical and may help the surveyed organisations in strategic decision-making with respect to diversification, focusing and investment in competence building activities. The research succeeded in logically and constructively identifying core competences of the examined companies, and important lessons were learnt. For instance, the results of applying the framework at IKEA show that Design and Quality service are its core competences; and also for a complete case study (cited as Company A) it was found that R & D and Performance management are its core competences. However, as any other research, the implementation process is not without its limitations and several questions have been posed. For example, in most targeted companies it can be seen that the identified core competences appear to be very general and similar ranging only between Manufacturing, Sales and marketing, R & D, Performance management (See Table 2.11). It can be noted that out of 42 examined companies, the core competence of 16 companies is Sales and marketing.

Identified Core Competence(s)	Number of firms
Manufacturing	4
Manufacturing; Sales and marketing	3
Manufacturing; R & D	3
Sales and marketing	16
R & D; Performance management	2
Performance mgt; Sales and marketing	1
R & D	4
Performance management	1
R&D ; Sales and marketing	8
Total	**42**

Table 2.11: Results of core competences identified using the Hafeez, *et al.,* (2002a) framework.

In the present author's view, in spite of the systematic procedure followed to identify core competences, these results tend to be vague. Sales and marketing, for example, may not be considered unique in competition and could be any other organisation's core competence. Sales and marketing or any of those identified core competences (i.e. Manufacturing; R & D; Performance management) can be owned by any organisation which means that they could be bought or copied by other competitors. This generalization is attributed to the fact that the framework was merely implemented at the top management level. Therefore, it is necessary to complement the analysis by studying the subsequent management levels within which the composition of the determined core competence can be further analysed.

Another technical gap is also highlighted throughout the stage of competence determination. According to the framework architecture, the methodology applied to determine competences requires measuring both the internal integration (collectiveness) and external differentiation (uniqueness) of each capability at the same time or in parallel (See Fig. 2.4). In contrast, although the case studies' capabilities were satisfactorily examined against the measures, it was noted that the procedure was performed in a sequential manner where collectiveness and uniqueness results were individually performed. This in turn would have significant impact on the selected competences and may affect the accuracy of the determined competences. For instance, in reviewing a case study's competence analysis (Zhang, 1999: p. 124-125) and a similar analysis of a firm cited as case study A (in Hafeez *et el.,* 2002a), it can be seen that some key capabilities were omitted after conducting the collectiveness analysis which led them to be excluded from the uniqueness analysis. This author believes that, in practice, conducting competence assessment on a one by one basis would very likely lead to the discarding of some capabilities after the collectiveness assessment from the following uniqueness analysis. Therefore, in order to obtain robust competence analysis and redeem this limitation, both collectiveness and uniqueness assessments should be implemented in parallel and at the same time as can be seen in the filtration process (See Fig.2.7).

2.11 Core Competence Composition

Core competence is created when distinctive activities and tasks are well performed by individuals and groups. It refers to the right mix between core technologies and core skills that would enhance the organisation competitiveness (Post, 1997; Baker *et al.*, 1997). Tampoe (1994) considers the structure of core competence as a technical subsystem that integrates diverse technologies, processes, and know-how to convey products and services. In the same vein, Hafeez and Abdelmeguid (2003) indicate that core competence is often a combination of intangible assets such as culture and people knowledge, and tangible assets such as equipment and technology. More specifically, this combination (Drejer, 2000) involves particular key related elements which are people, organisational structure and culture, and technology. It is a system that reflects the interactions of human beings, technology, and organisational (formal) and culture (informal) elements. Godbout (2000) delineates that, in practice, core competence of the company is the synergy of three elements, namely, human (motivation, individual effort, professional expertise), technological, organisational (methods of collaboration and management processes). However, every company possesses a unique mix of technologies, knowledge and skills that forms its core competence (Petts, 1997). For instance, (Unland and Kleiner, 1996) point out that technological contribution is a vital part of core competence as it provides the basic elements in the production process. On the other hand, it is the individuals' competencies that play a key role on the composition of core competence of consultancy industry. It can be therefore argued that the company's infrastructure and its business environment may have implications in forming core competence. Although many writers provide a variety of what characterise the composition of core competence, it can be extracted that three labels frequently feature the structure of core competence. This author considers that core competence is in fact a sum of human, organisational, and technological contributions. It is necessary to indicate that the term "technological" may be considered part of the tangible contribution for some industries. Drejer (2000), for example, views technology as the most visible part of competence involving physical systems such as tools, equipment, machinery, software programs and so on. For the purpose of this research, it is intended to evaluate the individuals' competencies aspect in particular and how they may be interrelated with core competences.

2.11.1 Core Competence and Individuals' Competencies

It is acknowledged that core competence is often evenly recognised in the form of intangible assets and tangible assets. However, the intangibles' contribution and value-added to competitive advantage is much more critical and influential (Hafeez and Abdelmeguid, 2003). Such contributions are largely influenced by the nature of core competence. With more clarification of the important role of intangible assets, Whitehill (1997) indicates that tangible assets offer decreasing competitive advantage against intangible assets and therefore organisations must focus on their intangible assets. Patents, brands, organisational or process knowledge, and other elements of intellectual capital are central to build competitive advantage.

The literature frequently indicates that individuals' competencies and core competence(s) are implicitly related. Core competence is created through the skills of individuals who can share their knowledge and expertise with others in innovative ways and without organisational boundaries (Unland and Kleiner, 1996). The role of human resources or what many writers refer to as intellectual assets, contribution towards core competence formation is crucial. Bergenhenegouwen *et al.* (1996) argue that an organisation should pay a considerable amount of attention to its employees' competencies as soon as it starts to embark on a core competences path. The experience and knowledge of employees and the manner they are appreciated by the management are the essential elements of the core competence content. Accordingly, Godbout (2000) ascertains that many successful western organisations have concentrated on both the organisational dimensional and the actual quality of their employees. He adds that know-how, once effectively exploited, becomes the primary asset to compete with rivals. Many decision-makers argue that value added is considerably enhanced through the contribution of intellectual assets such as human knowledge and experience. This author believes that individuals' competencies play an indispensable role in achieving a company's business objectives and have a major impact on the organisational core competences. Fig. 2.8 illustrates this author's view that the link between individual competency and organisational competence would lead to improve business performance.

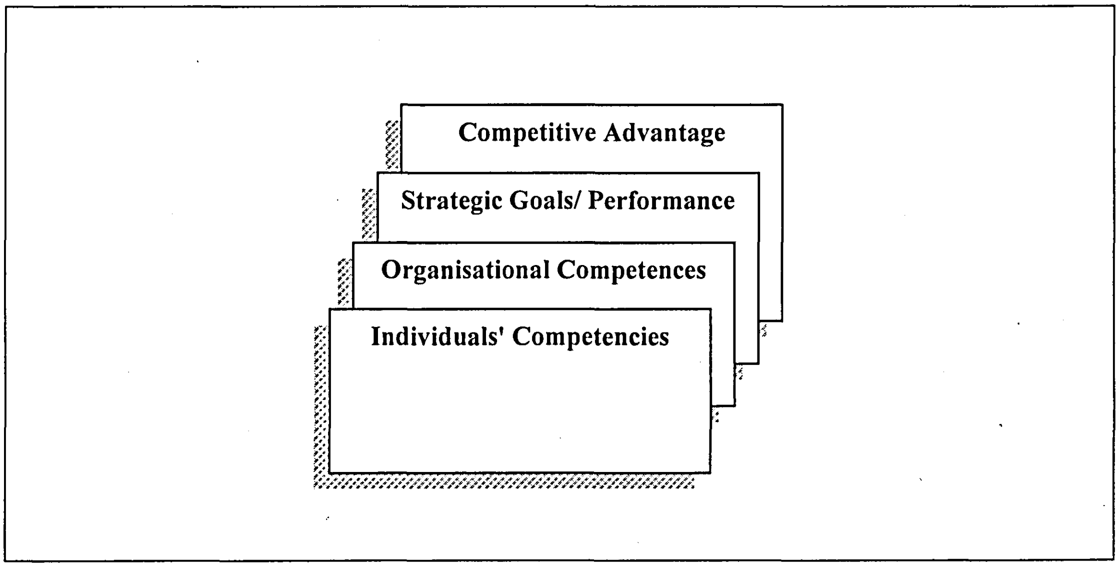


Fig. 2.8: Relationship between individuals' competencies and organisational competences.

2.12 The Concept of Individuals' Competencies

"Competency is about performance" (Weightman, 1994: p. 21). For management, competence is all about a high level of performance and that is why it is an attractive subject (Heffernan and Flood, 2000). Baker *et al.* (1997) describe the individual competency as a set of skills that an individual should possess in order to be capable of satisfactorily performing a specified job. Wynne and Stringer (1996) simplify the meaning of individuals' competencies as the things a person needs to have, know, and do to achieve the standards required for the task. It can be put in the form of the question, what do you need to be good at, to be good at your job? Armstrong (2000, p. 41) owes the popularity of the individual competency concept to Boyatzis (1982) definition who states that competency is " a capacity that exists in a person that leads to behaviour that meets the job demands within the parameters of the organisational environment and that, in turn, brings about desired results".

2.13 Competency Frameworks

Competency is usually closely linked with performance and that is why many organisations introduce a competency framework to develop/appraise individuals' performance in order to sustain corporate values. Research on competency and emotional intelligence shows that 92% of British and Irish employers use competency frameworks to improve their individuals' performance (Weightman, 1994; CIPD, 2001). It is argued that every organisation can develop a tailor-made competency framework based on the given resource, organisational structure and objectives. Armstrong (2003) states that it is fundamental to construct a competency framework that fits and reflects the organisation's own culture, values, core competences and operations. The two prime reasons for organisations to use competencies frameworks are first, to enhance human resources management aspects, and second, to provide means to articulate business values and objectives so that they can be expressed in its HR practices and achieve culture change and improve skill levels.

The interest in the competence field has significantly grown at a global level. Organizations are increasingly introducing rule sets and frameworks related to specific industries and tasks. In the UK, for instance, the Skills for Business Network which comprises the Sector Skills Councils (SSCs) and the Sector Skills Development Agency (SSDA), is a leading organisation in this field aiming to help employers to specify their individuals' skills needs and improve productivity (Campbell, 2004). In parallel, Career Space is a large project working to provide the generic skills profiles that are needed for ICT industry in Europe (www.career-space.com).

2.13.1 Producing a Competency Framework

Whiddett and Hollyforde (1999) outline that three principles must be taken into account to generate a competency framework, as mentioned in the following:

i. *Involve people:*

Involving the people who will be affected by the framework and considering their views before finalising the framework. People enthusiasm and commitment to the applied framework is a function on their awareness of the purpose and progress of the implemented framework.

ii. *Keep people informed:*

How to keep people informed, and what to inform them are critical factors for producing a framework. Effective communication is a key element to eliminate any potential challenges and difficulties which might hinder the framework implementation.

iii. *Create relevant competencies:*

It is essential to make competencies relevant throughout the organisation by ensuring that job or task information is collected which represents the range of work across the entire organisation. When developing a framework, it is also essential to incorporate a vision of the organisation's future business and not only the time when the framework is produced.

Armstrong (2003) draws attention towards research carried out by Rankin (2002) indicating that amongst 433 competencies, there are 22 most popular competency headings (See Table 2.12) highlighted by 40 surveyed business organisations. With its roots in the Rankin (2002) study, this author uses the Chartered Institute of Personnel and Development (CIPD) framework which highlights seven most widely used competency headings (See Table 2.13) in order to build a link with organisational competences. It can be seen from Tables 2.12 and 2.13 that the CIPD framework is derived from the competencies list introduced by Armstrong (2003). It is essential to restrict the number and complexity of competencies for the purpose of time-saving and loss of credibility (CIPD, 2003). The ground and justification of selecting this framework in particular to be linked to core competence identification framework is because they are measurable and can be applied at different management levels with degree of details. Also, these competencies are recognisable and applicable for this research surveyed industries as they can be linked to functional and technical areas.

The 22 Most Popular Competency Headings			
Competency	**%**	**Competency**	**%**
• Team orientation	78	• Creativity	30
• Communication	65	• Influence and persuasion	30
• Customer focus	65	• Quality focus	30
• People management	58	• Relationships	30
• Results orientation	58	• Change orientation	28
• Problem solving	55	• Information management	25
• Business awareness	38	• Interpersonal skills	25
• Decision making	35	• Strategic orientation	25
• Technical skills	35	• Self-development	23
• Developing others	33	• Commitment	20
• Initiative	33	• Self-confidence & assertiveness	20

Table 2.12: The 22 most popular competency headings and their prevalence.
Source: Armstrong (2003).

CIPD: The Most Widely Used Competency Headings
1. Team orientation
2. Communication skills
3. People management
4. Customer focus
5. Results orientation
6. Problem solving
7. Planning and organising

Table 2.13: The seven widely used competency headings.
Source: CIPD (2004).

2.14 Linking Individuals' Competencies and Core Competences

Extensive literature discusses and explores the link between individuals' competencies and organisational competences. The nature and objectives of the business may have a major impact on how individuals' competencies and organisational core competences can be related. For instance, in the consultancy business, it is the personnel competencies that could critically design the form of core competence. In contrast, taking a steel producer as an example, it would be the manufacturing capabilities that may make the difference in realising its core competence. However, there are areas where individuals' competencies and organisational competences can be closely linked such as in innovation and quality.

One method of how individuals' competencies and organisational competences can be related is described by Weightman, (1994), who stresses that it is essential to study and balance them, as different outcomes may be accrued by such a relationship. Based on a model designed by Lowendahl (1993), Weightman (1994) argues that the continuing success of an organisation depends not only on core competence identification but also on developing individuals' competencies that match with it. Therefore, a more systematic methodology to determine what the organisation requires, and the people who are to invest in it to develop its business objectives, is vital. Fig. 2.9 illustrates the possible outcomes of four different situations of the relationship between individual competency and organisational competence (Lowendahl, 1993: Weightman, 1994).

		Organisational Competence	
		Low	**High**
Individual Competency	**High**	People-based, highly vulnerable to exits	Balanced expertise and organisational maturity
	Low	Unlikely to survive	Routine or model-based, highly vulnerable to obsolescence

Fig. 2.9: Relationship between organisational competence and an individual's competency. *Adapted from Weightman, (1994).*

Bergenhenegouwen *et al.* (1996) discusses the impact of individuals' competencies in the creation of core competence. He argues that the expertise and knowledge, skills and motivation of employees, and the degree to which they are appreciated by management are key elements to drive the maximum benefits of the organisation's objectives and its core competence content. Individuals' competencies in his view are not those apparent ones, but they are the individual's underlying motives and qualities which may reflect the way all kind of tasks and challenges are tackled. To sum up, core competences are the result of a joint learning process throughout the organisation, and they shape products in which internal and external business strategies, production logistics and individual's competencies can be reflected and accounted. These components are conceptualised in a model as shown in Fig. 2.10.

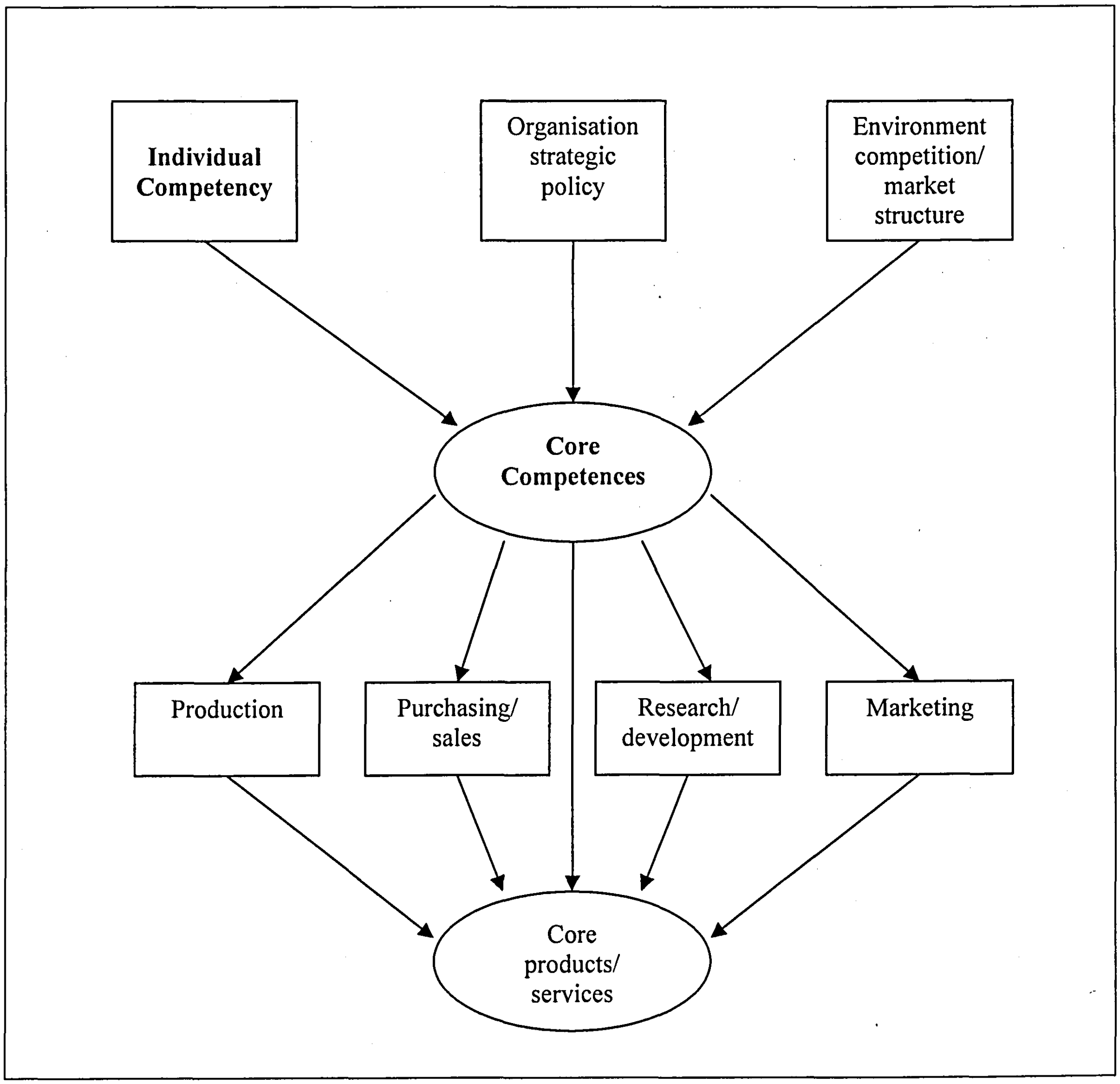


Fig. 2.10: The contribution of individuals' competencies to core competence.
Source: Bergenhenegouwen et al. (1996).

In the same vein but with much more weight towards the human competencies' contribution, Godbout (2000) views the organisational competences as a combination of business specialisation and economic utilisation of human skills. Core competences are therefore deemed to be concerned with the organisation's characteristic areas of expertise and involve the synergy of intellectual assets such as motivation, employee effort, technological and professional expertise, relationships and management processes. He defends that employees' talents, skills and motivation are key elements in developing core competence and consequently achieving the organisation's objectives because knowledge is enacted through human resources. So, the dominant impact of individuals' competencies on core competences' role on the organisation's environment and its market policy can be clearly seen in the structure of his model (Fig. 2.11).

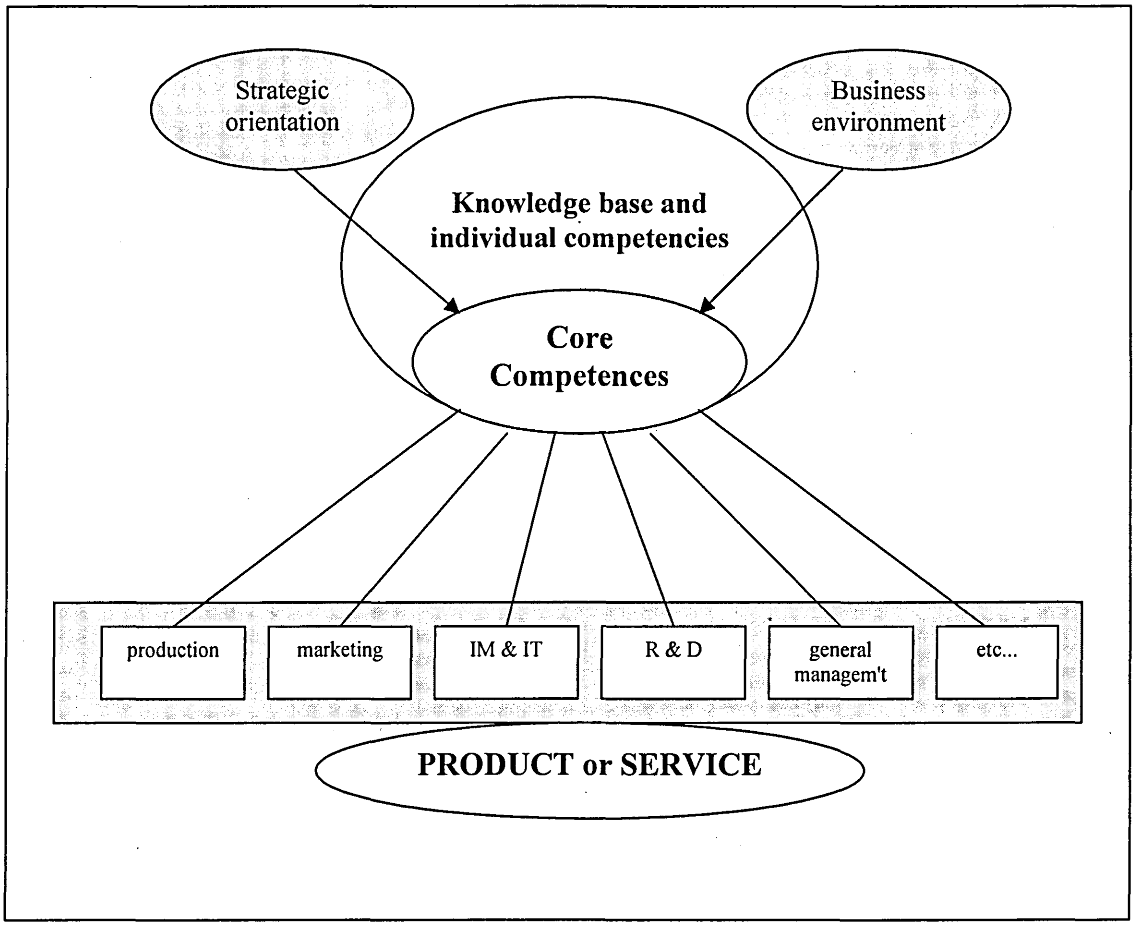


Figure 2.11: Organisational competences: description model.
Source: Godbout (2000).

2.15 Contribution to the Previous Work

Whilst the Hafeez *et al.* (2002a-c) core competence identification framework was effectively implemented in manufacturing and services sectors (Hafeez *et al.*, 2002a;

2002b; 2002c; Zhang, 1999), there are some limitations on the implementation process. These limitations can be summarised as follows:

- The attributes of collectiveness (across-function, across-product, and across-business) and uniqueness (rareness, inimitability, and non-substitutability) are equally considered and weighted. Also, the measures of strategic flexibility assessment are considered similar. In the present author's view, in practice, the importance and influence of these attributes may not be considered entirely identical due to the nature of the evaluated key capability and business objectives. For instance, in the pharmaceutical industry the across-product attribute would be more crucial compared with the across-function and across-business attributes as the competitiveness in this industry rests on the contribution of R&D in specific therapeutic products. In addition, it could be argued that the impact of inimitability attribute on the uniqueness exercise would be much more important within the consultancy industry.
- The (1-4) scores used to evaluate the degree of collectiveness and uniqueness of the examined key capabilities at the competence determination, and the strategic flexibility to identify core competence are limited and not flexible enough to provide more accurate assessments.
- With exception to the key capabilities determination stage, the implementation process was conducted using qualitative subjective value analysis which could make the accuracy of results questionable.
- The framework was mostly implemented at the top management level, whereas deep analysis could be conducted with managers at lower levels with more related information.

Therefore, based on these points and the critique rendered to the Hafeez *et al.* (2002a-c) framework (Section 2.10.2), this author intends to bridge these technical gaps and extend the framework by studying a lower level of management of the surveyed organisations to identify more specific core competences. A major contribution to the previous work, competency at the individuals' level would be studied and linked to the identified core competences as documented in Chapters Six and Seven. In addition, data is widely collected and analysed using the Analytic Hierarchy Process (AHP) technique to provide more robust results.

2.16 Summary

The literature review highlights that there is wide exchangeable use of terms such as competence and competency. Therefore, some differentiating between the terms is introduced and followed throughout the research in an attempt to associate competence to the organisational level and competency to the individuals' level. Core competence concepts, definitions, and some models of the identification process are reviewed and discussed. The Hafeez *et al.* (2002a-c) framework, the main theme of this research, is discussed widely and some critiques were posed for further development. Also, the subject of individuals' competencies is studied at length and some relevant frameworks are presented and therefore their potential link with core competence is explored. In light of those models, an integrated framework to link core competences with relevant individuals' competencies is introduced and implemented in Chapter Seven.

Ch. Three: Research Methodology

3.1 Introduction

This Chapter discusses the research methodology and related concepts and issues. The methodology adopted to conduct this research is delineated and justified. The concepts and types of research, focusing on management and business research are considered. The methods and procedures used for data collection and analysis are outlined. In particular, the field study and research sample are detailed.

3.2 Concepts and Types of Research

There is no consensus in the literature about a specific definition for research and it may have different meanings for different people (Hussey and Hussey, 1997). Research can be conducted in various areas such as the physical and life sciences; social and human aspects; or in the field of business and management and that is why it can be defined from different points of view and perspectives.

3.2.1 What is Research?

Research is "a systematic approach to answering questions" (Reaves, 1992: p.8). It is a purposeful investigation of an idea or subject to extend knowledge or explore a theory (Clough and Nutbrown, 2002). In relation to this study (management research), Sekaran (2003) defines research as an organised, systematic, data-based, critical, objective, scientific enquiry or investigation into a specific problem, purposing to find answers and solutions to it.

3.2.2 Types of Research

There are several common categories and approaches by which research can be classified and conducted. Hussey and Hussey (1997) state that research can be classified under four categories:

1. The *purpose* of the research: the reason behind conducting the research.
2. The *process* of the research: how data will be collected and analysed.
3. The *logic* of the research: whether moving from the general to specific (theory is tested by results) or vice versa (theory is built from results).
4. The *outcome* of the research: whether solving a particular problem or making a contribution to knowledge.

Type of Research	Basis of Classification
Exploratory, Descriptive, Analytical or Predictive	Purpose of the research
Quantitative or Qualitative	Process of the research
Deductive or Inductive	Logic of the research
Applied or Basic	Outcome of the research

Table 3.1: Classification of the main types of research (Hussey and Hussey, 1997).

3.2.2.1 Exploratory Research: this is concerned with a specific issue or problem for which very few previous studies have been undertaken, and there is limited information that can be referred to. The aim of exploratory research is to look for hypotheses, ideas or trends rather of testing them. Case studies, observations and historical analyses are the most useful techniques that can be used to provide both quantitative and qualitative data.

3.2.2.2 Descriptive Research: describes an existing phenomenon and is applied to identify and provide information regarding a specific issue or problem. Statistical techniques are frequently used to collect data, which are often quantitative. Descriptive research tests problems in more depth than exploratory research.

3.2.2.3 Analytical Research: it is a type of descriptive research. However, it attempts to analyse and explain the reasons why and how some descriptions occur. Analytical research aims to identify and measure relations between the studied phenomena.

3.2.2.4 Predictive Research: while analytical research focuses on explaining the causes of a particular situation, predictive research forecasts the possibility of a similar situation in a different place or time. The objective of predictive research is to discover general findings by predicting specific phenomena based on general and hypothesised relationships.

3.2.2.5 Quantitative (Positivistic) Research: this research has an objective nature and focuses on examining phenomena to provide measured results. It aims to collect and analyse the required data by using statistical techniques.

3.2.2.6 Qualitative (Phenomenological) Research: in contrast to the latter, qualitative research is more subjective in nature and incorporates examining and discussing perceptions to reach an understanding of social and human aspects.

3.2.2.7 Applied Research: this research is performed to conclude findings that can be applied to solve a specific or existing problem.

3.2.2.8 Basic Research: is designed primarily to improve the knowledge of general issues rather than a specific problem. Basic research is considered as the most academic form of research as it aims primarily to contribute to knowledge.

3.2.2.9 Deductive Research: is a type of research in which a theoretical structure is developed and then tested by empirical observation, and therefore particular instances are deduced from general conclusions. It is referred to as moving from the general to the particular.

3.2.2.10 Inductive Research: the opposite to deductive research, inductive research is a study in which theory is developed from the observations of empirical reality; thus general inferences are induced from particular instances. It is referred to as moving from the specific to the general (Hussey and Hussey, 1997).

3.3 Research Methodology and Research Method

Both of the terms research methodology and research method are used interchangeably by many writers (Hussey and Hussey, 1997), and therefore they should be clearly defined and discussed.

3.3.1 Research Methodology

Research is a pursuit for knowledge and methodology is how to organise this 'pursuit'. Research methodology in essence is a decision-making process. It is a system of interrelated decisions where every decision is affected by, and consequently, influences every other decision (Brannick, 1997). Despite the variety of approaches to management research, they all in essence share a problem-solving sequence (Gill and Johnson, 1991). Easterby-Smith *et al.* (2002) view methodology as a combination of techniques used to enquire into a particular situation. More specifically, this combination of techniques and problem solving methods aims to answer both the questions 'what' and 'how' (Checkland, 1981).

It is important to discuss the primary approaches of business and management research methodology in order to justify the selected methodology for this study. Research methodologies can be divided into two main paradigms or schools of philosophies: positivistic and phenomenological (Hussey and Hussey, 1997). Positivistic research has its roots in natural and social sciences. It is a highly structured deductive approach which aims to clarify the causal relationships and correlation between variables using quantitative data. Phenomenological research, on the other hand, is based on the way people view and understand a particular phenomenon under investigation. It aims to examine certain aspects of human activities by concentrating on the meanings rather than the measurements. Data collection and analysis in this approach is relatively complicated (Saunders *et al.*, 1997: Saunders *et al.*, 2003; Johnson and Duberley, 2000; Allison *et al.*, 1996; Hussey and Hussey, 1997; Remenyi *et al.*, 1998; Easterby-Smith, 2002; Sekaran, 2003).

3.3.2 Research Method

Hussey and Hussey (1997) highlight that research methodology and research method terms are sometimes used interchangeably causing some confusion in the literature. Therefore they distinguish between them by defining methodology as the overall approach to the research process from establishing the theory to the data collection and analysis process, whereas research method refers only to the means by which data can be collected and analysed. Jankowicz (1995) considers research method as a systematic and orderly approach applied for data collection so that information can be obtained from those data. It can be argued that research method is one aspect of research methodology. According to Hussey and Hussey (1997), there are key questions and issues that interpret the meaning of methodology such as: why collect specific data; what data is to be collected; the source of collected data; when to collect; how it is to be collected; how it is to be analysed.

3.4 The Selection of Methodology

Research can be conducted within different approaches depending on its paradigm and the problem it aims to investigate. Therefore, it should be stressed that a researcher's paradigmatic preference is important in designing a methodology as certain methodologies are usually associated with specific paradigms. Larsen-Free and Long (1991) emphasise that the important issue is not only the choice of a priori paradigm or even methodology, but also the purpose of the research and how that purpose can be matched with the attributes most likely to accomplish it. Put in another way, the methodological design should be determined by the research question. The research question and problem has a major impact on the methodology selected, and also the data collection method has a similar impact on the analysis and hence the research results and conclusion (Fellows and Liu, 1997).

Methodology, as it was discussed earlier, refers to the manner by which the elements of the research process are structured and linked from defining the research problem to drawing conclusions under the research objectives umbrella. Reviewing the literature on conducting research demonstrated a scope of methodologies being adopted to perform research. However, it can be argued that selecting the appropriate research methodology is not an easy task and therefore some considerations need to be taken into account. The researcher needs not to be constrained to a particular methodology and requires a thorough understanding about the context of the research in hand. In addition, understanding the core advantages and disadvantages of each approach is likely to guide the choice of the most relevant methodology for the intended research (Bell, 2005). The suitable methodology is largely driven by the research topic and problems emerged from the literature review (Remenyi *et al.,* 1998). It is important to mention that the researcher's perception, experience and available information of the research issue may have a major impact on the selected methodology. The researcher's role in identifying the most relevant approach (Allison *et al.,* 1996) is significantly a function of the research problem or question.

3.4.1 Inductive or Deductive

As was discussed in Chapters One and Two, there is a lack of structured frameworks to clearly define and identify core competence and consequently a number of authors endeavour to bridge the gap and deliver valuable theoretical contributions. Accordingly, in line with core competence based theory, this study aims to examine the applicability of a proposed framework based on specific assumptions to identify core competence and the appropriate individuals' competencies that could match. It is intended to explore and investigate, using real-world examples, if the proposed integrated framework is workable in specific industries. In other words, this entire research is focused on deducing results using a conceptual framework that stemmed from the competence theory. The deductive research process starts from general ideas by studying existing theory to deduce hypotheses that should be empirically tested by analysing the collected data and research findings (Hussey and Hussey, 1997; Jill and Johnson, 1997).

Looking at the purpose and logic of this research on the one hand, and available research methodologies on the other hand, it is clear that a deductive method is more suitable to explore if the framework would result in valuable outcomes that can be linked to the competence theory. It can be argued that the method the research would follow tends to be a positivistic approach in which analytic surveys are adopted. However, this does not entirely mean that some phenomenological tools are ruled out. It is not uncommon to adopt a mixture of approaches, especially for data collection and analysis in order to obtain a wider view of the research issue (Hussey ad Hussey, 1997). When deciding upon the choice of a specific research method, the distinction blurs and using mixed methods to some extent provides an improved perspective on the subject to be researched (Easterby-Smith *et al.,* 2002). For instance, to attain its goals, this research would implement particular techniques and methods associated with exploratory and deductive research used to gather data such as survey and case study models. These tools, however, can be used with the phenomenological approach too. It is rare to exclusively rely upon a single form of research: either positivist or phenomenal (Allison *et al.,* 1996).

3.4.2 Quantitative or Qualitative Approach

Research methodology is always a compromise between options and choices and frequently determined by the availability of resources (Gill and Johnson, 1991). It is not necessary to adhere to a single methodology as this could affect the reliability of the research contribution. The literature witnesses a broad application of combined approaches. One reason for this is the method of how to appropriately access the sources of information. There are several techniques that can be equally used to draw data either quantitatively or qualitatively. It is widely argued that a combined methodology can offer much more reliable data. A combination of quantitative and qualitative approaches is, therefore, applied to collect data. For instance, some parts of the study interviews with managers, which are a qualitative technique, would be conducted in parallel with a survey. It is not the methodology that can be called quantitative or qualitative; rather it is the way it can be utilised. In reality (Crompton and Jones, 1988) it is difficult to study organisations without using both methods. It can be argued that using a qualitative technique - a face-to-face interview case study method - is essential for the benefit of the research in order to judge the managers' perceptions and ensure valid data. The quality of judgement and validation is very likely to be attained through adopting a qualitative approach. A qualitative approach is subjective in nature and aims to examine phenomena to recognise their causes. Ghauri *et al.* (1995) indicate that qualitative methodology is "a mixture of the rational, explorative and intuitive, where the skills and experience of the researcher play an important role in the analysis of data". Findings through the qualitative approach are not drawn by statistical methods as the quantitative approach does. There are a number of other important features that encourage the application of a qualitative approach. First, is the researcher's management experience in the field of study (i.e. construction industry), which enabled him to conduct the interviews more efficiently. Second, is that conducting research in fairly new or emerging disciplines require further explanation for the participants to draw more reliable findings. Also, as would be illustrated later, speaking the same language with many respondents is vital to warrant better understanding of the research context. Jankowicz (1995) indicates that the qualitative approach is characteristic of discovering how people understand the situation or issue that the researcher is investigating and how that understanding guides their actions. Also, they demand that the researcher takes informants seriously in their own language and from their own point of view. A qualitative method seeks to develop knowledge by linking the accounts people give to an underlying body of theory.

The process of any research within which data are collected and analysed is either quantitative or qualitative. A combination of both of them is, however, commonly used, and there is no single best approach (Jankowicz, 1995). Quantitative methodology is more objective in nature, controlled, and introduces measurable values. With connection to the stated goal which is identifying core competence and linking it with relevant individuals' competencies based on pre-determined measurements, the nature of this research tends to be more exploratory. Quantitative research often delivers exploratory and unpredictable outcomes (Bryman, 1988). A numerical assessment is adopted and quantitative analysis of the results is central to perform the research. For instance, the relationship between the research variables and managers' perceptions is purely a subjective judgement. In addition, the research works as a filtration process through which some units of analysis are excluded using a clear calculable evaluation. Quantitative approach (Fellows and Liu, 1997) seeks to collect factual data and study how those facts are interrelated under a theoretical construction. Practitioners of quantitative research often conceptualise it as having logic in which theory establishes the research problem and addresses it in a form of hypotheses (Bryman, 1988). Quantitative methodologies are mostly preferred due to their capability to deal with large samples with a high level of reliability without consuming too much time. Questionnaire-based surveys, for example, are relatively economical and a less time-consuming common tool for data collection and can be applied for very large samples (Hussey and Hussey, 1997). However, it is not the dominance of quantitative methodologies in business research that has led to the choice of a quantitative approach to conduct this research. Rather, it is the research enquiry that requires an investigation and examination in a new area driven by a pre-tested conceptual structure. It can be argued that the objectivity of the research goal entails employing a quantitative approach to a large extent. However, as it would be discussed in Section 3.6, it is not unusual to use a mixed methodology.

3.5 Data Collection Techniques

The two main sources from which data can be collected are primary and secondary sources. The primary data is collected during the course of the research process, whereas the secondary data is obtained from reviewing the literature or databases. Furthermore, two approaches within which data can be collected and described are quantitative and qualitative. Each one in turn has specific techniques and tools. Table 3.2 presents a list of the common data collection techniques for both approaches. However, some techniques are mutually used by both approaches depending on the research objectives and process. A method is not necessarily meant to be quantitative or qualitative by its label but by the way it is used (Hussey and Hussey, 1997). Case studies, for instance, usually provide qualitative rather than quantitative data (Sekaran, 2003). Case studies are considered as a means of collecting data rather than a particular methodology (Fellows and Liu, 1997). In a survey of business and management research, interviews and questionnaires with their different styles are considered the most often used approaches (Sekaran, 2003).

Method
Interviews
Questionnaires
Observation
Critical incident technique
Focus groups
Diaries
Protocol analysis

Table 3.2: The main data collection methods (Hussey and Hussey, 1997).

3.5.1 Interview

An Interview is a purposeful discussion between two or more people which helps to collect valid and reliable data related to the research objectives (Saunders *et al.*, 2003). The personal interview has been considered the most favourable method used to collect data by business and management researchers (Remenyi *et al.*, 1998). There are three key elements to conduct a successful interview according to Fellows and Liu, (1997):

- Accessibility by the interviewee of the information required.
- Cognition: the interviewee's understanding of what is required.
- Motivation of the interviewee to answer the questions accurately.

One of the significant features of choosing interview as a data collection method is its adaptability and flexibility (Sekaran, 2003; Bell, 2005). However, in some occasions conducting interviews may result in a complex process and may be time consuming and costly. In addition, a serious inherent problem which could affect the validity and reliability of data collected throughout interviews is bias (Hussey and Hussey, 1997; Easterby-Smith, 2002). However, influences of bias whilst conducting face-to-face structured interviews, which are a very natural form of human behaviour (Remenyi *et al.*, 1998), are alleviated by conducting a number of telephone-interviews and complemented by a wider questionnaire-based survey.

3.5.2 Questionnaire-Based Survey

The most common economical, controllable, and straightforward method to collect either quantitative or qualitative data is surveys. Survey is a technique by which a sample of objects is drawn from a population and studied to produce trends and explore issues regarding the population. Surveys may take a descriptive or analytical objective and they can be performed through different procedures such as questionnaires and face-to-face and telephone interviews (Hussey and Hussey, 1997; Jankowicz, 1995; Easterby-Smith, 2002). Backer (1991) has drawn attention to the fact that survey research may not be without its limitations, and thus there are three main issues that might negatively affect the accuracy and validity of the survey's conclusions, which are:

- **i.** The unwillingness of respondents to provide the required data.
- **ii.** The ability of respondents to provide data. Some respondents may not have adequate knowledge and experience regarding the subject of the survey.
- **iii.** The influence of the questioning process on the respondents. Some respondents could provide the answers which the researcher wants to obtain.

3.5.2.1 Questionnaire

Since this researcher has chosen the questionnaire as a data collection tool, this section will highlight some key issues that influence its usage. Questionnaires are, by far, the most common used tool to collect information. A questionnaire is a set of questions addressed to obtain reliable answers from respondents of a selected sample and one of its main purposes is to test a hypothesis (Hussey and Hussey, 1997; Remenyi *et al.*, 1998). They can be applied in both methodologies: quantitative and qualitative, depending on the goals of the research.

3.5.2.2 The Advantages of Using Questionnaires

Cassell and Symon (1994) state that questionnaires have some important features, which prove them to be a viable and reliable tool:

- The questionnaire is an economical, quick and less biased data collection technique.
- The respondents become more open while answering questions because the questionnaire is more anonymous than an interview.
- Questionnaires are a flexible way to obtain data even from a large population or sample.

3.5.2.3 Types of Questionnaires

Saunders *et al.* (1997) and (2003) suggest that there are two main styles in which a questionnaire can be administrated, depending on the way the respondents will be contacted. According to the procedure the researcher follows, the questionnaire is either completed by the respondent and returned or completed through an interview. Figure 3.1 shows how questionnaires can be categorised.

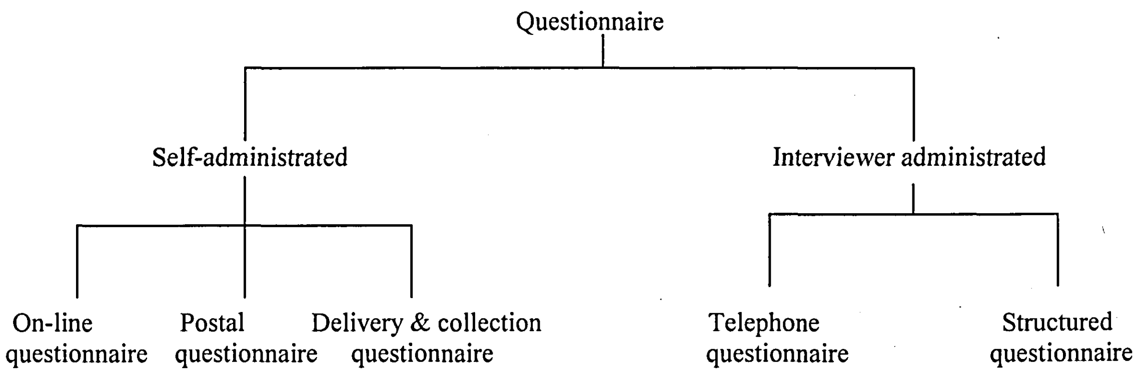


Fig. 3.1: Types of questionnaire.
Adapted from: Saunders et al. (2003)

3.5.2.4 Design of Questionnaires

The way the questions are formulated in a questionnaire is a vital key to construct a well-designed and effective questionnaire. It is very unlikely to achieve research objectives if the design of the questionnaire is mismanaged. A poor questionnaire will, more than likely, lead to poor research conclusions. Although questionnaires may appear simple to use and analyse, their design is not so (Easterby-Smith, 2002). "The perfect questionnaire has never been built. Good questionnaires are workable questionnaires" (Hague, 1993, p.8). In order to design a reliable questionnaire, he believes that researchers ought to ask themselves four important questions prior to the design of the questionnaire:

- Will this question be understood in the way I intend?
- In how many different ways could this question be interpreted?
- Is this question likely to annoy, intimidate or offend?
- Is there a better way of asking the question?

3.6 The Research Methodology

The methodology of this research is structured into three main stages, as illustrated in Fig. 3.2. In the first stage, literature on core competence and individuals' competencies is reviewed. In addition, more attention is paid to extend a previous work conducted on the Hafeez *et al.* (2002a-c) core competences identification framework to address any gaps. In the second stage, two tasks are performed in which the Hafeez *et al.* (2002a-c) framework is tested using a case study and, subsequently, the framework is developed at the individuals' level. Finally, the integrated framework to match relevant individuals' competencies with identified core competences is evaluated and validated throughout several case studies and a questionnaire-based survey.

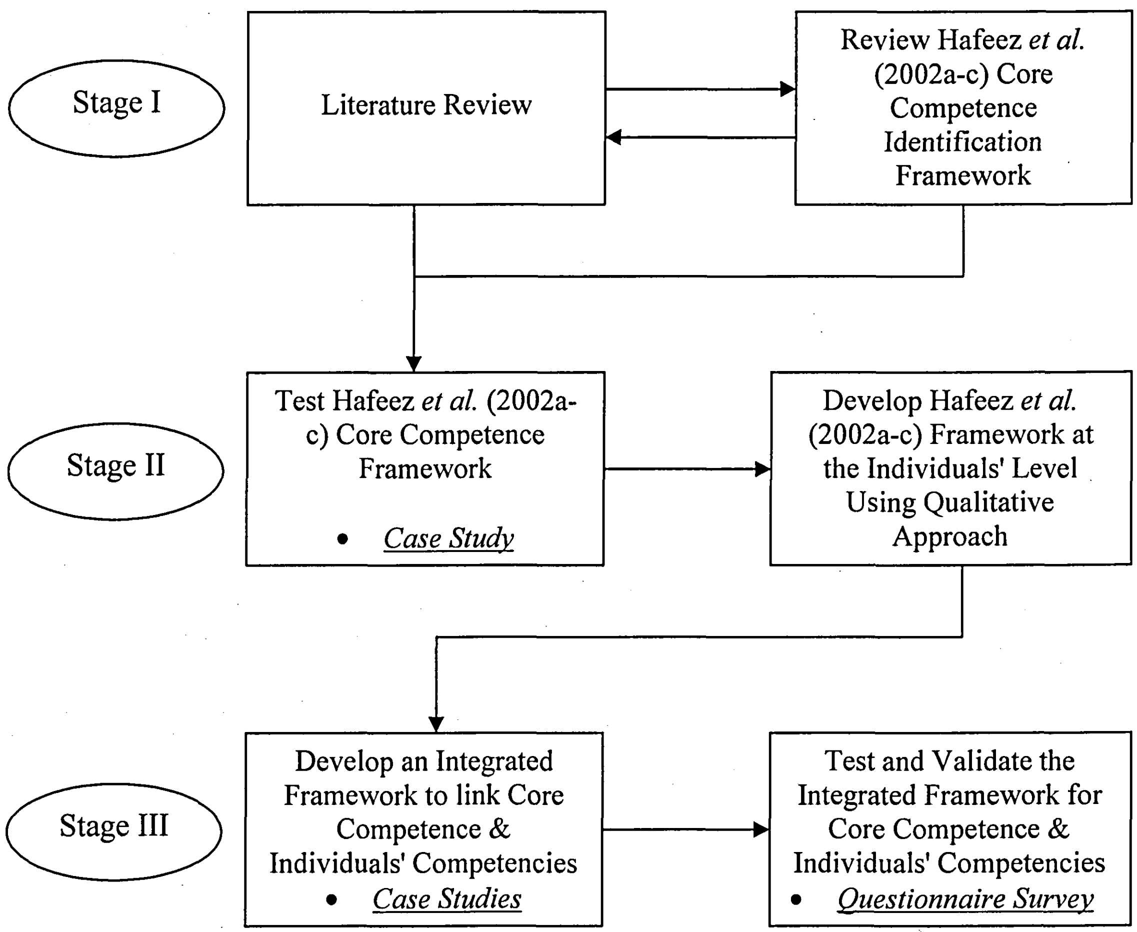


Figure 3.2: Stages of the research methodology.

The reason for adopting a combined methodology (interview-based case studies and a questionnaire-based survey) is to enhance the validity and reliability of the collected data and research conclusions. In addition, using multiple combined methodologies is vitally important in order to diminish bias. A complementary or combined methodology is described as triangulation (Gill and Johnson, 1997; Remenyi *et al.,* 1998). Hussey and Hussey (1997) define triangulation as the use of different methods and techniques in the same research to overcome the potential bias and gain more valid and reliable research. The stages of research methodology and their components are illustrated in Figure 3.2.

3.6.1 Stage I: Literature Review

The Literature review normally serves as the historical development of the research problem. There are some open-to-discussion important issues posed from reviewing the literature on organisational competences and individuals' competencies. The prime goal of searching literature is to address the research question and develop a theoretical framework in which the relationship between organisational core competences and individuals' competencies are theorised.

For this research, as discussed in Chapter Two, the literature review demonstrates that the quest to identify an organisation core competence is increasingly sought and questioned. It also indicates that the potential link between core competences and individuals' competencies is growingly subjected to a variety of studies and investigations. As is seen in Chapter Two, several models and frameworks on competences and competencies, in addition to the Hafeez *et al., (*2002) framework are discussed which enabled some guidelines to be drawn for the current research.

3.6.2 Stage II: Extend the Hafeez *et al.* (2002a-c) Core Competence Framework

In stage two, goals are achieved through two key steps. First, is to test the Hafeez *et al.* (2002a-c) core competence identification framework through the Celltech pharmaceutical company case study based on available secondary data. The analysis is entirely performed using qualitative assessment (See section 2.10.1 for more details). In accordance with lessons learnt from the Celltech case study, the framework is further tested at the ESCA and WSSC case studies - large utility companies. The second step is to develop this framework at the individuals' level through particular case studies using a qualitative approach.

3.6.2.1 Test of the Hafeez *et al.* (2002a-c) Core Competence Framework

This task is presented in Chapters Four and Five. The evaluation process of the framework through a case study approach is essential to redeem any gaps and develop it to an integrated framework to associate the related individuals' competencies with identified core competences.

Remenyi *et al.* (1998) indicate that a thoroughly real-life study and complete picture regarding the actual interaction between variables or events can only be obtained using case studies. They add that a case study allows the researcher to capture detailed interactive processes and make them transparent to a supplementary survey. Therefore, in such an exploratory research, case study is a very useful methodology to examine a certain problem. Yin (1994) emphasises that in a case study research the aim is not only to explore certain phenomena, but also to understand them within a particular perspective. Also, the research can utilise applying multiple methods to collect data namely quantitative and qualitative.

The case study approach has been increasingly used in management research as a valuable strategy for studying processes in companies and for explanatory and exploratory purposes (Gummesson, 1991; Hussey and Hussey, 1997). The present author believes that conducting a case study methodology is essential to validate the proposed framework and develop previous studies. It also paves the way to conduct a wider survey on this context.

3.6.2.2 Develop the Hafeez *et al.* (2002a-c) Framework at the Individuals' Level

The second task of this stage involves developing the Hafeez *et al.* (2002a-c) framework at the individuals' level. Three goals are met. First, the composition of the determined competences and core competences is explored in terms of human, organisational, and technological contributions. Second, the relationship between organisational competences and individuals' competencies is evaluated by determining on which organisational competences, individuals' competencies have the most influence and contribution. Third, by adopting the CIPD (2004) competency framework the most related individuals' competencies to be linked with identified core competences are evaluated. This task is performed in Chapter Six using a subjective value analysis as a qualitative approach. Two case studies from the utility sector, namely, WSSC and ESCA are discussed and evaluated. In this approach, the evaluation is performed using a particular scale of numerical values proposed by Whiddett and Hollyforde, (1999) which is explained in Section 3.8.2. On the other hand, the Analytic Hierarchical

Process (AHP), method as a quantitative, is implemented using a construction case study CCD which is presented in Chapter Seven.

3.6.3 Stage III: Develop an Integrated Framework to Link Core Competence(s) and Individuals' Competencies

In the final stage of the methodology, an integrated framework to link the relevant individuals' competencies with identified core competences (See Fig. 3.3) is developed and then tested. The main stages that constitute the framework are:

1. Mapping the capabilities and their compositions of tangible and intangible assets.
2. Determining key capabilities.
3. Determining competences.
4. Identifying core competences.
5. Evaluating and linking the related individuals' competencies.

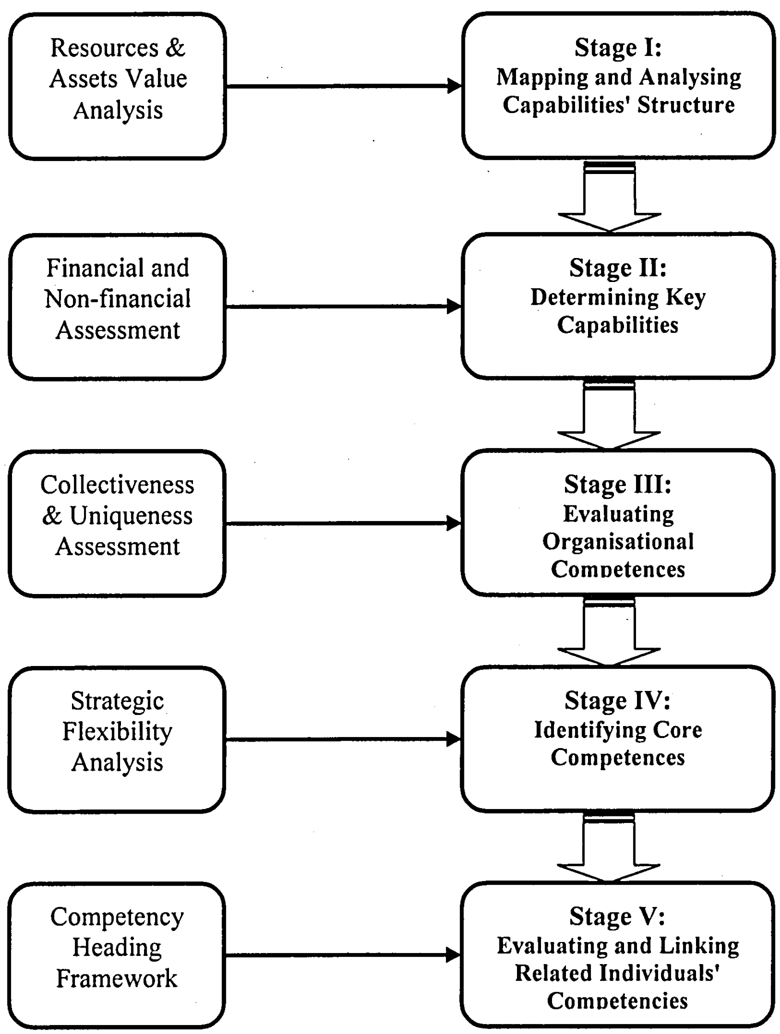


Fig. 3.3: The main stages of testing the integrated framework.

It is worth noting that the proposed integrated framework is flexible depending upon the access to data. For instance, in some cases the implementation process may terminate at the fourth stage if no core competence is identified. Also, stages I and II can be combined when the framework is tested at the second organisational level and AHP may not be applied to determine key operational capabilities. In parallel, some administration obstacles such as an inability to arrange further interviews or receiving incomplete questionnaires did hinder the conducting of all the stages as proposed. These points will be clarified when evaluating the case studies' results.

3.6.3.1 Test and Validate the Integrated Framework

The proposed framework (Fig. 3.3) is tested using a structured questionnaire-based case study as will be presented in Chapter Seven. Furthermore, the overall results of testing the framework in ten case studies are presented in each case study's Appendix. Several structured questionnaire-based interviews with key decision-makers of the surveyed organisations are conducted. The questionnaire is designed as a way to investigate and examine the areas the framework seeks to study. Furthermore, the outcomes of implementing the framework are validated with the management of particular case studies to investigate the robustness of the procedure.

3.6.4 The Role of AHP

With the exception of stage one, Analytic Hierarchical Process (AHP) as a quantitative method is used throughout to analyse data to obtain more consistent and reliable results. The rational behind applying this method is owed to the fact that the proposed integrated framework (See Fig. 3.3) is based on a sequential process to benchmark particular candidates at each stage. That is by conducting a pair-wise comparison using quantitative measures to isolate those candidates. The ultimate objective is to determine the most valuable candidates against the applied criteria. However, since this methodology is entirely based on a human evaluation, errors and misjudgements are likely to occur. The present author believes that being implementing the framework requires conducting long interviews which is a very involved process, the AHP is a viable technique used to address this challenge and ensure producing reliable results. It can simplify the task by decomposing its components into a multi-level hierarchical structure to create an optimal outcome. This is facilitated by the use of related software applications such as consistency ratio (CR) and sensitivity analysis which enhance the robustness and reliability of results. The role of CR in particular is critical to screen out any subjective anomalies by measuring the degree of consistency of collected data (See Section 3.8.3 for more details).

3.6.5 The Research Method

The present author believes that structured interviews are essential to ensure consistent data. This is because the research objectives demand personal assessment of specific variables and it is also due to the structure and nature of the questions to be asked. In other words, a subjective value-based discussion with the participant to highlight the capabilities needing to be analysed in the first part of the questionnaire is essential. Several in-depth face-to-face structured interviews are therefore conducted with directors and senior managers in accordance with their organisations management structure and data is collected.

In a questionnaire-based survey, opinions, attitudes and beliefs of individuals may present evidence to test a hypothesis or theory (Remenyi *et al.*, 1998). However, the researcher sometimes may select a list of the main strength areas of performance of the surveyed organisation of which the respondent has to choose from for analysis. In a survey research, the role of the researcher is central to direct the respondent. Survey research encompasses an artistic function as the investigator has to select which variables to use for analysis (Bryman, 1988). Postal questionnaires are also sent to the targeted organisations after explaining and discussing the aim of the research. The goal of this stage is to complement and validate the data collected from the case study stage. The same industries as in Table 3.3 are included in the survey and key decision-makers of the participated organisations are contacted. In most of the cases, each participant is asked to select the main functional organisational areas to be studied. Although the structure and content of the questionnaire is similar for all the surveyed organisations, particular questionnaires are designed for each industry based on the main functional areas of the organisations to be studied.

3.7 The Field Study

Several industries are studied in this research, namely, construction, utility, manufacturing, and energy services. The surveyed organisations range between public and private sector organisations with varied sizes and degrees of participation. Details of the used case studies and their levels of participation are illustrated in Table 3.3. The participants' perceptions and personal judgement according to their experience and responsibilities are considered crucial to test the framework and identify their organisations' core competences and consequently the relevant individuals' competencies. The unit of analysis is different ranging between organisations as a whole in some cases, and specific departments and functional areas in others. At the beginning of each interview, the aim of the study is explained and main issues are discussed with the interviewee to ensure that targets would be met and consistent and reliable data can be obtained.

Industry	Number of Case Studies	Number of Participants
Utility	4	8
Construction	6	10
Manufacturing	2	3
Energy Services	3	3
Total	15	24

Table 3.3: The classification of case studies and their levels of participation.

3.7.1 The Structure of the Questionnaire

The general outline of the questionnaire used in this research is constructed in a way to test the integrated framework with its two main stages and accordingly designed into two main parts (See Appendix B). In the first part, the main goal is to identify the organisational core competences, whereas in the second, the aim is to assess the potential human contribution to the organisational competences and then to determine the relevant individuals' competencies. However, since there are two paradigms adopted to collect data, which are subjective value analysis and AHP approach using a pair-wise comparison, two main forms of questionnaire are applied to tailor each case study's circumstances and scenario. For instance, at a number of surveyed organisations where a pair-wise judgement is adopted for the key capability determination stage and/or the following stages (competence and core competence identification, related individuals' competencies), matrixes of paired entities are designed to save more time and effort (See Appendix B).

Part one of the questionnaire comprises five questions attempts to identify core competences, followed by four questions concerned with the respondent's position and some details regarding the surveyed organisation. The first question purposes to assess the composition of the capabilities in terms of tangible and intangible assets. Question six, in particular, aims to assess the respondent's perception of the expected core competence(s), if found, and then to compare and validate it/them against what the framework identifies. The type of question is closed-ended with multiple choices within specific numerical scales (1 to 4 points: See Section 2.6.3). Such questions enable the survey to introduce measurable values that can then be easily analysed.

Part two in turn includes six questions most of which are similar to those in part one. However, some slight differences in the number of questions may be seen due to dependency of this part of the questionnaire on the results gained from part one. This is because the individuals' competencies to be determined are analysed against the organisational core competence(s). For instance, if only one core competence is determined for an organisation, only one question/table would be needed for the analysis. In part two, a relative difference in the scale used for variables evaluation (0, 1, and 2 scores), and also the mechanism of assessment can be seen. A pair-wise comparison methodology constructed in a matrix is applied. Finally, an important question is asked at the end of the questionnaire which aims to judge whether the respondent wants to reveal any individuals' competencies that might be essential to the identified core competences and may not be included in the framework.

3.7.2 The Covering Letter

The covering letter is as important as the questionnaire itself. It should be brief, objective clear and confidential (Hague, 1993). Therefore, each questionnaire was attached to a cover letter that aimed to tell the respondent the objectives of the survey and emphasises the importance of participation in the study and how the questionnaire can be returned. The letter was written in a formal style showing the names of the researcher and supervisor (See Appendix A).

It is imperative to say that the design of the questionnaire was tested by performing a pilot study in the ESCA case study before launching the final form. Some suggestions and useful amendments were made, based on discussions between the researcher and a key decision-maker of that organisation. For example, instead of making the pair-wise comparison of the individuals' competencies take the form of long questions, it was agreed to place them in a matrix structure. Furthermore, a focus group approach was adopted in a pilot study conducted in a large Pharmaceutical company to assess the applicability of the framework.

3.8 Data Analysis

As the paradigm of this research is positivistic, collected data is distinguished by a quantitative nature and therefore some statistical techniques are needed for evaluation and analysis. Therefore, as will be seen in Chapters Four, Five, Six, and Seven, the process of implementing the research framework throughout the surveyed organisations are systematically presented in forms of numerical values reflecting the perception and recognition of the management regarding particular variables and parameters. However, in such an exploratory research, the case is not only to display and present collected data, but also to interpret and validate the outcomes using particular statistical techniques.

3.8.1 Statistical Analysis

Similar to previous work to test the core competence identification framework (Hafeez *et al.*, 2002a-c), this research commenced with assessing key capabilities and the following stages using exclusive numerical values representing subjective value judgement (See Section 2.10.1). Therefore, in accordance with the structure of the used questionnaire and scales applied for assessment, the data analysis process is based on converting the answers of the questions into quantifying values and numerical tables for each stage of the framework components through a sequential analytic procedure. For instance, apart from question one in part I of the questionnaire, the scores assigned for collectiveness, uniqueness, and strategic flexibility measurements are evaluated against the respective mean value of total scores of all capabilities and competences in order to determine the candidates for the following process. In addition, a similar methodology is adopted at the individuals' competencies determination stage which is established on a matrix of pair-wise comparison derived from Whiddett and Hollyforde (1999). Nevertheless, due to some limitations which could emerge because of a reliance entirely on subjective numerical analysis, this research is reinforced and validated by using the AHP technique supported by Expert Choice software package for several case studies at all stages of the integrated framework.

3.8.2 Using Scale of Numerical Values (Whiddett and Hollyforde, 1999)

Since the second key stage of the integrated framework encompasses conducting a paired comparison amongst particular individuals' competencies, this research adopts a method introduced by Whiddett and Hollyforde (1999) which aims to evaluate the relative importance between particular alternatives in a pair-wise mechanism. It is used to evaluate the influence and contribution made by individuals' competencies on organisational competences. Additionally, it determines the most relevant individuals' competencies to be linked with core competences. The method focuses on demonstrating the priority weight and relative importance of one alternative against another using a scale of (0, 1, and 2) scores. For instance, the task is introduced to the interviewee in a form of this question: *Which competency (A or B) is more important with respect to core competence A?* Three outcomes then arise. The mechanism of implementing a complementary value effectively helps perform the prioritisation task by distinguishing which alternative is more important over the other alternative irrespective of how far they are different. The evaluation process is summarised in Table 3.4. More explanations regarding this method are presented in Appendix E.

The Outcome	Score of Alternative A	Score of Alternative B
Alternative A is more important than B	2	0
Alternative B is more important than A	0	2
Both alternatives are equally important	1	1

Table 3.4: The evaluation process of subjective pair-wise comparison by (Whiddett and Hollyforde, 1999).

3.8.3 Analytic Hierarchical Process (AHP)

The Analytic Hierarchy Process (AHP) approach is used to critically analyse the collected data of some case studies throughout all stages of the framework. AHP is a decision-aiding method developed by Thomas L. Saaty during the last quarter of the last century. It is a viable technique widely used to help decision-makers in a multi-criterion decisions process by decomposing the complex decision operation into a multi-level hierarchal structure, which allows quantitative and qualitative criteria to be considered and balanced. AHP serves to quantify relative priorities of particular compared alternatives within a specific scale based on human judgement (Lee *et al.,* 1995 in Hafeez *et al.,* 2000; Zhang, 1999; Al-harbi, 2001). It is imperative to point out that the AHP approach is run by means of a specific software package called EXPERT CHOICE which requires inputting data collected and then processed using a computer and manifested in the form of numerical tables and figures.

3.8.4 The Mechanism of AHP

The methodology of AHP is distinguished by five key elements, which are the hierarchy construction; prioritisation procedure; synthesis of results calculations; consistency ratio; and sensitivity analysis (Saaty, 1994; Partovi *et al.*, 1990; Partovi, 1994; in Hafeez *et al.*, 2001). These five features are discussed in the next sub-sections.

3.8.4.1 Decomposition

In the first stage of conducting AHP, the components of the problem or task are decomposed and then built into a hierarchical structure. A typical hierarchical model generally comprises three levels of components. In such a hierarchy, the top level is designated for the goal of the evaluation process; the second level reflects the criteria that affect the decision; the third level represents the decision alternatives. A typical AHP model is presented in Fig. 3.4.

3.8.4.2 Prioritisation

A prioritisation process is applied starting from the top to the bottom level of the model. However, the direction of conducting the prioritisation exercise is from the lower to the upper level. Therefore, once the hierarchy structure is built, a pair-wise comparison amongst the applied criteria at the second level of the structure is performed to determine the relative importance and preferences of those criteria with respect to the goal established at the top level of the hierarchy. Then, a similar procedure is followed to compare pair-wise the alternatives residing at the third level against each criterion at the second level.

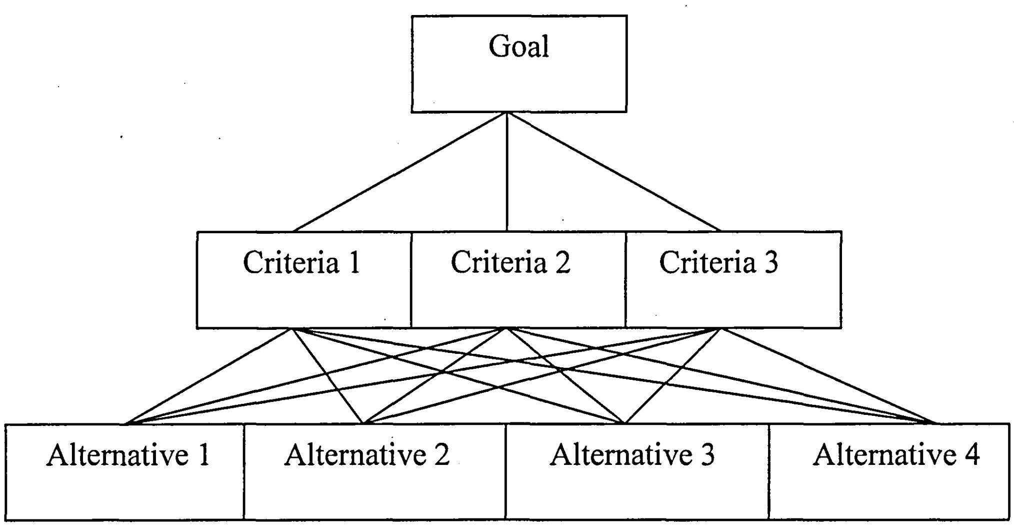


Fig. 3.4: A typical three-level AHP model.

The comparisons at the second level are made by asking the following questions:

Q 1- Which criterion is more important (criterion 1 or criterion 2) with regards to the goal, and by what scale (1 to 9)?
Q 2- Which criterion is more important (criterion 1 or criterion 3) with regards to the goal, and by what scale (1 to 9)?
Q 3- Which criterion is more important (criterion 2 or criterion 3) with regards to the goal, and by what scale (1 to 9)?

Subsequently, at the third level, the comparisons are made by asking the following questions:

Q 1- Which alternative is more important (alternative 1 or alternative 2) with regards to criterion 1, and by what scale (1 to 9)?
Q 2- Which alternative is more important (alternative 1 or alternative 3) with regards to the criterion 1, and by what scale (1 to 9)?
Q 3- Which alternative is more important (alternative 1 or alternative 4) with regards to the criterion 1, and by what scale (1 to 9)?
Q 4- Which alternative is more important (alternative 2 or alternative 3) with regards to the criterion 1, and by what scale (1 to 9)?
Q 5- Which alternative is more important (alternative 2 or alternative 4) with regards to the criterion 1, and by what scale (1 to 9)?
Q 6- Which alternative is more important (alternative 3 or alternative 4) with regards to the (criterion 1, and by what scale (1 to 9)?

For each comparison task, consequently, the relative importance result for each variable is translated into a statistical table and measurable weights determined. The values offered by the AHP technique to implement the prioritisation through pair-wise comparison judgement range between (1 and 9). The decision-makers and respondent managers judge the model components according to these values which reflect the degree of relative importance (See Table 3.5).

Absolute Value	Definition
1	Equal importance
3	Moderate importance of one over another
5	Strong or essential importance of one over another
7	Very strong or demonstrated importance of one over another
9	Extreme importance of one over another
2,4,6,8	Intermediate values
Reciprocal	Reciprocals for inverse comparison

Table 3.5: The AHP comparison scale.

3.8.4.3 Synthesis

As the prioritisation process is performed for each individual criteria and alternative, therefore, in this stage, the overall weights are computed by accumulating the values across the hierarchy to constitute a single weight for each criterion and decision alternative. These synthesis results are generated by the software package and are a key element to recognise the overall evaluation process of the AHP model.

3.8.4.4 Consistency Ratio (CR)

Consistency ratio (CR) is a measure to check the consistency of judgement. It is a very distinctive characteristic provided by the AHP approach to enhance the robustness of collected data. It is not uncommon to obtain inconsistent judgement during the pair-wise comparison due to a decision-maker's inaccurate evaluation. Hence, CR works as a monitor to adjust any inconsistent data using a particular numerical scope of (0.0 to 0.1) (See Table 3.6). It is essential to ask the decision-maker or respondent to re-judge the pair-wise comparison if the CR is greater than 0.1 until the CR becomes less than 0.1.

Value of CR	Result / Action
≥ 0.1	Pair-wise judgement requires re-evaluation
< 0.1	Judgement is consistent and acceptable
$= 0.0$	The theoretical best fit judgement

Table 3.6: The consistency ratio (CR) possible outcomes.

3.8.5 Sensitivity Analysis

Sensitivity analysis is a complementary task to the previous procedures which aims to determine the alternative outcomes if the respective weight of a particular variable is changed. It is a critical evaluation method which works as a predictor of "what-if" type of analysis to assess the performance of a variable and the potential outcomes if the weight is increased or decreased by a percentage ratio of the actual value (i.e. ± 50%). Sensitivity analysis is performed to help decision-makers to evaluate the consequences of making any adjustment according to their perceptions regarding the performance and relative importance of variables.

3.8.6 Application of AHP

The research witnessed several approaches followed to implement the framework using AHP at the surveyed organisations. The primary reason for this is, indeed, the organisational structure of the organisation and the way it is contacted and accessed. For instance, the AHP technique is applied at a number of case studies at particular stages of the integrated framework, whilst at others it is used throughout the entire stages of the framework. In fact, it is not only these administrative challenges that hinder full application of AHP, but also the use of subjective value analyses in some stages. For example, in some case studies, AHP is used to determine only key capabilities and in others used only to evaluate individuals' competencies. In brief, it is the lack of time to conduct further interviews due to time limitations for the interviewees. Table 3.7 demonstrates the methods used to evaluate case studies results, which are the weights and scoring method developed by Whiddett and Hollyforde (1999), and the AHP technique.

The Evaluation Methods Used for Conducted Case Studies		
Whiddett and Hollyforde (1999) Method	**AHP Method**	**Both Methods**
WSSC	CCD	ESCA
WSWC	TOS (PM)	CCA
QEWC	SOC	CCC
TOS (OM)	AESC	
CCB	TCC	
CCE	ESCA (STM)	
CCF		

Table 3.7: The sample companies and respective data collection methods.

3.8.7 Validation of the AHP Results

In order to judge the validity of results, the core competences of the organisations which were identified by applying the AHP technique are compared against the management perceptions of those case studies (See Table 3.8). The table does not include the results of organisations where the AHP method is partly used.

Organisation	Core Competences Identified	
	AHP Method	**Management Perception**
CCD	Innovative solutions/ Execution to specifications	Innovative solutions/ Execution to specifications
TOS	Engineering and design/ Consultancy services	Engineering and design/ Consultancy services
SOC	Engineering and design	Engineering and design/ Process engineering
AESC	Engineering management/	Engineering management/ R&D
TCC	Product development/ Marketing	Marketing

Table 3.8: Comparing the results of using AHP and management perceptions.

Table 3.8 illustrates the identified core competences of five organisations on which the integrated framework is entirely evaluated using the AHP method. It can be noted that in CCD and TOS case studies the outcomes of both evaluations are identical. However, there are some core competences according to the perception of management but not identified by the AHP analysis such as Process engineering of SOC, R&D of AESC, and Marketing of TCC organisations. Nevertheless, what is important is that all core competences identified through the application of AHP are considered by the management of these organisations. Such minor differences to the results of AHP can be attributed to the subjective value assessment which confirms the viability of the AHP method.

3.9 The Field Study (Research Sample)

The sample of the research covers different business environments across a variety of regions. Not only are several industries and styles of organisations involved in this study, but also participants at different organisational levels are contacted. This in one way may be considered as a limitation of the study. However, it is the accessibility to the sources of information that led the research to be conducted in such a wide context. Tables 3.3 and 3.9 show the industries and nature of case studies incorporated in the study, and the distribution of the surveyed organisations respectively. The author, however, considers the variety of the field study and sample of the targeted organisations contributed to the flexibility of conducting the framework at different levels and in a much wider context.

It can be noted from Table 3.9 that there are different contributions in terms of the organisational management levels, interviewee's positions, and investigated business areas_amongst the participated organisations. However, at least one member participated in eleven case studies. Some case studies are discussed in a broader context in Chapters Four, Five, Six, and Seven where a justification of the methodology followed within each case study is explained.

Industry	Organisation	Level of Analysis	Number of Participants	Data Collection Tool
Utility	ESCA	2	4	SI and PQ
	WSSC	2	2	SI and PQ
	WSWC	2	1	PQ
	QEWC	1	1	PQ
Construction	CCA	2	3	SI
	CCB	2	2	SI
	CCC	1	1	SI
	CCD	1	1	SI
	CCE	2	2	PQ
	CCF	1	1	PQ
Manufacturing	TCC	1	1	SI
	AESC	2	2	SI and PQ
Oil services	TOS/OP	1	1	SI
	TOS/ PM	1	1	SI
	SOC	1	1	SI
Total	15		24	

**Abbreviations: SI=structured interview; PQ=postal questionnaire.*

Table 3.9: Distribution of the case studies and degree of participation in the study.

3.9.1 Construction Industry

It can be noted that the most surveyed organisations are from the construction industry and this can be owed to two main rationales. First is the accumulated experience of the author from working in this sector for several years, and having the ability to access this industry in order to gain information utilising personal relationships and contacts. It can be argued that the researcher's preference and knowledge based on his understanding and experience of this sector would offer a very good chance to accomplish a successful research project. The second reason, which derived from the first one, is the author's belief that the changeable, rapid growth, and mobile nature of construction organisations resulted from fierce competition which would ensure the individuals' competencies and skills play a crucial role in achieving the business goals. For instance, it is not uncommon for a construction company to outsource a small number or a large amount of its employees either at the top or lower management level depending on the projects to be executed. In the construction industry, an organisation is characterised by its instability and transience as projects have a limited time scale and the organisational processes occur at particular locations where the projects are to be accomplished (Bresnen, 1988: in Bryman, 1988). A construction organisation often has to determine the most suitable individuals who then have the priority to develop their competencies and in what basis (DFEE, 2000). It can be therefore argued that this challenge may be overcome by identifying the organisational competences of the organisation that would direct the management to focus on the right areas for development.

3.10 Summary

After defining the main types of research and presenting some basic related concepts, the Chapter has profoundly discussed the design and stages of the research methodology adopted in this research. This research is deductive and followed a quantitative methodology for investigation. Based on a structured questionnaire, several case studies in addition to a postal questionnaire-based survey are employed to collect data. The case studies are conducted through face-to-face interviews with key decision-makers within the participant organisations. The questionnaires are distributed by post to particular decision-makers within selected organisations. Although the techniques used to gather data can also be used in a qualitative approach, the exploratory nature of the research influenced the choice of a quantitative procedure. Several industries are included in the study, with a bias towards the construction sector. The framework is flexibly applied depending on the organisational structure and areas of study of the participated organisation. Data is analysed and presented in statistical forms throughout sequential numerical assessments. In addition, AHP is consistently used in many case studies to analyse collected data and produce reliable outcomes. The present author believes that using a combined methodology to conduct the research has helped to gain more reliable results and robust conclusions. However, there is no research without its limitations. This research encountered some challenges - especially as it explores a context which has few previous studies. The limitations of the research are discussed in Chapter Eight.

Ch. Four: Core Competence Identification Framework: A Pilot Case Study

4.1 Introduction

In this chapter the proposed framework to identify core competence is tested by conducting a pilot case study at Celltech Plc- a UK-based global pharmaceutical manufacturer- using a secondary data approach. The results of this author's analysis are compared using a focus group method. Twenty participants reviewed the process and re-evaluated the results.

4.2 Pilot Case Study: Celltech Plc

The main goal of conducting the pilot case study is to examine how the building blocks of the core competence identification framework (Hafeez *et al.*, 2002a-c) are articulated and the methodology adopted for this process. Basically, there are three main stages to be followed to implement the framework: key capability determination, competence determination, and core competence identification, as shown in Fig. 4.1. The pilot study helped the author to be more familiar with the framework related issues and make any proper amendments and redeem any gaps.

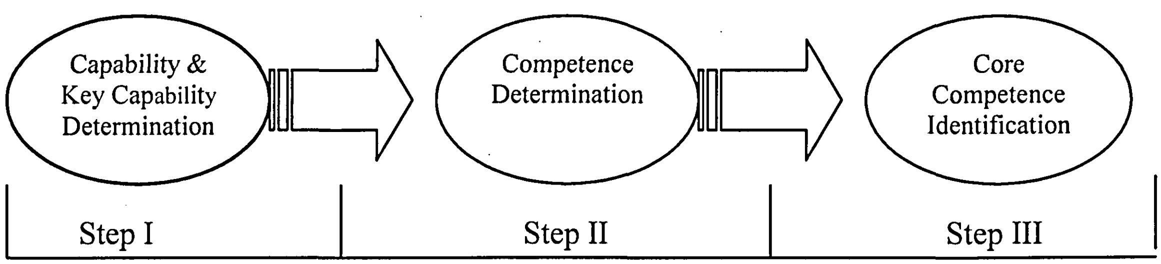


Fig. 4.1: The main stages of testing core competence identification framework.

The analysis uses a secondary data approach and was validated through five focus groups of twenty part-time post-graduate students. A number of copies of the case study illustrating the stages followed to identify Celltech's core competences were at first distributed amongst sixty postgraduate students. Five copies involving twenty participants were received and a comparison study was done. This sample group included professionals from middle and senior ranks of different SMEs and large organisations who had at least three years of experience. Results of the participants' perceptions about identifying Celltech core competences are considered and discussed. Their assessments are summarised and compared with this author's analysis.

4.3 Why the Pharmaceutical Industry?

Growing market pressure and fierce competition occur in the UK pharmaceutical environment. In terms of trade figures, the pharmaceutical industry's contribution to the UK economy is substantial. Following the petroleum industry, it provides the UK economy with the second-largest trade surplus. The number of UK registered pharmaceutical companies rose considerably from 286 in 1975 to 464 in 1998 (Earl-Slater, 1998).

From a theoretical perspective, the pharmaceutical industry represents a rich context in which resource stocks and capabilities can be transformed to valuable attributes that sustain a firm's competitive advantage (Yeoh and Roth, 1999). They argue that a pharmaceutical manufacturer's competitive advantage generally is built on particular capabilities, namely, R & D and sales force expenditures. Research on the discovery of new drugs and their successful commercialisation are vital for firm performance. The pharmaceutical firms mostly endeavour to capitalise in particular therapeutic areas to become competent in very specific fields (De Carolis, 2003). These two findings basically represent conductive factors that stimulated testing the framework within this industry.

4.4 Overview of Celltech

Celltech was founded in 1980 creating the UK's first biotechnology company using leading edge recombinant DNA technology licensed from the Medical Research Council (MRC). It was also at the forefront of protein manufacturing, was one of the first companies to establish large scale fermentation and purification facilities, and was a pioneer in antibody engineering technologies including humanisation techniques. The company is considered a global leader in the pharmaceutical industry; ranked the 8th largest biotechnology company out of 50 in Europe in 1999 and 4th in the UK in 2000 (McNamara and Baden-Fuller, 1999; McNamara *et al.,* 2000).

Celltech's substantial long-term commitment and main business goal is to develop innovative and novel drugs. Its extensive product portfolio sustains its growth and represents a valuable source of revenues and value-added, and therefore, its strategy is to deploy and invest these revenues into focused R & D areas. Utilising from its dominance in some markets, it adopts partnerships with major pharmaceutical companies in specific disease areas. Celltech comprises two main operating companies: Celltech R & D and Celltech Pharmaceuticals.

4.5 Step I: Celltech Capabilities and Key Capabilities

Literature on the company's published data and online available information is reviewed. Also, a previous case study conducted by McNamara *et al.,* (2000) to assess a rejuvenation strategy adopted by Celltech to exploit its intellectual property, was considered the grounds to map out its capabilities and key capabilities. In an initial assessment, potential capabilities were identified. Accordingly, four functional capabilities including eighteen key capabilities are identified to be the building blocks for analysis. The functional capabilities and key capabilities of Celltech are shown in Table 4.1 and Fig. 4.2.

R & D	**Manufacturing**
• Therapeutic antibodies discovery • Molecular therapeutic design • Product development • Academic collaboration • Gene discovery research • Research Collaboration	• Licensed innovative technology • Molecular drugs production • Medicinal chemistry applications • Novel genomic techniques • Engineered human antibodies • Protein production
Sales and Marketing	**Performance Management**
• Strategic partnering • Selling diversity of therapeutic products • Global market access	• HRM • Health, Safety & Environment mgt • Data analysis management

Table 4.1: Mapping functional areas and key capabilities of Celltech.

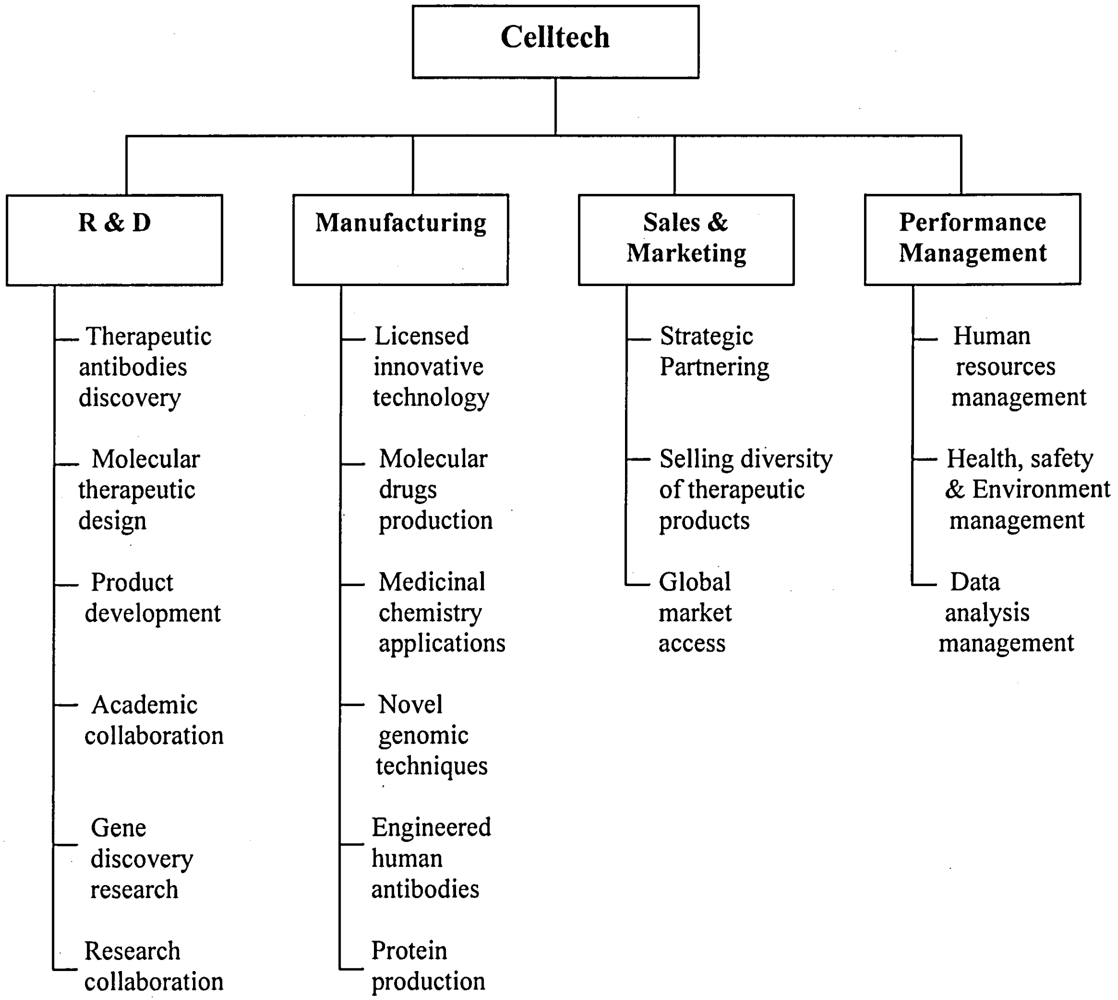


Fig 4.2: Mapping the main functional areas and key operational capabilities of Celltech.

4.6 Step II: Determination of Competences

As suggested by the framework, competences of Celltech are determined through a twofold key capabilities collectiveness and uniqueness assessment exercise. All the eighteen key capabilities are first assessed under the three dimensions that compose the collectiveness, namely, across-function, across-product, and across-business.

4.6.1: Collectiveness Analysis

As explained in Chapter 2, each selected key capability is to be assessed against three "collectiveness" measures. These are across-function, across-product, and across-business on a scale of (1) to (4) points. The overall numerical assessment, according to the present author, is shown in Table 4.2.

Functional Area	Key Capability	Collectiveness			
		Across-function (Score out of 4)	Across-product (Score out of 4)	Across-business (Score out of 4)	Overall score
R & D	Therapeutic antibodies discovery	2	3	4	**9**
	Molecular therapeutic design	2	3	4	**9**
	Product development	3	4	3	**10**
	Academic collaboration	2	3	2	7
	Gene discovery research	3	3	2	8
	Research collaboration	2	3	4	**9**
Manufacturing	Licensed innovative technology	4	3	3	**10**
	Molecular drugs production	3	3	3	**9**
	Medicinal chemistry applications	2	3	2	7
	Novel genomic techniques	2	3	3	8
	Engineered human antibodies	3	3	3	**9**
	Protein production	3	2	2	7
Sales & Marketing	Strategic partnering	3	3	4	**10**
	Selling diversity of therapeutic products	3	4	3	**10**
	Global market access	2	4	4	**10**
Performance Management	Human Resource Management	3	2	4	**9**
	Health, safety & environment mgt	3	4	4	**11**
	Data analysis management	3	4	3	**10**
	Mean Value				***9.00***

Table 4.2: Collectiveness assessment of Celltech's key capabilities.

Table 4.2 shows that the mean value of the selected key capabilities' scores is (9.00). The range of total scores is between (7) and (11). Therefore, each key capability that scored a value equal to or greater than 9.00 is considered as a key integrated capability, and selected to be assessed under uniqueness analysis. Health, safety and environment management capability scored relatively the highest value (11). Considering the nature of this industry, this seems fairly reasonable reflecting the high commitment the management bestowed upon the implementation of health and safety regulations. Capabilities of Sales and Marketing, in particular, all have scores of (10) embodying the key business role this functional areas plays for Celltech. Overall, the assessment determines thirteen key integrated collective capabilities (distinguished as shaded cells) that represent Celltech's primary areas of strength. In contrast, five key capabilities have values below the mean and were excluded from the subsequent testing.

4.6.2: Uniqueness Analysis

Once again, a similar procedure is followed to evaluate the "uniqueness" degree of those thirteen key capabilities. In other words, the goal is to determine the key integrated capabilities that can make Celltech's business "unique" and competitive to its rivals. The fierce domestic and global competition which is a feature of the therapeutic industry puts further pressure on Celltech and, therefore, more concentration is devoted to obtain a more reliable assessment for this task. The result of the uniqueness analysis is presented in Table 4.3.

Integrated Key Capability	Uniqueness			
	Rareness (Score out of 4)	Inimitability (Score out of 4)	Non-substitutability (Score out of 4)	Overall score
Therapeutic antibodies discovery	3	3	3	9
Molecular therapeutic design	3	4	3	10
Product development	3	3	2	8
Research collaboration	2	4	2	8
Licensed innovative technology	4	3	3	10
Molecular drugs production	3	3	3	9
Engineered human antibodies	3	3	2	8
Strategic partnering	3	3	3	9
Selling diversity of therapeutic products	3	2	2	7
Global market access	3	3	2	8
Human Resource Management	3	3	3	9
Health, safety & environment mgt	2	3	3	8
Data analysis management	3	2	2	7
Mean Value				***8.46***

Table 4.3: Uniqueness assessment of Celltech's integrated key capabilities.

As can be seen in Table 4.3, the mean value of the uniqueness analysis (8.46) is slightly lower than the mean value of the collective assessment (9.00). Values of key integrated capabilities range between (7) and (10). Similarly, any key integrated capability that scores a value ≥ 8.46 will be selected as a competence of Celltech. As a result, six key capabilities are determined as competences of Celltech, whilst the remaining seven capabilities are discarded from the subsequent assessment. Molecular therapeutic design and Licensed innovative technology, in particular, appear to be the most unique key integrated capabilities with scores of (10). Literature confirms that Celltech is substantially distinctive in designing molecular therapeutic products especially in certain therapeutic areas such as autoimmune and inflammatory diseases, and cancer which can not be easily replicated by rivals (URL:www.celltechgroup.com). This key capability is, indeed, coupled with Celltech exclusive licensed innovative technology such as SLAM (Selected Lymphocyte Antibody Method) and ALIS (Automated Ligand Identification System) which rests on its robust platform of technology (Ibid.). Table 4.3 shows also that there are four key capabilities: Therapeutic antibodies discovery, Molecular drugs production, Strategic partnering, and Human Resource Management which each achieved a score of (9). This can be attributed to their dependable business roles stemming from Celltech's mission and strategy. For instance, discovering therapeutic antibodies and producing molecular-based drugs is a principal business goal for Celltech that is enhanced through strategic partnering with global manufacturers and management of prestige human resources. On the other hand, seven key capabilities are excluded to be competences as having total scores below the mean value. Although they are critical for Celltech, these key capabilities are not considered to possess a high degree of uniqueness. For instance, Product development, Research collaboration and Global market access can be pursued and gained by a variety of similar companies. The six key capabilities that emerge as Celltech competences are: Therapeutic antibodies discovery, Molecular therapeutic design, Licensed innovative technology, Molecular drugs production, Strategic partnering, and Human resource management.

4.7 Step III: Identification of Core Competences

To identify core competences of Celltech, a strategic flexibility analysis is conducted. The six identified competences are evaluated against the flexibility of redeploying their resources and reorganising their sets of routines and practices. The analysis is explained in Table 4.4.

Competences	Strategic Flexibility		
	Resource re-deployment (Score out of 4)	**Routine re-organisation (Score out of 4)**	**Overall score**
Therapeutic antibodies discovery	4	3	7
Molecular therapeutic design	3	3	6
Licensed innovative technology	4	3	7
Molecular drugs production	4	4	**8**
Strategic partnering	3	3	6
Human Resource Management	3	3	6
Mean Value			***6.67***

Table 4.4: Strategic Flexibility of Celltech's Competences.

Table 4.4 illustrates that the mean value of this analysis is (6.67). In the view of this author, any competence which achieves a total score of (6) obtained equally from both elements of strategic flexibility (i.e. each measure =3) is likely to be a candidate for core competence. However, in the Celltech case, some competences are not considered core competences as the mean value is greater than (6). It can be noted from the assessment that Molecular drugs production competence has the maximum score of (4) for both measures of strategic analysis. That is because the resources allocated for producing molecular drugs in autoimmune and inflammatory areas are also re-deployed and used for portfolio of oncology products. In addition, Celltech is capable of re-organising the routines and re-using SLAM and ALIS programmes to help develop the treatment in those therapeutic areas. The other two core competences are Therapeutic antibodies discovery and Licensed innovative technology. These two have identical scores against both measures. The assessment assigns (4) scores for Therapeutic antibodies discovery against resource re-deployment due to Celltech's capacity of extending and combining its skills and research centres facilities with its ambitious gene discovery projects. Also, regarding the routine re-organisation element, its strategy's routines to produce novel oncology products are customised to develop potential treatment for osteoporosis. Licensed innovative technology competence, in turn, has a score of (4) regarding resource re-deployment as Celltech adopts a flexible approach aiming to develop its superior technological platform for further antibodies areas. For instance, utilising the SLAM technology license, it has been able to generate a diverse range of high- affinity antibodies targeting particularly the areas that show difficulty raising antibodies.

Furthermore, the ALIS technology license is employed to produce innovative rapid screening technology.

Functional areas/ Capabilities?			
R & D	**Manufacturing**	**Sales & Marketing**	**Performance Mgt**
Key Operational Capabilities? Value Analysis			
Therapeutic antibodies discovery	Licensed innovative technology	Strategic partnering	Human Resource Management
Molecular therapeutic design	Molecular drugs production	Selling diversity of therapeutic products	Health, Safety & Environment mgt
Product development	Medicinal chemistry applications	Global market access	Data analysis management
Academic collaboration	Novel genomic techniques		
Gene discovery research	Engineering human antibodies		
Research collaboration	Protein production		
Competences? Collectiveness Assessment			
Therapeutic antibodies discovery	Licensed innovative technology	Strategic partnering	Human Resource Management
Molecular therapeutic design	Molecular drugs production	Selling diversity of therapeutic products	Health, Safety & Environment mgt
Product development	Engineering human antibodies	Global market access	Data analysis management
Research collaboration			
Competences? Uniqueness Assessment			
Therapeutic antibodies discovery	Licensed innovative technology	Strategic partnering	Human Resource Management
Molecular therapeutic design	Molecular drugs production		
Core Competences? Strategic Flexibility			
Therapeutic antibodies discovery	Licensed innovative technology		
	Molecular drugs production		

Fig. 4.3: The core competence filtration process for Celltech.

To conclude, the assessment presents that Celltech has three core competences (distinguished by shaded rows in Table 4.4), namely, Therapeutic antibodies discovery, Molecular drugs production, and Licensed innovative technology. The overall identification process for Celltech is illustrated in Fig. 4.3.

4.8 Evaluation of the Pilot Case Study Results

The author's assessment of identifying Celltech core competences is validated through a comparison analysis with the evaluation of the other twenty participants. All the five groups' analysis of collectiveness, uniqueness, and strategic flexibility are summarised and conclusions are drawn. The scale of agreement between this author and the focus groups is expressed in percentage ratios (See Table 4.5). The size of each group of participants is taken into account and therefore weighted for conducting the judgement.

It can be also seen from Table 4.5 that the other participants' assessment of collectiveness is identical to this author's evaluation with respect to particular key capabilities, and this is interpreted as a full agreement of 100%. The scope of consistency is calculated according to the weight of the group. For example, the consistency ratio between the author and groups for Molecular therapeutic design is computed by counting the number of participants who select it as a key capability. So, as is seen in row 2 of Table 4.5, groups 1, 2, 4, and 5, which include 16 out of 20 participants, select it as a key capability constituting a ratio of 80%. Other key capabilities selected by the author as high collective ones are also considered by the focus groups and is expressed within the range of 75% - 90% of agreement. It is important to note that none of the Celltech key capabilities are selected in contradiction to the author's analysis, and five key capabilities are selected neither by the author nor by the groups. It can also be noted that the analysis of group 2 is entirely identical to the author's evaluation, and the analysis of group 4 approximately matches the author's assessment with exception of disagreement about Research collaboration key capability. The overall degree of agreement between the author's perception and the participants reached 79.16%.

Key Capability	Author's Analysis	Group 1 Analysis	Group 2 Analysis	Group 3 Analysis	Group 4 Analysis	Group 5 Analysis	% of Agreement
		5 people	5 people	4 people	2 people	4 people	
Therapeutic antibodies discovery							100
Molecular therapeutic design							80
Product development							55
Academic collaboration	Neither selected by the author nor by focus groups						100
Gene discovery research	Neither selected by the author nor by focus groups						100
Res earch collaboration							90
Licensed innovative technology							75
Molecular drugs production							35
Medicinal chemistry applications	Neither selected by the author nor by focus groups						100
Novel genomic techniques	Neither selected by the author nor by focus groups						100
Engineered human antibodies							75
Protein production	Neither selected by the author nor by focus groups						100
Strategic partnering							100
Selling diversity of therapeutic products							35
Global market access							60
Human Resource Management							80
Health, safety & environment mgt							60
Data analysis management							80
Average							***79.16%***

Table 4.5: Comparison between the author's assessment and the other participants' analysis of collectiveness analysis.

On the other hand, with respect to uniqueness assessment, as is seen in Table 4.6, the consistency ratio between the comparison made by the author and the focus groups of 79.62% tends to be quite similar to the previous comparison for collectiveness assessment of 79.16 %. It can be noted that the assessment of groups 2, 3, and 4 is the same as the judgement of the author. However, four key capabilities are chosen by some reviewers (all are highlighted by group 5) as unique key capabilities in contrary to the author; however these do not constitute a major contradiction as all are discarded by all groups.

Key Capability	Author's Analysis	Group 1 Analysis	Group 2 Analysis	Group 3 Analysis	Group 4 Analysis	Group 5 Analysis	% of Agreement
		5 people	5 people	4 people	2 people	4 people	
Therapeutic antibodies discovery							75
Molecular therapeutic design							80
Product development							80
Research collaboration							55
Licensed innovative technology							75
Molecular drugs production							55
Engineered human antibodies							80
Strategic partnering							100
Selling diversity of therapeutic products							80
Global market access	Neither selected by the author nor by focus groups						100
Human Resource Management							55
Health, safety & environment mgt	Neither selected by the author nor by focus groups						100
Data analysis management	Neither selected by the author nor by focus groups						100
Average							*79.62%*

Table 4.6: Comparing the author's assessment with the participants' evaluation of uniqueness analysis.

Finally, Table 4.7 illustrates a comparison analysis with regard to the strategic flexibility assessment. It can be seen that all core competences identified by the author are agreed with by most groups but with different respects. For instance, whilst Therapeutic antibodies discovery and Licensed innovative technology are both identified as core competences by 75% of the respondents, Molecular drugs production is identified by 55%. It is interesting to highlight that in all assessments this competence is chosen by a minority of all study participants. However, the overall analysis clarifies that 69.17% of respondents agree with what this author considers are Celltech core competences indicating a reasonable degree of unanimity between them.

Competences	Author's Analysis	Group 1 Analysis	Group 2 Analysis	Group 3 Analysis	Group 4 Analysis	Group 5 Analysis	% of Agreement
		5 people	5 people	4 people	2 people	4 people	
Therapeutic antibodies discovery							75
Molecular therapeutic design							55
Licensed innovative technology							75
Molecular drugs production							55
Strategic partnering							55
Human Resource Management							100
Average							***69.17%***

Table 4.7: The author's assessment against the participants' assessment of strategic flexibility analysis.

4.9 Lessons from the Pilot Case Study

This initial study was to check the robustness and repeatability of the procedure via using a multi group study employing secondary data. It is noted that in most stages of the process of identifying Celltech core competences, there is enthusiastic congruence between the author's analysis and the groups' assessment. Some important lessons, as a result, were learnt and considered for the subsequent case studies.

The overall analysis shows that the degree of agreement between this author's assessment and the participants' assessment is reasonable to some extent. For instance, with respect to collectiveness assessment, 79.16% of participants agree with this author's analysis; 79.62% agree with regards to uniqueness assessment; and 69.17% for the strategic flexibility evaluation. However, this author acknowledges that some factors such as the participants' different backgrounds and limited amount of knowledge for some have contributed to not having a relatively higher level of agreement. What is more important is that using a subjective value evaluation approach has implications due to human judgement. As a result, in the subsequent case studies, AHP is used to ensure the elimination of the human bias and to gain more robust data. Secondly, it can be noted that collectiveness and uniqueness assessments were, as originally proposed in the previous research (Hafeez *et al.,* 2002a; Zhang, 1999), sequentially performed, which led to discarding some key capabilities from the uniqueness assessment. For instance, it can be seen in Table 4.2 that all key capabilities with total scores less than the mean value of (9) are discarded from the uniqueness analysis. The author believes that this methodology rendered to exclude some potential collective key capabilities from testing their degree of uniqueness. Two particular potential collective key capabilities (with scores = 8) which are Gene discovery research and Novel genomic techniques are eliminated from assessing their uniqueness degree. It is not always the case that every key capability with a high degree of collectiveness may have a high degree of uniqueness too. Tables 4.2 and 4.3 demonstrate that a number of highly collective key capabilities such as Health, safety and environment management, Data analysis management, Selling diversity of therapeutic products, Global market access and Product development have, on the other hand, low degree of uniqueness. In contrast, several subsequent case studies in this research confirm that it is not uncommon to discover that some key capabilities with poor scores of collectiveness are highly unique and therefore need to be studied to explore means to develop their potential collectiveness. Therefore, in order to ensure more credible assessment, the competence analysis should be affected simultaneously to obtain a comprehensive figure of both the collectiveness and uniqueness of key capabilities and avoid disregarding any potential competences. This point was discussed in more detail in Section 2.7 of the thesis.

4.10 Summary

This Chapter presented a pilot case study conducted on Celltech Plc to evaluate core competence identification framework (Hafeez *et al.*, 2002a-c). The aim was to exercise the process of implementing the proposed framework and bridge any gaps. Using the framework the study commenced with analysing eighteen key capabilities from which three core competences were identified. The author relied on a secondary data approach to conduct the study. However, twenty part-time postgraduate participants contributed to evaluate the results of the assessment. A comparison analysis between the author's and participants' evaluation was, therefore, performed and key lessons were learnt. The pilot study demonstrated that at the competence determination stage, collectiveness and uniqueness exercises should be conducted simultaneously to avoid disregarding any potential collective key capability from uniqueness assessment. It shows also that relying on subjective value evaluation may have implications and therefore it is important to use the AHP technique for the subsequent case studies to ensure eliminating the human bias and obtaining more robust results.

Ch. Five: Identifying Core Competence For Two Utility Companies

5.1 Introduction

The core competence identification framework (Hafeez *et al.,* 2002a-c) is examined in the utility sector using four case studies. In this Chapter, two case studies involving a Water and Sewerage Services Company (WSSC) and an Electricity Supply Company (ESCA) are analysed and discussed. The results of the other case studies are filed in Appendix N. Compared with the Celltech case study, presented in Chapter Four, a significant development with respect to the approach used to collect and process data for these two companies can be recognised. Data is gathered using questionnaire-based structured interviews with key decision-makers. Also, utilising the applicability the framework offers, it is implemented at two organisational management levels following an identical methodology for assessment. Furthermore, in the competence determination stage, collectiveness and uniqueness assessments are performed simultaneously instead of sequentially. In depth analysis is accomplished involving several functional business areas, however, the outcomes are prone to qualitative subjective value evaluation. In total, six functional areas of both cases are studied and results are validated with management.

5.2 WSSC Case Study

WSSC is an overseas utility firm providing the bulk of the water supply and sewerage services for a wide region comprising ten cities and a number of villages. The company is operated by approximately 700 employees functioning across nine sites and offices throughout the region. WSSC is governed by stringent authorities' standards for health and environmental issues and faced with increasing competition especially in sewerage services works. Its 2004 financial year turnover reached £7 million. With a traditional organisational structure, WSSC has thirteen departments.

5.3 Testing the Core Competence Framework at WSSC

A structured interview with the general director was conducted in which the aim of the study and stages of the proposed framework were explained. At all stages of the framework, data is collected according to subjective value assessment by the WSSC's management.

5.3.1 Identification of Key Capabilities

As was done with the Celltech case study, the analysis proceeded from the key capabilities determination stage due to time limitation. The present author opted to map out the key functional capabilities of the company according to the WSSC's management perception. These key capabilities are understood to constitute the key strength areas of the company and play a more crucial role than others to achieve its business goals. The identified key capabilities include:

1. Financial & Managerial Affairs
2. Performance and Development Management
3. Facilities and Services Management
4. Water Management
5. Sewerage Management
6. Projects Management

Therefore, these six key capabilities are considered the basis to test the proposed framework.

5.3.2 Determination of Competences

As explained in Section 2.9.3, in this stage a two dimensional quantitative assessment analysis based on weighing the identified key capabilities in terms of their internal integration "collectiveness", and external differentiation "uniqueness" is carried out. All key capabilities of WSSC are assessed and weighted one-by-one by two interviewees using a (1-4) score scale.

5.3.2.1 Collectiveness Assessment

The score assigned to each attribute of a capability implies the management perception of how a capability is integrated amongst various business functions. In this assessment a key capability with a score of 9.16 or more out of 12 is considered a collective capability and forms an integral part of various essential business operations.

Key Capability	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Financial & managerial affairs	3	2	3	**8**
Performance & Development Mgt.	3	3	3	**9**
Water Management	4	4	4	**12**
Facilities Management	2	3	2	**7**
Sewerage Management	4	3	3	**10**
Project Management	3	3	3	**9**
Mean Value				***9.16***

Table 5.1: Collectiveness assessment of WSSC's key capabilities.

As can be seen from Table 5.1, two of the six identified key capabilities (shaded colour) achieved a relatively higher score than the respective mean (9.16). Accordingly, it can be concluded that water management and sewerage management capabilities are widely integrated within the company's business operations. Water management is, by far, the most collective key capability scoring the top value (4 out of 4) for each element of this analysis.

5.3.2.2 Uniqueness Assessment

Part two of the competence determination is to conduct a uniqueness assessment exercise similar to the collectiveness assessment. Table 5.2 summarises the scores achieved by each key capability in terms of uniqueness attributes according to the company's top management.

Key Capability	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Financial & managerial affairs	2	2	2	**6**
Performance & Development Mgt.	2	2	3	**7**
Water Management	4	4	3	**11**
Facilities Management	3	2	2	**7**
Sewerage Management	4	3	4	**11**
Project Management	3	2	3	**8**
Mean Value				***8.33***

Table 5.2: Uniqueness assessment of WSSC key capabilities

Table 7 indicates that there is a considerable variation with regards to key capabilities' scores for uniqueness assessment. For example, whilst water management and sewerage management capabilities each have a relatively high overall score (11 out of 12), financial and managerial capability were below the mean score with (6).

In contrary to the procedure followed with the Celltech case study, it is intended to gauge the key capability scores against the collectiveness and uniqueness dimensions simultaneously. Table 5.3 gives the overall scores for the key capabilities.

Key Capability	**Collectiveness** Overall Score (max=12)	**Uniqueness** Overall Score (max=12)
Financial & managerial affairs	**8**	**6**
Performance & Development Mgt.	**9**	**7**
Water Management	**12**	**11**
Facilities Management	**7**	**7**
Sewerage Management	**10**	**11**
Project Management	**9**	**8**
Mean Value	***9.16***	***8.33***

Table 5.3: Competence analysis of WSSC's key capabilities.

Table 5.3 illustrates that for collectiveness and uniqueness assessments, only water management and sewerage management capabilities score relatively higher than the respective mean. Therefore, based on the framework assumptions, these capabilities may be considered to be WSSC competences. However, projects management capability, appears to be a potential candidate for competence as its respective score values (9 and 8) are very close to the mean values.

WSSC candidates of competences, are also graphically highlighted in a two dimensional plot as shown in Figure 5.1. These results are presented in a two-dimensional matrix using a statistical programme called Minitab (MINITAB Statistical Software, 2003). The competence zone is located at the top right corner. Theoretically, the competence zone includes the key capabilities which are highly collective (embedded within the organisation) and is highly unique to enable product differentiation. Figure 5.1 shows clearly that water management and sewerage management are the only capabilities that lie within the competence zone and therefore are considered WSSC organisational competences and a potential candidate to be a core competence.

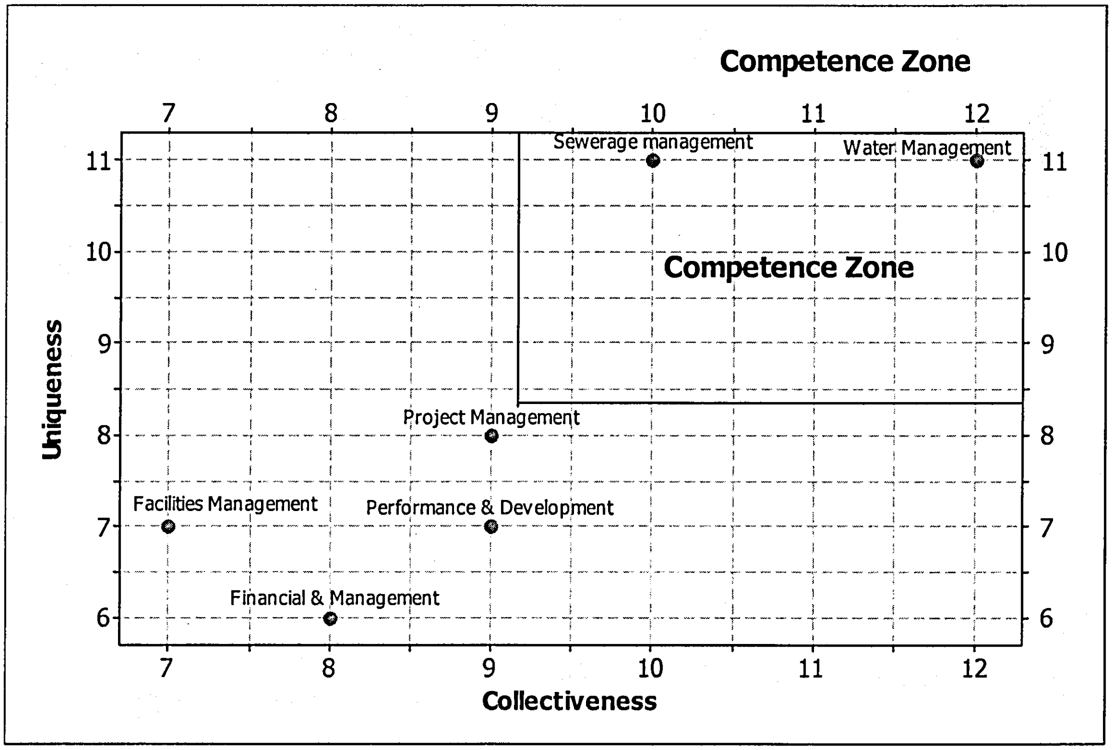


Fig. 5.1: Presenting the key capabilities' values against collectiveness and uniqueness.

5.3.3 Identifying Core Competences

As the framework suggests, core competences are identified through a strategic flexibility evaluation. A similar weighting method to the previous stages is employed. Table 5.4 gives the overall scores of water management and sewerage management organisational competences. Accordingly, competences with scores equal to or higher than the overall respective mean (6.50) are the competences that can be readily redeployed as well as re-organised to develop future businesses.

Organisational Competences	**Strategic Flexibility**		
	Resource Re-deployment Score (1-4)	Routines Re-organisation Score (1-4)	Overall Score
Water Management	4	3	7
Sewerage Management	3	3	**6**
Mean Value	3.50	3.0	***6.50***

Table 5.4: Strategic flexibility assessment of WSSC organisational competences.

Table 5.4 illustrates that the scores of both competences appear comparable. However, the water management competence relative high capacity (score 4 out of 4) to redeploy its resources into further business areas leads to differentiate it from sewerage management and be qualified as the core competence of the Company. However, the importance of sewerage management competence can not be disregarded, as it secures equal scores to water management against the routine re-organisation measure and falls very close to the mean value (6.50) in this analysis. Core competence of WSSC is also graphically illustrated by identifying the core competence zone on the chart (See Fig. 5.2).

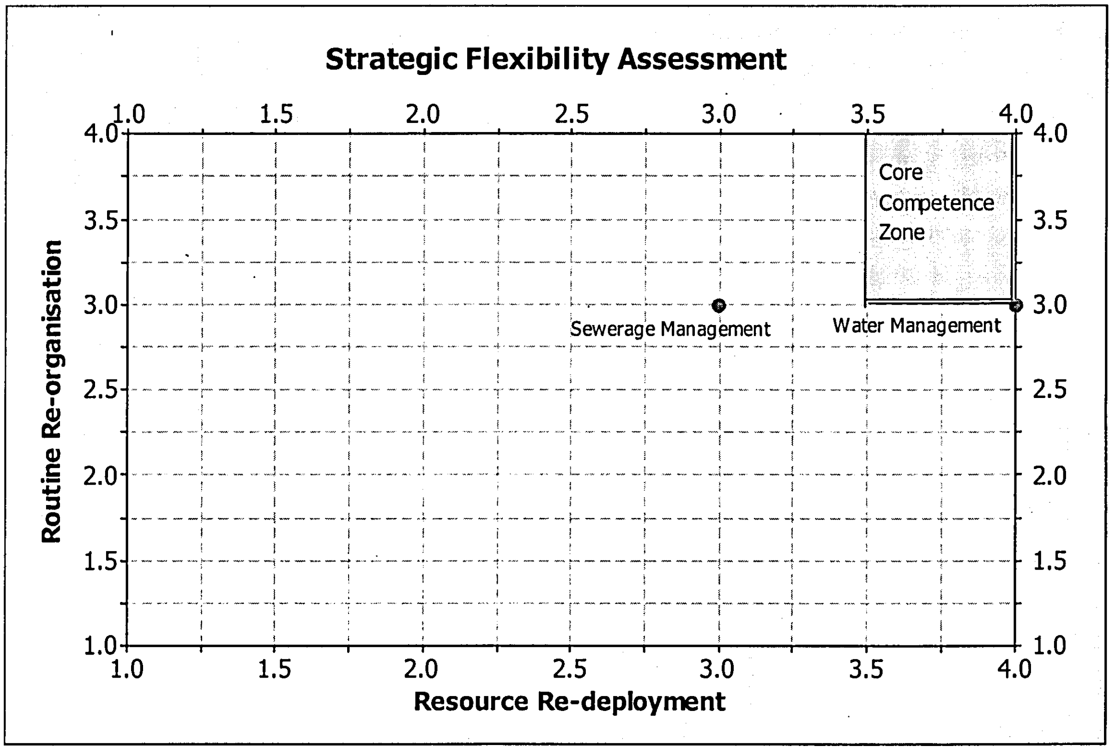


Fig. 5.2: Identifying graphically the core competence of WSSC.

5.4 Evaluating Core Competences of WSSC at the Second Level

Taking advantage of the framework applicability to be used at different levels, and according to the results drawn earlier, core competences at the top organisational management level are further explored at the second level. The aim is to judge the water management area's general manager's perception to identify related core competence(s) using the same weights of evaluation. A similar structured questionnaire designed to access this area's sub key capabilities is used to collect further data.

The Water management area is responsible for supplying drinking water to all properties controlled by WSSC. This capability is largely operated by sub-operational capabilities under government supervision and standards. During the interview with the water management general manager, five key operational capabilities were determined, namely, Exploration & excavation, Continuous Water Supply, Secure Network, Water Quality Tests, and Disinfectant Processes (See Fig. 5.3). The water management area is mainly driven by these five sub-capabilities according to management knowledge and perception.

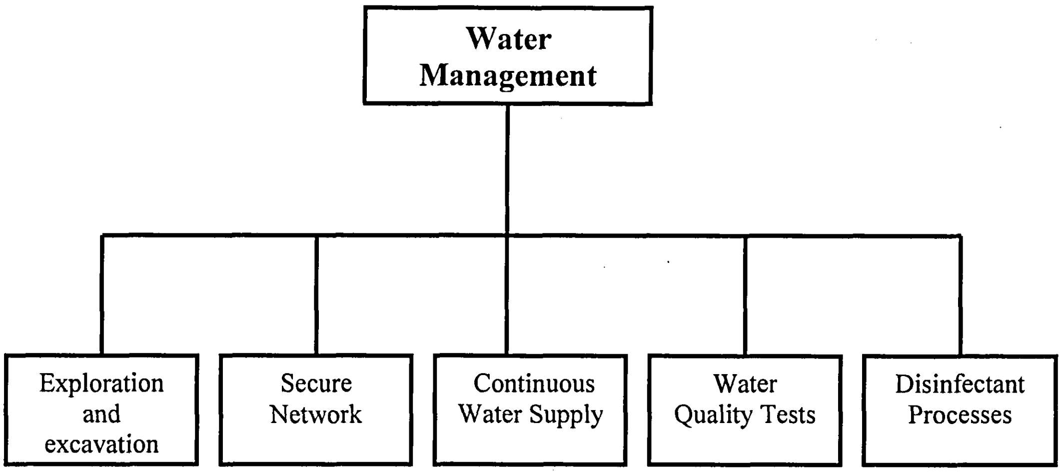


Fig. 5.3: Key operational capabilities of the Water management area.

5.4.1 Determining Competences of Water Management

As was earlier done to identify core competences of WSSC at the top organisational level, collectiveness and uniqueness assessments are first performed simultaneously to determine the competences of the water management area. Table 5.5 shows that three key capabilities, namely, Secure Network, Water Quality Tests, and Disinfectant Processes, are relatively high collectively as their scores (12) are greater than the respective mean value of collectiveness (11.00).

Operational Key Capability	**Collectiveness**			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Exploration & excavation	3	4	3	**10**
Continuous water supply	3	3	3	**9**
Secure network	4	4	4	**12**
Water quality tests	4	4	4	**12**
Disinfectant processes	4	4	4	**12**
Mean Value				***11.00***

Table 5.5: Collectiveness assessment of WSSC's key capabilities.

On the other hand, the uniqueness assessment shows that, with the exception of the Exploration & excavation key capability, the scores of the other four key capabilities are greater than the respective mean value (9.80) (See Table 5.6). This indicates that the management of the Water management area considers most of this area's sub-capabilities have a relatively higher degree of uniqueness and differentiation than other companies working in this business.

Operational Key Capability	**Uniqueness**			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Exploration & excavation	2	2	3	**7**
Continuous water supply	3	3	4	**10**
Secure network	3	3	4	**10**
Water quality tests	4	4	4	**12**
Disinfectant processes	3	3	4	**10**
Mean Value				***9.80***

Table 5.6: Uniqueness assessment of WSSC key capabilities

In order to determine the competences of the Water management area, collectiveness and uniqueness assessments are presented in a matrix where competences can be isolated (See Table 5.7). Therefore, the analysis shows that Water management has three competences which are Secure network, Water quality tests, and Disinfectant processes.

Operational Key Capability	**Collectiveness** Overall Score (max=12)	**Uniqueness** Overall Score (max=12)
Exploration & excavation	**10**	**7**
Continuous water supply	**9**	**10**
Secure network	**12**	**10**
Water quality tests	**12**	**12**
Disinfectant processes	**12**	**10**
Mean Value	***11.00***	***9.80***

Table 5.7: Competence analysis of Water management operational key capabilities.

5.4.2 Identifying Core Competences of Water Management

Competences are subsequently subjected to strategic flexibility assessment. Based on the data gathered in terms of resource re-deployment and routine re-organisation (See Table 5.8), two competences namely, Secure network, and Water quality tests have relatively high scores (7 and 8 respectively) equal to or greater than the respective mean value (7.00). Accordingly, the evaluation process confirms that secure network, and water quality tests are core competences of WSSC. The sequential process to isolate water management area's core competences is illustrated in Fig. 5.4.

Organisational Competences	**Strategic Flexibility**		
	Resource Re-deployment Score (1-4)	Routines Re-organisation Score (1-4)	Total Score
Secure network	4	3	7
Water quality tests	4	4	**8**
Disinfectant processes	3	3	**6**
Mean Value			***7.00***

Table 5.8: The Strategic Flexibility analysis of water management competences.

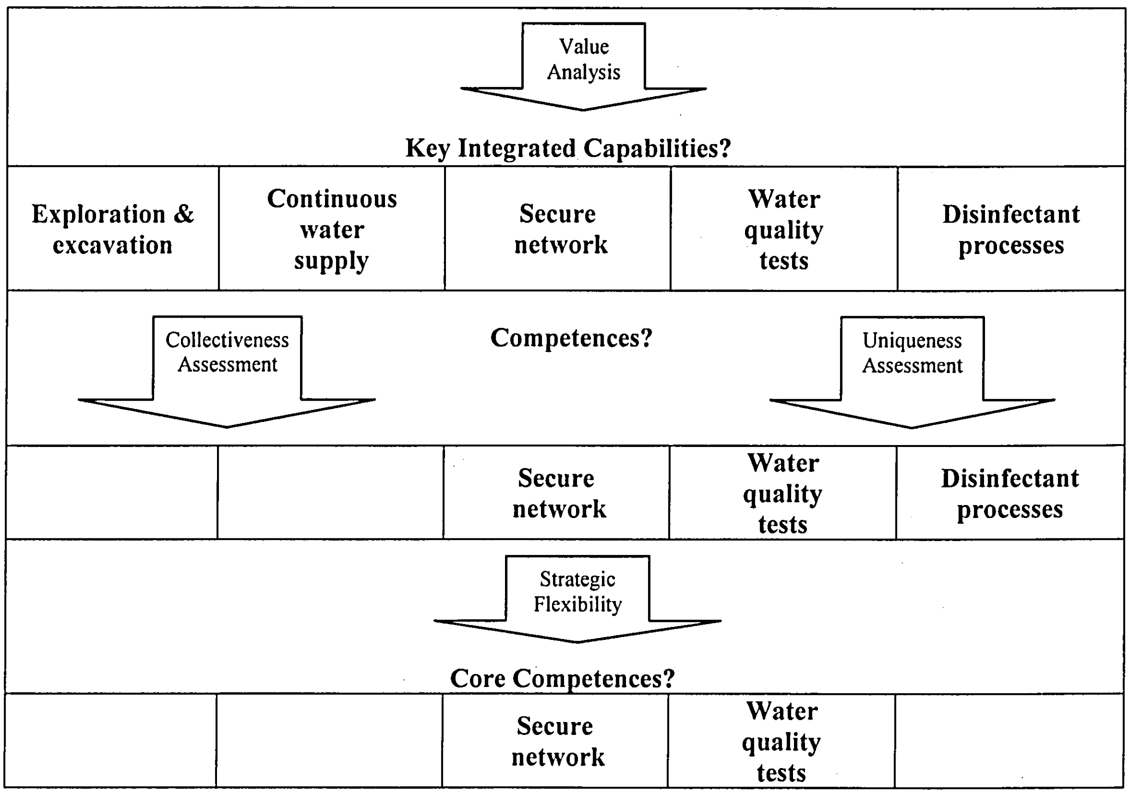


Fig. 5.4: The core competence filtration process for the WSSC Company.

5.5 Evaluation of WSSC's Case study

In comparison with the Celltech case study, there are a number of developments made. The first important change which occurred is that data is gathered using questionnaire-based structured interviews with key decision-makers to determine the key capabilities.

Second, is the applicability of implementing the framework at two management levels, and therefore to conduct detailed analysis within the identified core competences' areas. Third, in the competence determination stage, collectiveness and uniqueness assessments are conducted simultaneously instead of sequential assessments. Although the framework was systematically implemented and important conclusions were achieved, the study was thoroughly accomplished according to a qualitative subjective value evaluation.

5.5.1 Deliverables of WSSC

Six functional capabilities are studied. The framework manifests that the role of the water management area is central for performing the company's business. The capabilities associated with this area are highly unique and deeply embedded throughout the organisational processes and routines involving many cross-functional processes and businesses. Subsequently, a further analysis focusing on its capabilities was performed. Within five sub-capabilities, Water quality tests and Secure network appear to be the candidates for the water management area and therefore the whole company's core competences. Although the management of WSSC considers water management and sewerage services as the key candidates to be core competences, the framework concluded that, specifically, water management is the company's core competence at the top organisational level. This differentiation is based on the strategic flexibility analysis which shows that resource re-deployment of water management competence is more flexible compared with sewerage services (See Table 5.4). This author, however, considers that the contribution of sewerage services area to WSSC's business can not be disregarded. Overall, the results of analysis recommend the management to consolidate its strength in the water management area while still investing and outsourcing its capabilities in the sewerage management area.

5.6 Testing the Core Competence Framework at ESCA

The core competence identification framework is systematically tested at ESCA relying mainly on the management subjective evaluation. Lessons and conclusions drawn from the implementation process at Celltech and WSSC constitute grounds for further developments that can be recognised in the approach followed at ESCA. In particular, the present author realised that the lack of distinguishing key capabilities from capabilities, as seen earlier for Celltech and WSSC, requires further study. In addition, further work needs to be done to achieve robust results with less human bias. Therefore, the analysis of ESCA would be demonstrated using AHP, as a quantitative method, at the key capability determination stage enhanced with effecting sensitivity analysis to eliminate human bias.

5.7 Electricity Supply Company (ESCA) Overview

ESCA is a large overseas utility firm supplying electricity to more than 25000 customers including households, farmers, and businesses. Its markets include private and governmental properties for different needs such as housing, agriculture, manufacturing, trade, and public properties. It has more than 1000 employees and a turnover exceeding £20 million per annum (The ESCA annual report, 2003). With a traditional organisational structure, it has nine main divisions running the business, controlled by the company's General Director. The company is a major producer of electricity operating within a fast growing domestic market. It has entered into a joint venture project to supply electricity to a neighbouring country utilising its experience and extensive resources. However, the entry of new rivals in the market due to a dramatic increase in electrical power demand has entailed strategic plans to face these challenges.

5.8 Identifying Core Competence of ESCA

At the beginning of the structured interview with the managing director, the theme of the research and purpose of the study were introduced and discussed. Also, an outline regarding the framework to gather data was explained. Based on subjective value analysis, nine functional capabilities which were recognised to make up the key business areas of the company to achieve its business goals were mapped and highlighted. These capabilities are sales, Purchasing and inventory, IT, Services and training management, Safety management, R & D, Electricity supply management, Facilities management, and Installation management.

5.8.1 Resources and Capabilities Relationships

The managing director was asked to assign the contribution of tangible and intangible assets to the capabilities. As was earlier defined in Chapter 2 that a capability is the use of resources, and resources are split into tangible and intangible assets, it is assumed that the contribution of tangible and intangible assets is complementary and, therefore, their total proportions should sum 100%. The intention is to illustrate the compositions of core competence in terms of tangibles and intangibles, and to explore the role of individuals' competencies as intangible assets towards core competences. Table 5.9 presents a breakdown of the structure of each capability in terms of tangible and intangible assets, according to ESCA management.

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Sales	60	40	100
Purchasing and inventory	80	20	100
IT	70	30	100
Services & training management	70	30	100
Safety management	85	15	100
R & D	60	40	100
Electricity supply management	80	20	100
Facilities management	75	25	100
Installation management	70	30	100
Average	*72.22*	*27.78*	***100***

Table 5.9: The resources and capabilities relationships of ESCA.

Table 5.9 shows that capabilities of ESCA are all largely dominated by tangible assets' contribution ranging between 60 - 85%. The average of the tangible assets contribution to capabilities is 72.22%, whilst it is as low as 27.78% for intangible ones. The proportions of intangible assets' contributions do not exceed 40% as can be seen in Sales, and R & D capabilities. Safety management, Purchasing and inventory, and Electricity supply management have relatively the highest tangible assets with percentages of 85, 80, and 80, respectively. According to the management perception, such high values are mainly attributed to using extensive safety instruments and protection systems for safety management; massive stock warehouses for Purchasing and inventory; and widespread and extensive power stations to supply electricity across the country. Overall, the ESCA business is dependent on its private, huge tangible resources that are difficult for its rivals to acquire.

5.8.2 Key Capabilities of ESCA

The next step is to determine key capabilities using the financial and non-financial measures as the model suggests. The goal is to evaluate the financial and non-financial contributions made by ESCA capabilities to its business performance. A typical three-level AHP model is built for both performance measures (See Figs. 5.5 and 5.6). The financial and non-financial measures used in the study are borrowed from (Hafeez *et al.*, 2002a). The structure and mechanism of building an AHP model was discussed at length in Section 3.8.4 in Chapter 3.

Figure 5.5 shows the AHP evaluation model for ESCA financial performance comprising three levels. The first top level represents the goal and refers to the financial performance. The second level signifies the criteria represented by the three used financial measures, namely, sales growth, operating profit, and return on capital employed. The third level corresponds to the alternatives which are represented by ESCA's nine capabilities. Accordingly, with the application of the AHP methodology using the Expert Choice software, five key capabilities were determined based on the values provided by the interviewee. The results of the key capabilities determination task using AHP are discussed in the next section.

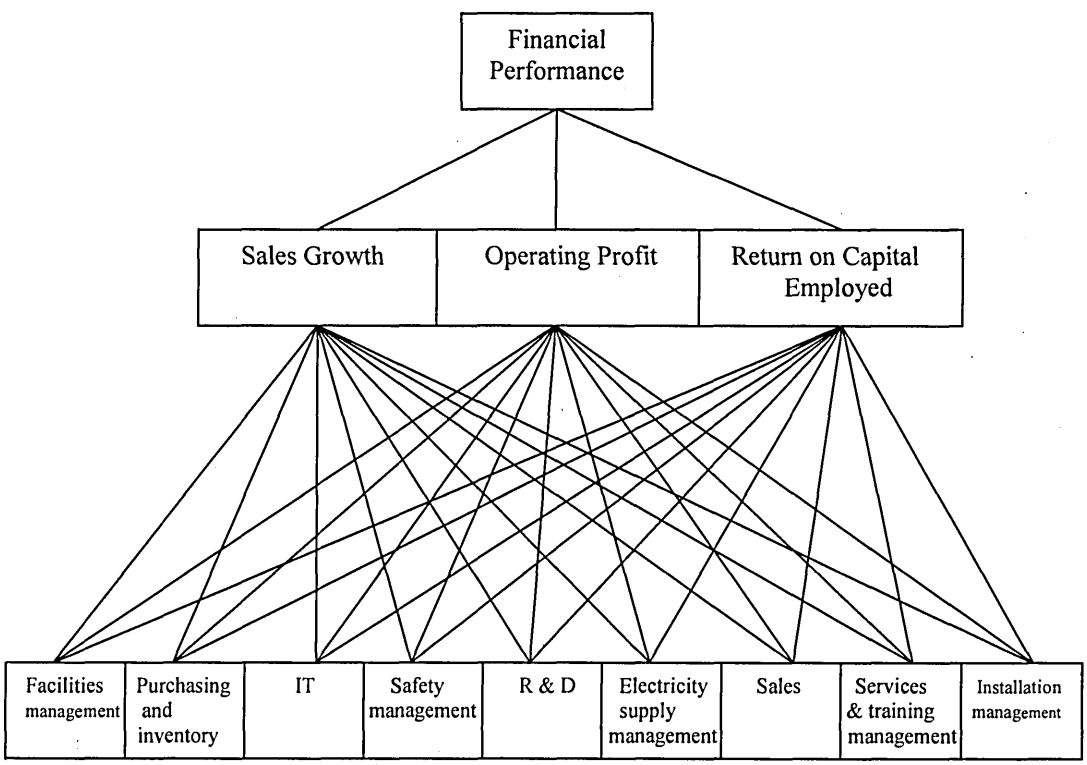


Fig. 5.5: The financial performance evaluation AHP model for ESCA.

Similarly, Figure 5.6 illustrates the non-financial evaluation model for ESCA. A three-level AHP model is designed; however, the components of the top two levels are different. In this model, the goal is non-financial performance; the criteria are the non-financial measures, namely, customer satisfaction, market share, and new product introduction.

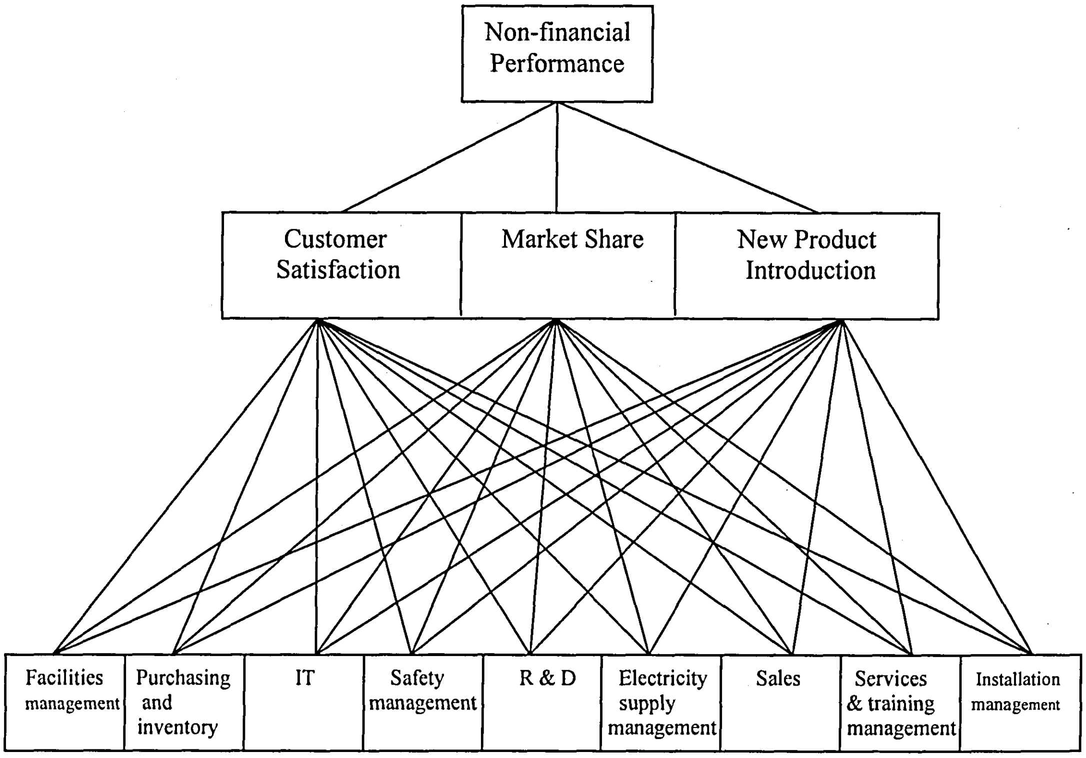


Fig. 5.6: The non-financial performance evaluation AHP model for ESCA.

5.8.2.1 Financial and Non-financial Performance Evaluation

The process of determining ESCA key capabilities consists of two parts. First, with respect to the goal of evaluating the financial performance, a pair-wise comparison between its quantitative measures (sales growth, operating profit, and return on capital employed) is conducted. In addition, a similar pair-wise comparison amongst capabilities against each financial measure is performed. Then, once again, a pair-wise comparison between the qualitative measures (customer satisfaction, market share, and new product introduction) with respect to the non-financial performance goal followed by a pair-wise comparison between capabilities with regard to the non-financial measures is affected. The aim of these tasks is to demonstrate the weight and relative importance of the used measures before conducting a similar assessment of capabilities.

All the results of analysing capabilities are presented in Appendix H, and a summary of the evaluation process is illustrated in Tables 5.10 and 5.11.

Table 5.10 and Table 5.11 respectively show the financial and non-financial contributions made by the capabilities of ESCA. The overall weights of relative importance of capabilities are calculated using Expert Choice software. Each capability's contribution against each criterion is multiplied by each criterion's weight with respect to the main goal and then added. This is given by this equation:

The overall weights of capability*= $\sum$ *weight of alternative* × *weight of criterion.

In other words, for calculating the overall weights of financial contribution made by a specific capability the equation will be as follows:

The overall weights of capability = priority weight of capability × priority weight of sales growth (0.644) + priority weight of capability × priority weight of operating profit (0.271) + priority weight of capability × priority weight of return on capital employed (0.085).

For example, the overall financial weight of the Facilities management capability (0.043) is computed as follows: (0.037 × 0.644 + 0.058 × 0.271 + 0.051 × 0.085) (See Table 4.10).

Capability	**Financial Performance**			Overall weights
	Sales growth (0.644)	Operating profit (0.271)	Return On Capital Employed (0.085)	
Facilities management	0.037	0.058	0.051	0.043
Purchasing and inventory	0.135	0.121	0.174	0.135
IT	0.048	0.061	0.057	0.052
Safety management	0.047	0.052	0.057	0.049
R & D	0.194	0.122	0.144	0.172
Electricity supply management	0.218	0.140	0.108	0.189
Sales	0.156	0.256	0.220	0.185
Service & training mgt	0.113	0.115	0.093	0.111
Installation management	0.054	0.076	0.095	0.063

Table 5.10: Evaluation of the financial performance of ESCA.

It can be seen from Table 5.10 that the result of the pair-wise comparison for priority preferences of the financial performance measures led the author to consider Sales growth is the most important measure with (0.644), followed by Operating profit with (0.271), and Return on capital employed with (0.085). The increasing growth of supplying electricity due to the increase in electrical power demand is considered a major factor that places Sales growth in a leading position. According to the ESCA 2004 Annual report, the gross produced electric power rose from 15496 GW/H "Giga watt per hour" in the year 2000 to 20202 GW/H in 2004. It can also be noted that for each financial measure, the priorities between capabilities is clearly different. For instance, with regard to Sales growth, Electricity supply management is the most important capability with a ratio of (0.218) and Facilities management is the least important with (0.037). In comparison, with respect to Operating profit, Sales capability has the greatest value of (0.256), whereas safety management is the lowest with (0.052). Also, for the Return on capital employed measure, Sales is also the most important capability with (0.220), compared with Facilities management scoring the least (0.051). It could be argued that being ESCA a public company working in a monopoly environment contributes to this outcome. The sales growth remains a strategic target to ESCA's management supported by the exclusive license to distribute electricity. The final column of Table 5.10 gives the overall weights of all capabilities towards the financial performance of ESCA. It can be seen that Electricity supply management with an overall weight of (0.189), Sales with (0.185), and R & D with (0.172) are the three most important capabilities regarding ESCA financial performance.

On the other hand, with respect to the non-financial performance analysis, the priorities preferences of the measures New product introduction (0.528); Customer satisfaction (0.333); and Market Share (0.140) are relatively more comparable. The ESCA management considers New product introduction the most important non-financial measure with a weight of (0.528). For ESCA, this owes much to offering continuous improved services and the application of advanced technology to supply electrical power to customers. Accordingly, the three most highly valued capabilities are R & D, Electricity supply management, and Purchasing and inventory with overall weights, respectively of (0.187), (0.143), and (0.142).

Capability	Non-financial Performance			Overall weights
	Customer satisfaction (0.333)	Market share (0.140)	New product introduction (0.528)	
Facilities management	0.063	0.054	0.064	0.063
Purchasing and inventory	0.156	0.131	0.133	0.142
IT	0.044	0.041	0.064	0.053
Safety management	0.076	0.054	0.045	0.059
R & D	0.148	0.156	0.233	0.187
Electricity supply management	0.142	0.099	0.155	0.143
Sales	0.089	0.235	0.118	0.120
Service & training mgt	0.136	0.124	0.144	0.138
Installation management	0.146	0.106	0.042	0.094

Table 5.11: Evaluation of the non-financial performance of ESCA.

5.8.2.2 Key Capabilities Determination

The overall financial and non-financial weights of ESCA capabilities are given in Table 5.12. The respective mean value of each measure is 0.111. Using (Hafeez *et al.,* 2002a) criteria to become a key capability candidate should score ≥ mean value for both financial and non-financial measures.

Capability	Financial weights	Non-financial weights
Facilities management	0.043	0.063
Purchasing and inventory	0.135	0.142
IT	0.052	0.053
Safety management	0.049	0.059
R & D	0.172	0.187
Electricity supply management	0.189	0.143
Sales	0.185	0.120
Service & training management	0.111	0.138
Installation management	0.063	0.094
Mean Value	***0.111***	***0.111***

Table 5.12: The overall priority weights for the capabilities alternatives.

Table 5.12 illustrates that five capabilities meet the criteria of achieving values ≥ 0.111 against both measures. These are Purchasing and inventory, R & D, Electricity supply management, Sales, and Service & training management. These results are presented in a two-dimensional matrix using the Minitab statistical programme, where a key capability zone can be demonstrated (See Fig. 5.7). The boundaries of the key capability zone are the mean values of financial and non-financial measures.

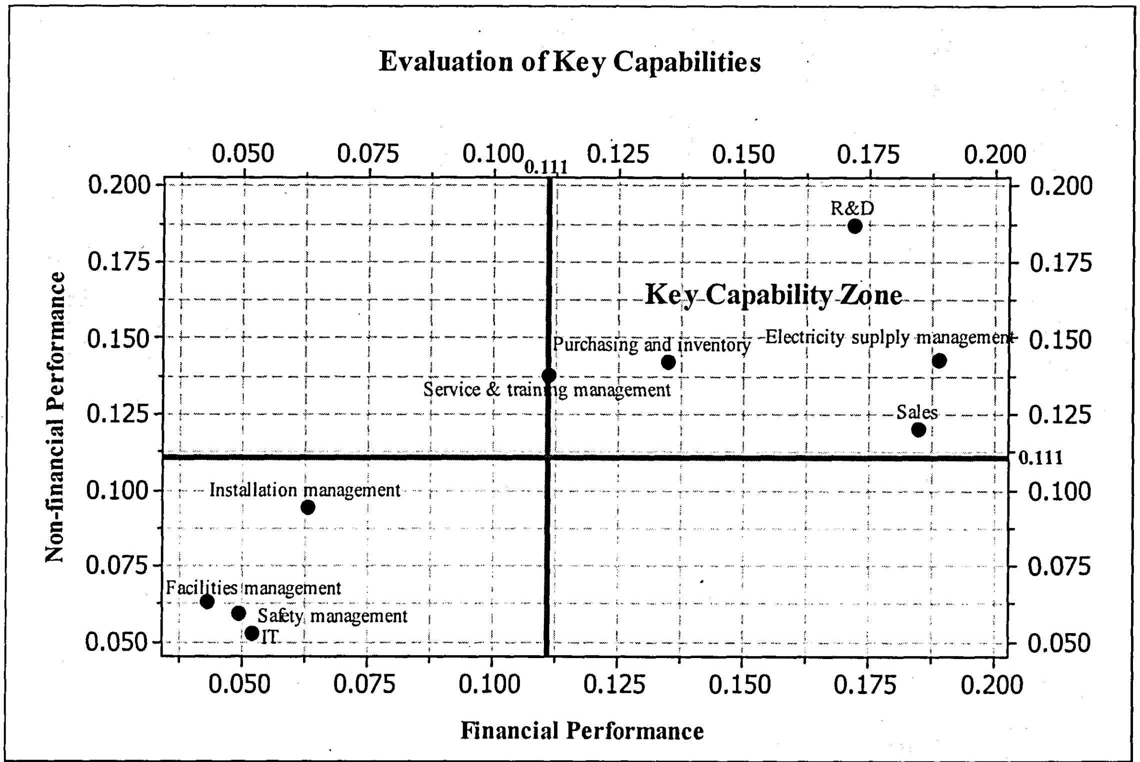


Fig. 5.7: Determination of key capability zone using Minitab programme.

Figure 5.7 illustrates the distribution of ESCA capabilities as coordinates in an XY chart. The X axis represents the financial performance values, whereas the Y axis represents the non-financial values. The key capability zone starts at the value of (0.111) which is the mean value of the respective both measures. Therefore, any capability which has a value of ≥ 0.111 would fall within the zone and be considered a key capability. As a result, as can be clearly seen in Fig. 5.7, the analysis of AHP results identifies five key capabilities, which are:

I. R & D;
II. Electricity supply management;
III. Purchasing and Inventory;
IV. Sales;
V. Services and Training Management.

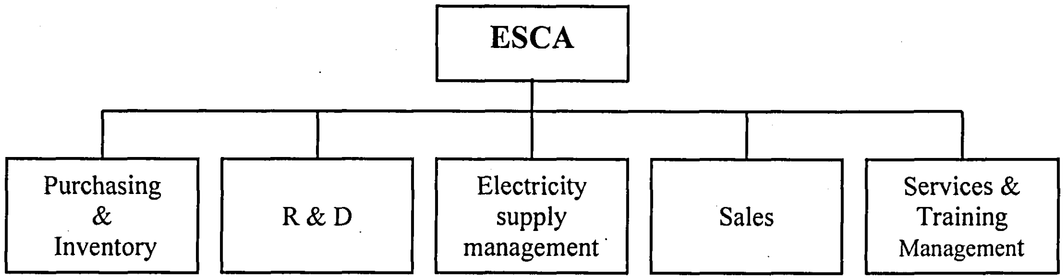


Fig. 5.8: Key capabilities of ESCA.

5.8.3 Determination of Competences

According to the framework, competences are determined by conducting collectiveness and uniqueness assessments simultaneously. Therefore, at this stage, a two dimensional quantitative assessment analysis based on weighing key capabilities in terms of their internal integration "collectiveness", and external differentiation "uniqueness" is carried out. The management of ESCA provided the scores for each attribute. Table 5.13 gives "collectiveness" scores for ESCA against these attributes, namely, across-function, across-product, and across-business as explained in Section 2.10.1. Again, a key capability with a score of equals to or greater than the mean value is considered a collective capability that forms an integral part of various essential business operations.

Key Capability	**Collectiveness**			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Sales	3	4	4	**11**
Purchasing & inventory	3	4	3	**10**
Services & training	3	2	3	**8**
R & D	3	4	4	**11**
Electricity supply management	3	4	3	**10**

Table 5.13: Collectiveness assessment of ESCA key capabilities.

It can be seen from Table 5.13 that, with the exception of Services and training management, the other four key capabilities are relatively collective since each one achieved a score equal to or higher than the mean score (10). As argued earlier, these capabilities are widely integrated within the company's business operations and span its products and services. For example, Sales and R & D are relatively more integrated within the company's business functions and products as they secured the highest scores of (11). This may be due to the fact that ESCA's strategic plans and future development rest on R & D, and its dominance in the market is achieved through its Sales' capabilities. Electricity supply management, and Purchasing and inventory key capabilities, in turn, complement such a role by controlling the technical and mechanical operations to produce and distribute electrical power across the networks and provide sophisticated systems to control power demand and materials stock and inventory.

Part two of the competence determination process is to conduct a "uniqueness" assessment using an identical scale of evaluation. Table 5.14 illustrates the scores achieved by each key capability in terms of uniqueness attributes according to the company's management view.

Key Capability	**Uniqueness**			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	overall Score
Sales	2	3	3	**8**
Purchasing & inventory	3	3	3	**9**
Services & training	2	2	2	**6**
R & D	4	4	4	**12**
Electricity supply management	3	3	3	**9**

Table 5.14: Uniqueness assessment of ESCA capabilities.

Table 5.14 indicates that, in contrast to the "collectiveness" analysis, there is, relatively, a significant difference amongst the scores for key capabilities with regard to uniqueness assessment. For instance, while the R & D key capability has the maximum overall score (12 out of 12); the Services and training management key capability attained only half of that score (6). The ESCA management considers R & D as the most important principal area that places them at a superior competitive position due to its high degree of uniqueness. The continuous research focusing on developing high quality power supply and services, combined with exclusive licensing agreements and special privileges to distribute electrical power to a variety of customers and domains make it difficult for its rivals to imitate. In addition, ESCA's Electricity supply management capability owns rare operating systems due to its patents for supplying electricity. Purchasing and inventory capacity to procure and monitor power requirements in addition to supplementary electric power also grants ESCA increased uniqueness within its business environment.

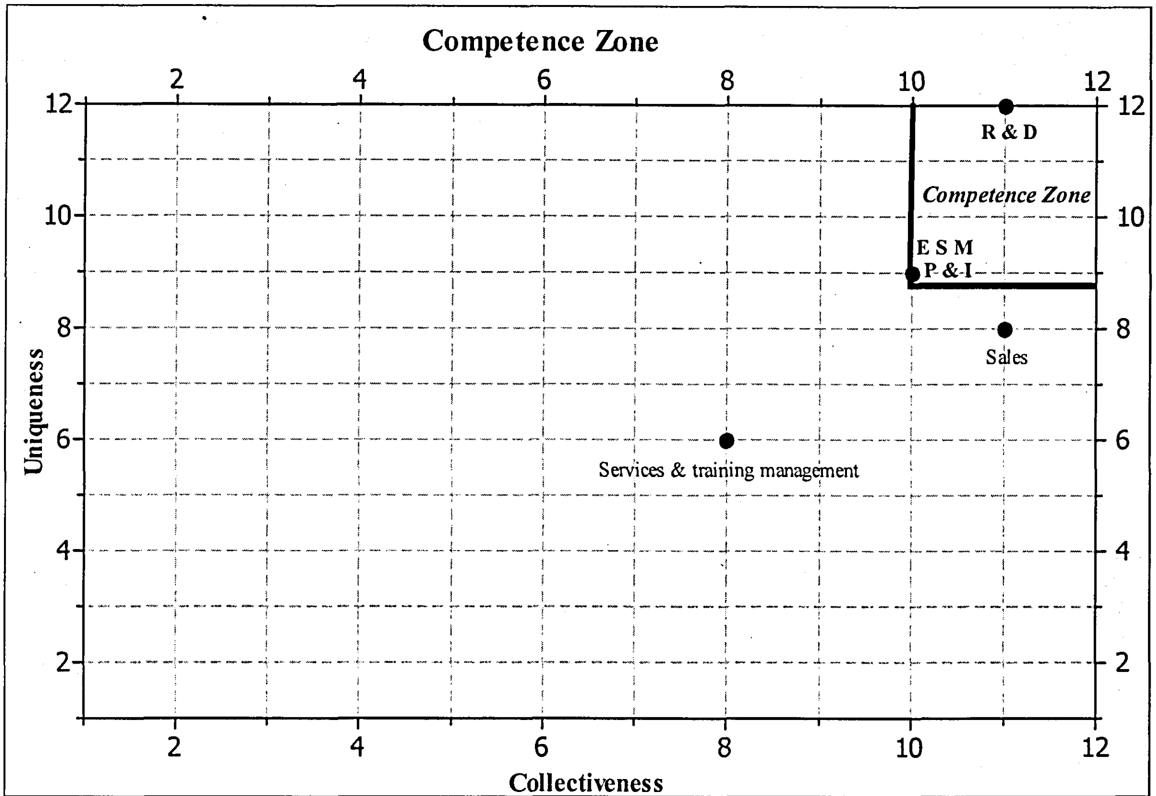
On the other hand, the lowest value of uniqueness assessment is secured by Services and training. Within this area, ESCA does not seem to have any differentiating factors against competitors, as their main job is to provide product-related services for external customers and offer training and performance development programmes for internal customers (employees). Such operational capabilities are indeed possessed by many counterparts and that is why this particular key capability scored as low as (6).

By comparing the overall scores of "collectiveness" and uniqueness analyses presented in Tables 5.13 and 5.14, the overall competence analysis can be identified (See Table 5.15). In accordance with the management perception, R & D, Purchasing and inventory, and Electricity supply management tend to be the potential strengths of the company against its competitors. The evaluation process, however, turns the focus to the R & D key capability. It reveals that R & D secures the highest overall score for all uniqueness attributes (a 4 score for each attribute) and, clearly, appears to be a core strength that is crucial to the ESCA mission and business goals. Purchasing and inventory and Electricity supply management both, in turn, achieve a total value of (9) scores which also represents a high degree of uniqueness in relative terms.

Key Capability	**Collectiveness** Overall Score (max=12)	**Uniqueness** Overall Score (max=12)
Sales	**11**	**8**
Purchasing & inventory	**10**	**9**
Services & training	**8**	**6**
R & D	**11**	**12**
Electricity supply management	**10**	**9**
Mean Value	***10.00***	***8.80***

Table 5.15: Competence analysis of ESCA's key capabilities.

Table 5.15 illustrates that with respect to the collectiveness element, apart from the services and training management key capability, all other key capabilities scored equal to or greater than the respective mean value (10.00). Similarly, with regards to the uniqueness measure, Purchasing and inventory, Electricity supply management and R & D scored 9, 9, and 12, respectively. These are higher than the respective mean value (8.80). Finally, as can be seen from Table 5.15, these key capabilities' scoring a value equal to or greater than the mean value for both criteria are distinguished by shaded strips. Key capabilities' values are also presented graphically using the Minitab programme. A chart is therefore produced showing the competence zone and key capabilities that lay within this zone to be selected as competences (See Fig. 5.9).



(Key: ESM=Electricity Supply Management; P&I: Purchasing and Inventory)

Fig. 5.9: Identifying graphically the competences of ESCA.

The competence zone boundaries are the mean values of collectiveness and uniqueness which are (10.00) and (8.80) respectively (Fig. 5.9). Theoretically, the competence zone includes the key capabilities which are highly collective (integrated across-functions, across-products/services, and across-business), and also have a high degree of uniqueness (rare, inimitable, and non-substitutable). The figure shows that there are three clear candidates to be considered as the organisational competences of ESCA, namely, R & D, Purchasing & inventory, and Electricity supply management.

5.8.4 Identifying Core Competences

As explained earlier (Section 2.10.1), core competences are those competences that are strategically flexible. Strategic flexibility analysis involves two elements; resource redeployment and routine re-organisation. The respective scores for ESCA are given in Table 5.16. It is suggested that competences with scores higher than the overall mean

(5.67) are the competences that can be readily redeployed as well as re-organised to develop new and future businesses.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Routines Re-organisation Score (1-4)	Total Score
Purchasing & inventory	3	2	5
R & D	3	3	**6**
Electricity supply management	3	3	**6**
Mean Value			***5.67***

Table 5.16: Identifying core competence of ESCA.

Table 5.16 indicates that whereas the total scores achieved by ESCA competences are very close, however, the routines re-organisation factor leads to exclude Purchasing and inventory competence from the analysis as its overall value of (5) is below the mean (5.67). This corresponds to the rigid procedures and routines adopted by ESCA in its working practices. According to the management of ESCA, the strategies to meet the production processes' requirements and consumers' demand and rules and procedures to manipulate inventory are often run with a regular approach that does not offer potential business development. On the other hand, R & D, and Electricity supply management competences both score (6) and qualify to become ESCA core competences. As was discussed earlier, the strategic role of R & D and Electricity supply management competences are critical for the ESCA business. In terms of strategic flexibility perspective, the resources of R & D such as licences to supply electrical power to housing and industry are utilised and redeployed to also provide the power to agricultural and manufacturing sectors. The expertise and knowledge in the field of electrical power and prestige research centres are also developed to establish alternative energy sources such as solar energy stations offering more choices for customers. In parallel, utilised from its massive resources to produce electrical power, the competence of Electricity supply management can be redeployed to generate other sustainable power alternatives and enter into joint venture projects for electrical power generation.

5.9 Discussion

Further discussions with the management of ESCA reveal that the company's business strategies and development plans are largely centred on R & D. They consider R & D capabilities relatively highly unique and collective as these are embedded into many cross-functional processes and businesses. For instance, the company sets up and controls new electrical networks and power stations, which is a vital factor to develop more projects and growth. It owns centres of network development operated by prestige experts giving the company an edge in its market to achieve its strategic targets. Therefore, the company's capacity to deploy and combine its unique tangible resources (centres) and intangible resources (licenses and expert knowledge) grants its R & D capability an essential strategic role. In addition, Electricity supply management and Purchasing and inventory capabilities both have a strategic dimension for business development. For example, while the majority of the electricity supply and networks operations are controlled by its Electricity supply management division, the market demand of power stations' and networks' requirements is largely monopolised through the company trade channels and extensive warehouses.

It is important to highlight that the management of ESCA had viewed R & D and Purchasing and inventory as the most important candidates to be core competence prior to this analysis. The analysis reveals, however, that R & D and Electricity supply management are the company's core competences. This difference can be related to strategic flexibility analysis which shows that the resource re-deployment score of Purchasing and inventory competence (5) is slightly less than the mean value (5.67). This in turn means that it is less flexible compared with the other core competences candidates (See Table 5.16). However, the assessment confirms that Purchasing and inventory competence is a potential area for future development to meet strategic flexibility criteria if, for instance, some operations are outsourced and redundant resources are invested. Finally, with the results of implementing the framework at the top organisational management level of ESCA, all the stages followed towards identifying ESCA core competences, are illustrated as a systematic filtration process. Figure 5.10 clarifies the mechanism applied to isolate the company's capabilities to be candidates of core competences using specific criteria and measures.

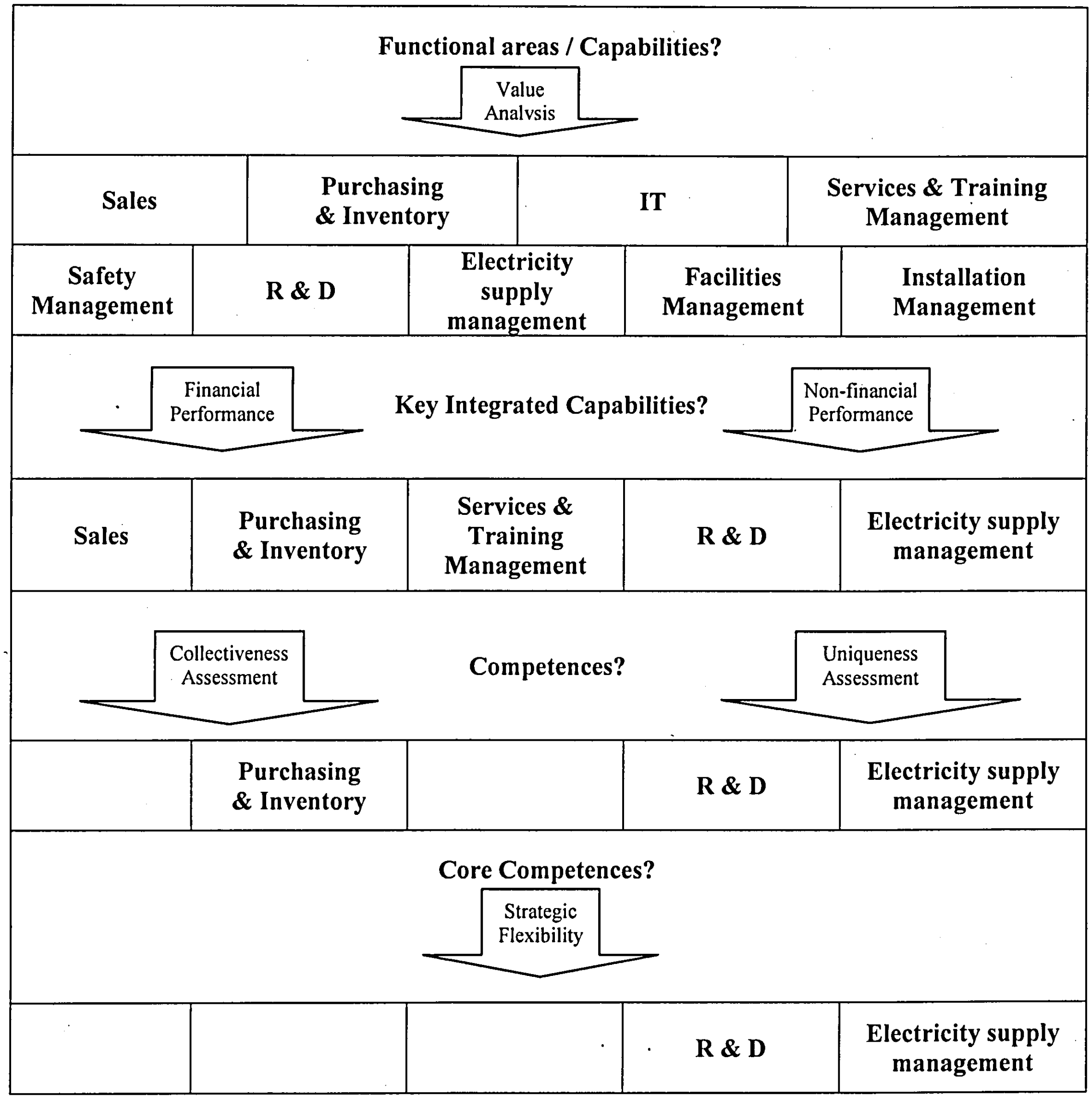


Fig. 5.10: The filtration process of identifying core competences of ESCA.

5.10 Applying the Framework at the Second Management Level of ESCA

Based on the results drawn from applying the framework at the ESCA top organisational management level which identified R & D and Electricity supply management as its core competences, it is intended to study these particular divisions individually to identify their sub-core competences. Therefore, two further interviews with the managers of those functional areas were arranged. Once again, an identical process to explore core competences of these areas is conducted and the entire results are illustrated in Appendix H.

5.10.1 Key Operational Capabilities of R & D

During the interview with the manager of the R & D area, out of a group of sub-capabilities, three key operational capabilities were identified; namely Network extension, fault reduction research, and Safety applications. The basis for selecting these key capabilities is the R & D management subjective value assessment. Appendix H illustrates the results of evaluating their collectiveness and uniqueness in order to determine competences of R & D.

5.10.2 Strategic Flexibility Analysis of R & D

Only one competence, which is Faults reduction research, is derived from the evaluation process of key capabilities of R & D (See Appendix H). As a consequence, it is subject to strategic flexibility analysis to assess whether it can be considered a core competence (See Table 5.17).

Organisational Competences	**Strategic Flexibility**		
	Resource Re-deployment Score (1-4)	Routines Re-organisation Score (1-4)	Total Score
Fault reduction research	2	2	**4**

Table 5.17: Core competence analysis of the R & D area.

Table 5.17 illustrates that Fault reduction research; the single competence; scores low for both elements of strategic flexibility analysis. The underlying resources and the routines for this competence are highly specialised to explore the causes of power interruptions and technical problems that face the electricity supply industry, and to study reducing and preventing such challenges. Accordingly, the most important and interesting conclusion of implementing the framework in this division of ESCA is that R & D has no core competence. Therefore, based on these results, R & D is not considered for further analysis and hence there is no need to complement the analysis at the individuals' competencies level.

5.11 Further Analysis of the Electricity Supply Management

A similar scenario is followed in this division to identify if it has any core competence. Appendix H depicts the outcomes of the full analysis of this area. Out of three organisational competences, two core competences, namely, Testing and On-time repairing will be studied to specify their most related individuals' competencies (See Table 5.18).

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Routines Re-organisation Score (1-4)	Total Score
Testing	3	3	**6**
Monitoring and control	2	3	**5**
On-time repairing	3	3	**6**
Mean Value			***5.67***

Table 5.18: Identifying core competences of Electricity supply management.

Table 5.18 gives the strategic flexibility assessment of Electricity supply management organisational competences. However, the score related to redeploying Monitoring and control resources (2 out of 4) scores low which excludes it as a core competence. It is understood that equipment and facilities of Monitoring and control competence are completely tailored to manage the task of distributing appropriately and effectively the electrical power to customers, and therefore can not be redeployed to other different works.

5.12 Lessons from the ESCA Case Study

The methodology followed to identify core competences of ESCA appears similar to the WSSC case study. However, further progress is witnessed. Firstly, the analysis of ESCA involves examining the relationship between resources and capabilities and the contribution made by tangible and intangible assets towards capabilities. This is critical to evaluate the structure of core competences in a later stage of the integrated framework. Secondly, the AHP technique followed by sensitivity analysis is conducted at the key capabilities determination stage providing more robust and reliable results.

5.13 Summary

The core competence framework is firstly implemented at the top organisational management level of ESCA. Two core competences, as a result, are identified; namely R & D and Electricity supply management, and subsequently subjected to further assessment. Accordingly, the managers relevant to these core competence areas were contacted to participate in the second stage of the identification framework. Whilst the results of implementing the integrated framework demonstrate that no sub-core competences are recognised within the R & D area, two core competences are identified within the Electricity supply area, which are Testing, and On-time repairing. The author considers the importance of implementing the framework at a lower management level because core competence is a collective learning that integrates and is explored through all levels of the organisation. The top management concerns with corporate strategy, whereas lower management focuses on activities and functions to achieve the business strategies and therefore as emphasised by (Gilgeous and Parveen, 2001) there is a need to link the strategies, activities, and functions within a congruent hierarchy.

The results of the analysis were verified by the management of the company and some conclusions drawn. Overall, ESCA requires reviewing its performance within the R & D area as no sub-core competences were recognised, despite being one of the company's core competences at the top management level. On the other hand, capabilities of Electricity supply management need to be further exploited and invested in to enhance its strategic role in the company's business and protect its competitive position. For instance, the management of this area necessitate dictating more resources and flexible routines to the Monitoring and control operational capability to support this area's significant contribution to ESCA.

Ch. Six: Evaluating Individuals' Competencies

6.1 Introduction

This Chapter focuses on evaluating individual's competencies. As explained earlier in Sections 2.11 and 2.12, the corner stone for this goal is the (CIPD, 2004) framework. Three main stages are undertaken to pave the way to link the relevant individuals' competencies with the identified core competences. First, the composition of core competence in terms of human, organisation, and technological contributions is assessed. Second, the organisational competences are differentiated and prioritised with respect to the individuals' competencies impact. Finally, the most appropriate individuals' competencies linked with identified core competences are determined. In the latter two stages, a pair-wise comparison adopted from Whiddett and Hollyforde, 1999 is conducted. Two case studies, which are WSSC and ESCA, are presented and discussed using subjective value assessment.

6.2 Organisational Competences Composition of WSSC

As explained earlier (Sections 2.11 and 2.11.1), this research assumes that competence is a combination of (tangible and intangible) assets formed by human, organisational, and technological contributions. Such contributions are largely influenced by the nature of organisational competence and essential for understanding its make up. In this task the interviewee is asked to evaluate the composition of the organisational competences of WSSC in terms of these dimensions. Five competences of WSSC are assessed by assigning a percentage value for each contribution as seen in Table 6.1.

Competence	Human contribution	Organisational contribution	Technological contribution	Total 100%
Exploration & excavation	40	10	50	100%
Continuous water supply	25	25	50	100%
Secure network	40	20	40	100%
Water quality tests	35	20	45	100%
Disinfectant processes	40	20	40	100%
Average	***36***	***19***	***45***	

Table 6.1: The composition of WSSC's organisational competences.

Table 6.1 presents the structure of WSSC's five organisational competences in terms of human, organisational, and technological contributions. On average, the technological contribution individually forms 45% of the organisational competences; followed by human and organisational contributions constituting 36% and 19% respectively. However, the sum of average human and organisational together contributes to 55%. In particular, Secure network, and Water quality tests, as WSSC's core competences, appear to be dominant individuals' competencies (60% and 55% respectively).

6.3 Individuals' Competencies Contribution of WSSC

This author believes that individuals' competencies play an indispensable role in achieving the company's business objectives and have a major impact on the organisational competences. In this section, the impact of individuals' competencies on organisational competences is evaluated. As explained earlier in Section 2.10, this is performed through a pair-wise comparison amongst the organisational competences with respect to individuals' competencies contribution. A key question (See Table 6.2) is asked to the interviewee: *"On which of these competences do individuals' competencies have the most influence and contribution?"* Using Whiddett and Hollyforde's 1999 criterion (See Section 3.8.2), the scale of the evaluation process is a complementary value of (2). The score ranges between (0 and 2) where (2) means one competence is relatively "more" influenced than the other; (1) indicates relatively "equal" importance of individuals' competencies influence, whilst (0) refers to "no impact" of individuals' competencies on organisational competences. The method of comparison is designed to compare the competences in columns against competences in rows and assign an individual relevant score and so on. Diagonal cells are shaded because a competence cannot be compared with itself. The total scores of each competence are accumulated to assess their differentiations and prioritisation in terms of individuals' competencies impact. More explanations regarding the applied pair-wise comparisons (at this stage and for linking individuals' competencies to core competences) are provided in Table 6.2 which gives the overall results of investigating the relative impact of individuals' competencies on organisational competences.

Question: On which of these competences do individuals' competencies have the most influence and contribution?					
	Exploration and excavation	Continuous water supply	Secure network	Water quality tests	Disinfectant processes
Exploration and excavation		0	2	1	2
Continuous water supply	2		2	2	2
Secure network	0	0		1	0
Water quality tests	1	0	1		0
Disinfectant processes	0	0	2	2	
Total Score	**3**	**0**	**7**	**6**	**4**

(Score: More important=2, Equally important=1, Less important=0).

Table 6.2: Assessing the contribution of individuals' competencies on WSSC's organisational competences.

It can be seen from Table 6.2 that individuals' competencies have relatively the most influence on the Secure network as it secures a score of (7), followed by Water quality tests with a score of (6). This result is an enthusiastic conclusion as these two areas are WSSC's core competences, and subsequently, it supports the research assumption that core competence is potentially linked with individuals' competencies.

6.4 Linking Individuals' Competencies to WSSC Core Competences

The final task is to specify the appropriate set of individuals' competencies that would match with identified organisational core competences. Again, a pair-wise comparison amongst the seven individuals' competencies proposed by the CIPD (2004) competency framework is conducted with respect to each core competence. The evaluation process is undertaken using the same range of scores applied in the previous task (Section 6.3). This is presented by asking the interviewee to prioritise the relative importance of each pair of individuals' competencies with regard to the identified core competence. The final results of comparison analysis showing the relative importance of individuals' competencies associated with core competences are shown in Tables 6.3 and 6.4.

Core Competence: Secure network							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P &O
Team Orientation (TO)		0	1	1	1	2	1
Communication Skills (CS)	2		1	2	1	1	2
People Management (PM)	1	1		1	0	1	1
Customer Focus (CF)	1	0	1		0	1	1
Results Orientation (RO)	1	1	2	2		1	1
Problem Solving (PS)	0	1	1	1	1		1
Planning and Organising (P&O)	1	0	1	1	1	1	
Total Score	**6**	**3**	**7**	**8**	**4**	**7**	**7**

(Score: More important=2, Equally important=1, Less important=0).

Table 6.3: The relative importance comparison between individuals' competencies against the Secure network core competence.

Table 6.3 shows that Customer Focus competency secures relatively the highest value (8) with respect to the Secure network core competence. People Management, Problem Solving, and Planning and Organisation score comparable values (7).

Core Competence: Water quality tests							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation		0	0	2	1	1	1
Communication skills	2		1	2	1	2	1
People management	2	1		2	1	1	1
Customer focus	0	0	0		1	1	1
Results orientation	1	1	1	1		1	1
Problem solving	1	0	1	1	1		1
Planning and organising	1	1	1	1	1	1	
Total Score	**7**	**3**	**4**	**9**	**6**	**7**	**6**

Table 6.4: The relative importance comparison between individuals' competencies against the Water quality tests core competence.

Similarly, for the Water Quality Tests competence, Customer Focus secures a score of (8) and becomes relatively the most important competency needed to maintain this organisational competence. Team Orientation and Problem Solving, in turn, both score (7) and are considered the next most important competencies. A common element for the analysis of both core competences is that Customer Focus is the first relatively important competency and Communication Skills, on the contrary, appears to be relatively the lowest. In brief, the evaluation confirms that Customer focus, Problem solving, and Planning and organising are relatively the most related individuals' competences for both core competences.

6.5 Lessons from WSSC

The assessment reveals that the core competence of WSSC is composed of human, organisational, and technological competences. The technological aspect is considerable; however, individuals' competencies in the forms of human and organisational play key roles. The contribution made by individuals' competencies on organisational competences is considerably varied. Interestingly, core competences are primarily influenced by individuals' competencies impact. This can be attributed to the fact that they necessitate more human control and organisational processes to monitor the quality of water under the stringent government supervision, compared with the other competences (Exploration and excavation, and Continuous water supply).

The seven examined individuals' competencies were prioritised with respect to both core competences. Similar outcomes emerged. Customer focus is the most relative important competency to develop the identified core competences due to the significance of the product (water) and services (sewerage) for customers' satisfaction. The qualitative subjective value analysis may have an impact on such a similarity.

6.6 Core Competences Composition of ESCA

As with the other case studies, the interviewee was informed by the outcomes of the first part of the questionnaire, and subsequently asked to evaluate the contributions made by human, organisational, and technological elements. Core competences of ESCA (On-time repairing and Testing) were identified in Chapter Five (Section 5.11).

Table 6.5 summarises the composition of Electricity supply management core competences in terms of human, organisational, and technological contributions. As human and organisational contributions are considered under individuals' competencies, they are distinguished by shaded colour in Table 6.5.

Core Competence	Human contribution	Organisational contribution	Technological contribution	Total %
On-time repairing	70	20	10	100
Testing	50	10	40	100

Table 6.5: The composition of Electricity supply management core competence.

As can be seen in Table 6.5, the majority of the On-time repairing core competence content is made up of human competencies and organisational competences, whereas human and organisational contributions constitute about 60% of the Testing core competence. This illustrates that core competence is linked with individuals' competencies and is largely influenced and driven by the individuals' competencies contribution.

6.7 Individuals' Competencies Contribution of ESCA

In this section, the impact of individuals' competencies on organisational competences of ESCA is evaluated using a pair-wise comparison. Table 6.6 presents the results of this exercise.

Question: On which of these competences do individuals' Competencies have the most influence and contribution?			
	Monitoring and control	Testing	On-time Repairing
Monitoring and control		1	1
Testing	1		1
On-time repairing	1	1	
Total Score	***2***	***2***	***2***

(Score: More important=2; Equally important=1; Less important=0).

Table 6.6: Assessing the contributions of individuals' competencies on Electricity supply management organisational competences.

In contrast with the results of WSSC discussed earlier (See Section 6.3), the assessment of ESCA shows no differentiation with respect to the influence of individuals' competencies amongst its organisational competences. The total scores of each competence equal (2) (See Table 6.6) indicating interestingly that the influence and contribution of individuals' competencies on the organisational competences is relatively equivalent. The present author recognises that the results of assessing the individuals' competencies contribution on organisational competences for WSSC are more consistent compared with ESCA. This may be partly attributed to the fact that the number of evaluated organisational competences for WSSC is more than those related to ESCA (5 and 3 respectively). However, this author would suggest that although the pair-wise comparison approach works effectively to evaluate upon which organisational competences the individuals' competencies have more influence, the scale of judgement (0-2) points seems to be restricted and inflexible to deliver more precise results.

6.8 Linking Individuals' Competencies to ESCA Core Competences

As was seen earlier in Section 5.11, core competences of ESCA are Testing, and On-time repairing. It is intended in this final stage to determine the most appropriate related individuals' competencies out of the CIPD (2004) competencies portfolio using the approach introduced by Whiddett and Hollyforde, 1999 (Section 3.8.2). Table 6.7 summarises the final results of evaluating the individuals' competencies to be linked with Testing, whereas Table 6.8 shows results for On-time repairing. Appendix H gives more details with this regard.

Core Competence: Testing	
Individual Competency	**Total Score**
Team orientation	10
Communication skills	8
People management	8
Customer focus	4
Results orientation	3
Problem solving	3
Planning and organising	6

Table 6.7: The prioritisation process of individuals' competencies against the Testing core competence.

Table 6.7 illustrates that with respect to core competence Testing, the most relative important competencies are Team orientation, Communication skills, and People management as they score 10, 8, and 8 respectively. Planning and organising scores a relatively moderate score of 6). On the other hand, with respect to On-time repairing core competence (See Table 6.8), Team orientation secures, by far, the highest respective score (11). Subsequently, the analysis demonstrates that Planning and organising with a relative score of 8 is the second most important competency. Results orientation, in addition, can be considered moderately important with a score of (6).

Core Competence: On-time Repairing	
Individual Competency	**Total Score**
Team orientation	11
Communication skills	4
People management	4
Customer focus	4
Results orientation	6
Problem solving	5
Planning and organising	8

Table 6.8: The prioritisation process of individuals' competencies against the On-time repairing core competence.

6.9 Lessons from the ESCA Case Study

The analysis illustrates that the core competence of ESCA is a blend of human, organisational, and technological competences with different shares. It shows that the core competences of ESCA are largely driven by individuals' competencies contribution (See Table 6.5). The contribution made by individuals' competencies on organisational competences tends to be comparable. Nevertheless, the related individuals' competencies for core competences have different outcomes. For instance, Team orientation stood out to be relatively the most important competency for both Testing and On-time repairing. That is because the nature of these areas requires collective work and effective co-operation of skilled teams of employees to ensure a high quality of services to safe electricity supply. However, irrespective of the position of Team orientation, the relative priorities of the other six competencies are considerably different. For instance, whilst the Communications skills and People management competencies came out relatively as the second most important with regard to Testing, they were the lowest with respect to On-time repairing. In addition, although Planning and organising appears to be the second most important competency to develop On-time repairing, it is rated fourth for Testing. In summary, compared with WSSC, the assessment of ESCA implies that each core competence has its own distribution of the most relative important individuals' competencies.

6.10 Summary

This Chapter established a ground to extend the Hafeez *et al.*, (2002a-c) core competence identification framework at the individuals' competencies level. Two case studies were analysed and discussed. Three main goals were met. First, the composition of core competence in terms of human, organisational, and technological contributions were evaluated. The analysis of WSSC case study shows that the composition of its core competences tends to be relatively similar. However, the human and organisational contributions are slightly greater than the technological share. On the other hand, with regard to ESCA, the composition of core competences is more comparable. The human and organisational contributions are dominant.

Second, the relative influence and impact of individuals' competencies on organisational competences were compared and prioritised. Whilst the outcomes of ESCA's study revealed that the impact and influence of individuals' competencies on organisational competences is identical, the results of WSSC appeared different showing the core competences as the most areas influenced by the individuals' competencies role.

Finally, the most appropriate packages of individuals' competencies, derived from the CIPD, (2004) framework, that need to be linked with core competence(s) were determined. Once again, different outcomes between WSSC and ESCA were found. The main conclusion for this task is that for each core competence, there are particular competencies need to be linked. Although both companies are from same sector (utility), the overall results are rather different. It can be argued that the business strategies and nature of organisational competences may have impact on evaluating the relationship between core competence and related individuals' competencies. For instance, the analysis of ESCA shows that the management considers Team orientation, and Planning and organising as relatively the most important competencies to be linked with both core competences. On the contrary, WSSC puts Customer focus at the top of prioritising the seven tested competencies due to its business goal which is customer satisfaction according to the governmental standards.

Overall, the (0 to 2) scale of pair-wise comparison enabled the author to reach realistic conclusions. However, the results achieved through using this mechanism posed some questions due to the inflexibility of the scale used and relying completely on subjective human evaluation.

Ch. Seven: An Integrated Framework to Link Core Competence and Individuals' Competencies

7.1 Introduction

This Chapter aims to extend and validate the Hafeez *et al.*, (2002a-c) core competence identification framework at the individuals' level. It is devoted to test the proposed integrated framework to identify core competences and their related individuals' competencies using AHP method exclusively at all stages. Compared with (Chapters Four, Five, and Six) where quantitative and qualitative approaches were used, major development can be perceived in this Chapter. Data are collected at all stages of the proposed integrated framework using structured questionnaire-based interviews and are analysed using the AHP to filter out inconsistency and subjective bias, and offset any questionable results. Sensitivity analysis, in addition is further performed for more robust results. In addition, results are validated with management of the presented case study.

7.2 Construction Industry

The integrated framework is implemented in the construction sector using six case studies with different approaches. More details are provided in Appendix O. While being tested in three construction companies at the top two organisational levels, it is applied in the key functional area - construction management - of the CCD case study, the theme of this Chapter.

7.3 Construction Company D (CCD)

CCD is a governmental executive department in charge of all the construction and installation works of historic, heritage, and religious buildings. It works in a highly competitive environment which requires creating state of art designs for particular customers. Three interviews were arranged with the director of the department, who had graduated from a UK university. The purpose of the research and structure of the framework was first introduced and explained during an informal meeting.

7.4 Stage I: CCD Resources and Capabilities Relationships

The CCD director was asked to list the main capabilities that were valuable for the business. Subsequently, he was asked to specify the tangible and intangible assets' contribution towards those capabilities. Nine capabilities were selected, which were understood to contribute relatively the most in order to achieve its business objectives. These are Modern methods of construction, Value added design, Modern style design, Innovative solutions, Cost effective construction, Quality management, Completion on time, Execution to specifications, and Safety and environment applications. Table 7.1 illustrates the contributions of tangible and intangible assets towards the CCD capabilities.

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Modern methods of construction	15	85	100
Value added design	20	80	100
Modern style design	15	85	100
Innovative solutions	10	90	100
Cost effective construction	20	80	100
Quality management	15	85	100
Completion on time	20	80	100
Execution to specifications	15	85	100
Safety, environment applications	20	80	100
Average	*16.67*	*83.33*	*100*

Table 7.1: The CCD capabilities and their assets' contribution.

As can be seen in Table 7.1, the analysis reveals that CCD's capabilities are largely governed by intangible assets with a percentage of 83.33% leaving a very small proportion to tangible assets (16.67%). The CCD manager interpreted this distinctive feature as symptomatic of having prestige designers and availability of sophisticated information technology combined with a reputable brand in the country.

7.5 Stage II: Determining Key Capabilities of CCD

AHP is used to determine key capabilities out of the mapped valuable capabilities as the framework suggests. All data revealed by the interviewee were documented in the questionnaire and processed using the Expert Choice software to produce key capabilities of CCD. The goal is to evaluate the financial and non-financial contributions made by CCD capabilities to its business performance. The process of determining CCD key capabilities encompass two key stages for evaluating the financial and non-financial performance. This involved designing a typical three-level AHP hierarchical structure for each part.

7.5.1 The Financial Performance Evaluation

The financial evaluation model for CCD is presented in Fig. 7.1. First, with respect to the goal of evaluating the financial performance, a pair-wise comparison between its quantitative measures (sales growth, operating profit, and return on capital employed) i.e. the criteria of the model is conducted using a (1-9) range of values (See Section 3.8.3 for details). Subsequently, a pair-wise comparison amongst CCD's nine capabilities, which are the alternatives of the model, with respect to each criterion is performed. The aim is to demonstrate the relative importance of the key capabilities. All the results of analysing the weights of priorities for financial contributions of capabilities are presented in Tables 7.2, 7.3 and 7.4.

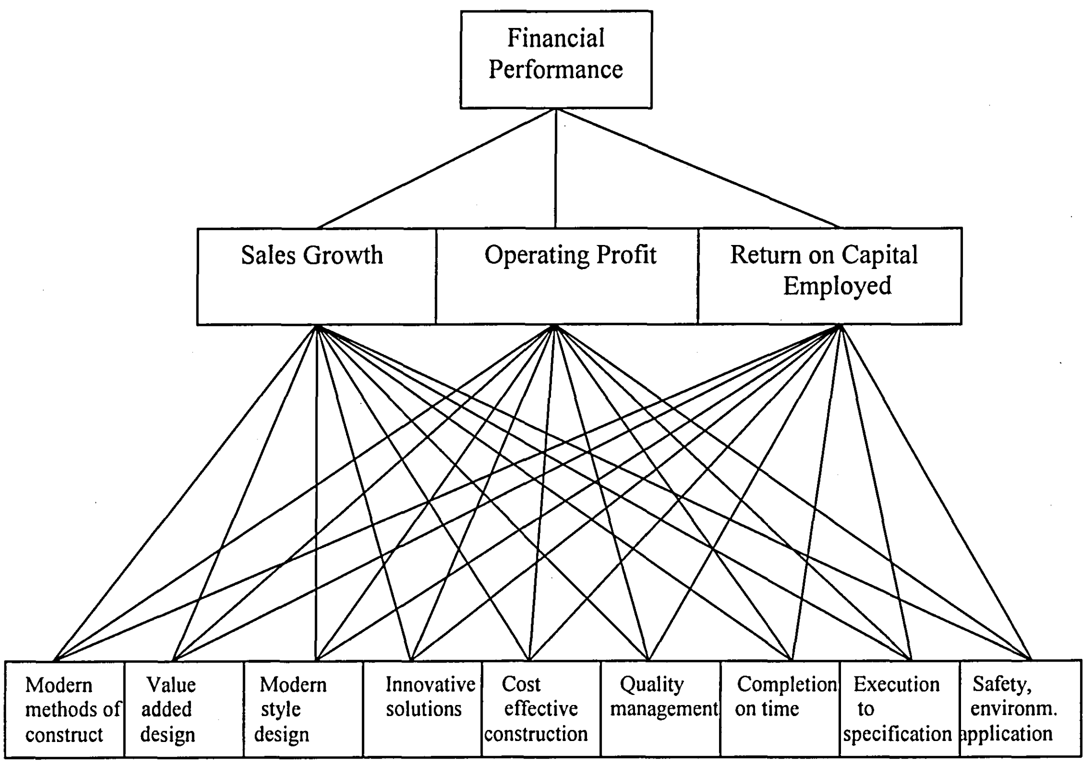


Fig. 7.1: The financial performance evaluation AHP model for CCD.

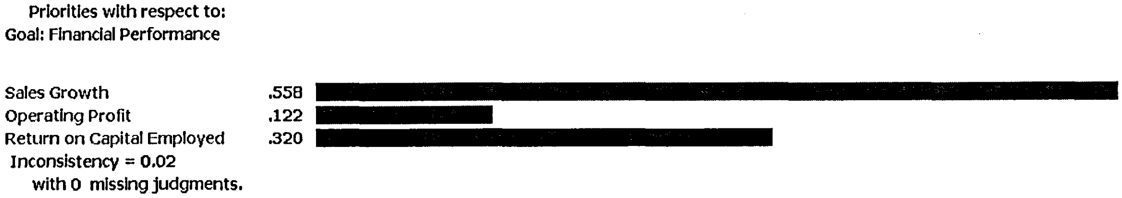


Table 7.2: The priority weights for financial measures.

Table 7.2 illustrates that the Sales growth with a relative weight of (0.558) is comparatively the most important measure against financial performance for CCD's capabilities, followed by Return on capital employed (0.320) and operating profit (0.122). It can be noted that the accumulative weight of both measures (Return on capital employed and Operating profit - 0.442) is less than the relative weight of Sales growth individually, indicating the significance of the latter to the financial performance for CCD. Table 7.2 also reveals that the analysis of pair-wise judgement regarding the financial performance is considerably robust as its inconsistency ratio is 0.02.

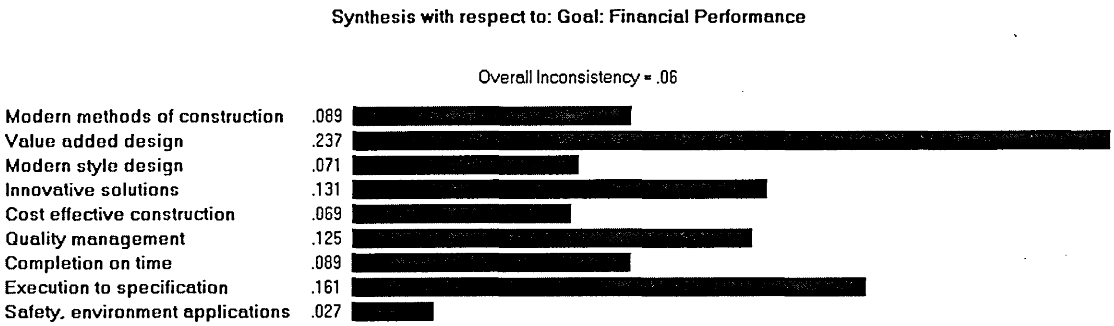


Table 7.3: The priority weights with respect to financial performance for CCD capabilities.

Table 7.3 gives the synthesis results of the financial performance for CCD's capabilities according to the management judgement. The priority weight of each capability with respect to its financial contribution is shown. The results are produced by the EXPERT CHOICE software and randomly presented. Value added design is, by far, relatively the most important capability for CCD with respect to the financial performance evaluation with a priority weight of (0.237). Execution to specifications and Innovative solutions are also relatively important capabilities with priority weights (0.161 and 0.131 respectively). The overall inconsistency ratio (0.06) is within the acceptable range as it is less than 0.10. In addition, the results are considered logical and consistent (Expert Choice, 2002) as there are no missing judgements i.e. with 0 missing judgements (See Table 7.2). Further details regarding the overall analysis of CCD financial performance is presented in Table 7.4.

Capability	Financial Performance			Overall weights
	Sales growth (0.558)	Operating profit (0.122)	Return On Capital Employed (0.320)	
Modern methods of construction	0.089	0.143	0.070	0.089
Value added design	0.265	0.229	0.203	0.237
Modern style design	0.068	0.095	0.067	0.071
Innovative solutions	0.123	0.085	0.156	0.131
Cost effective construction	0.072	0.050	0.072	0.069
Quality management	0.131	0.101	0.127	0.125
Completion on time	0.099	0.063	0.084	0.089
Execution to specifications	0.125	0.204	0.196	0.161
Safety, environment applications	0.028	0.031	0.025	0.027

Table 7.4: The financial measures and financial performance of CCD capabilities.

The overall synthesis weights of capabilities are computed using the Expert Choice software. The formula to calculate the overall weights is as follows:

The overall weights of capability= $\sum$priority weight of capability $\times$ weight of criterion.

The overall weight of financial contribution made by Completion on time capability, for example, can be expressed in this way:

$0.099 \times 0.558 + 0.063 \times 0.122 + 0.084 \times 0.320 = (0.089)$ - as seen in Table 7.4.

7.5.2 The Non-financial Performance Evaluation

A similar procedure to evaluate the financial performance for CCD capabilities is followed to assess the non-financial performance. Consequently, an AHP model, in which the goal is the non-financial performance; the criteria are the non-financial qualitative measures (customer satisfaction, market share, and new product introduction), and the alternatives are the CCD's capabilities, is constructed (See Fig. 7.2). Table 7.5, 7.6, and 7.7, respectively, show the non-financial contributions made by capabilities of CCD.

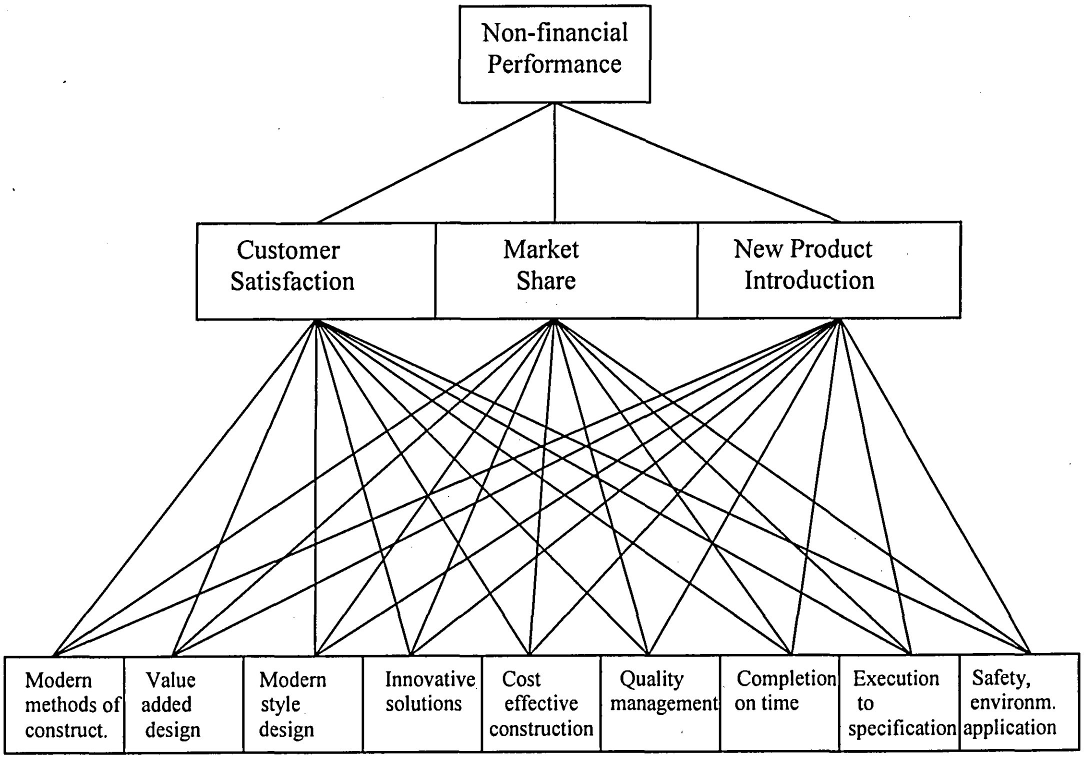


Fig. 7.2: The non-financial performance evaluation AHP model for CCD.

Priorities with respect to:
Goal: Non-Financial Performance

Customer Satisfaction	.352
Market Share	.559
Nwe Product Introduction	.089

Inconsistency = 0.05
with 0 missing judgments.

Table 7.5: The priority weights for non-financial measures.

Synthesis with respect to: Goal: Non-Financial Performance

Overall Inconsistency = .07

Modern methods of construction	.092
Value added design	.175
Modern style design	.079
Innovative solutions	.112
Cost effective construction	.050
Quality management	.114
Completion on time	.095
Execution to specification	.263
Safety, environment applications	.021

Table 7.6: The priority weights with respect to non-financial performance for CCD capabilities.

Capability	Non-financial Performance			Overall weights
	Customer satisfaction (0.352)	Market share (0.559)	New product introduction (0.089)	
Modern methods of construction	0.050	0.121	0.069	0.092
Value added design	0.156	0.183	0.195	0.175
Modern style design	0.081	0.083	0.051	0.079
Innovative solutions	0.151	0.085	0.130	0.112
Cost effective construction	0.059	0.047	0.041	0.050
Quality management	0.123	0.102	0.151	0.114
Completion on time	0.162	0.059	0.057	0.095
Execution to specifications	0.197	0.300	0.295	0.263
Safety, environment applications	0.023	0.021	0.011	0.021

Table 7.7: The non-financial measures and non-financial performance of CCD capabilities.

Tables 7.6 and 7.7 demonstrate that the Execution to specifications capability - the second relatively important one for CCD's financial performance - becomes relatively the most important capability with an overall relative weight of 0.263 with respect to non-financial performance. Compared with the financial performance evaluation (Table 7.4), the priority of Execution to specifications capability changes places with Innovative solutions, and similarly the rank of Quality management capability is exchanged by Innovative solutions. It is interesting, however, to note that the most important capabilities for both financial and non-financial contributions are the same candidates, namely, Execution to specifications, Value added design, Innovative solutions, and Quality management.

7.5.3 Key Capabilities of CCD

In order to isolate and determine the key capabilities of CCD, the overall synthesis weights of financial and non-financial contributions are presented in one matrix (See Table 7.8). The financial and non-financial performance evaluation simultaneously reveals that the most important capabilities are the same regardless of their relative priorities. These are Value added design, Execution to specifications, Innovative solutions, and Quality management (See Table 7.8).

Capability	Financial Weight	Non-financial Weight
Modern methods of construction	0.089	0.092
Value added design	0.237	0.175
Modern style design	0.071	0.079
Innovative solutions	0.131	0.112
Cost effective construction	0.069	0.050
Quality management	0.125	0.114
Completion on time	0.089	0.095
Execution to specifications	0.161	0.263
Safety, environment applications	0.027	0.021
Mean value	***0.111***	***0.111***

Table 7.8: Evaluation of financial and non-financial performance of CCD capabilities.

Candidates for key capabilities are those capabilities with scores ≥ the mean value for respective financial and non-financial measures. It can be seen in Table 7.8 that there are four key capabilities that have secured values ≥ 0.111 and are therefore considered as key capabilities based on the results produced by the software. These key capabilities (distinguished by shaded areas in Table 7.8) are Value added design, Innovative solutions, Quality management, and Execution to specifications. The key capabilities of CCD are also determined using the Minitab programme to enhance the results delivered by the matrix presented in Table 7.8. All capabilities are plotted in a two-dimensional diagram called a key capability zone (See Fig. 7.3) where key capabilities can be clearly recognised. The boundaries of the key capability zone are the mean values of financial and non-financial measures (Table 7.8).

Figure 7.3 shows the location of the key capabilities zone and the capabilities that occupy this zone. The key capability area is defined by all the values ≥ 0.111, which is the mean value for both the measures. As a result, Fig. 7.3 confirms that CCD has four key capabilities which are Value added design, Innovative solutions, Quality management, and Execution to specifications.

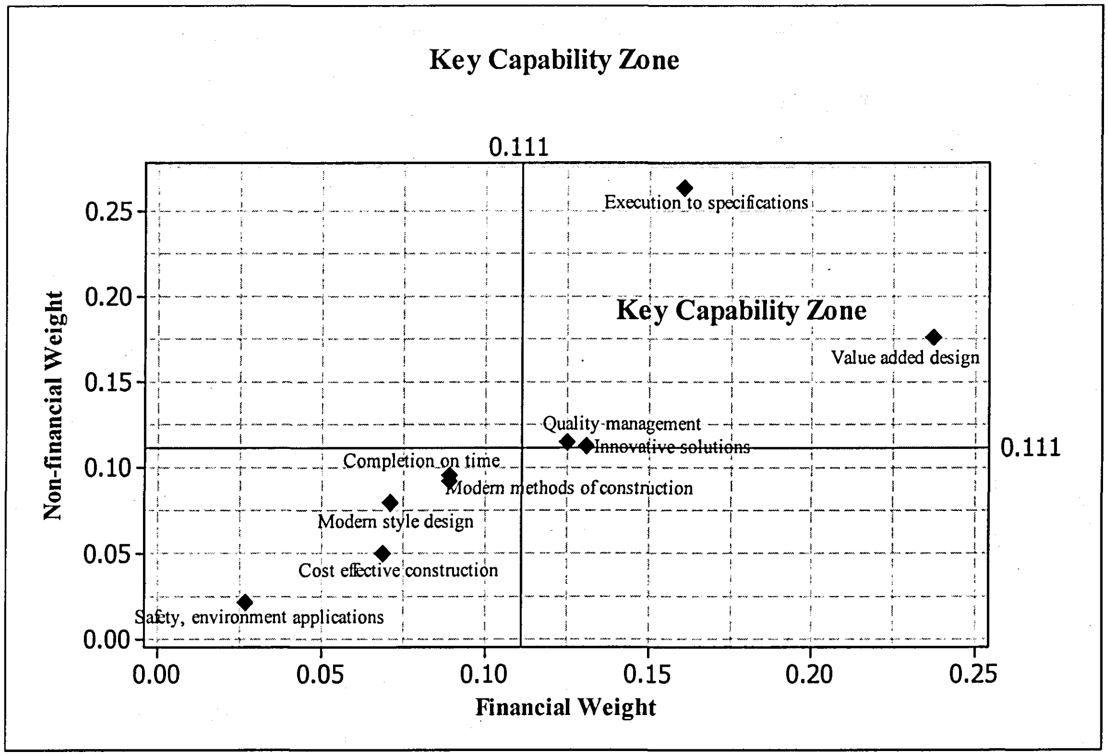


Fig. 7.3: Determination of key capability zone using Minitab programme.

7.6 Sensitivity Analysis of Financial Performance Measures

As explained earlier in Section 3.8.5, sensitivity analysis is performed to test the response of the key capabilities results to manipulation of relative importance and preferences in the pair-wise comparison. The aim of this test is to examine the sensitivity for robustness of key capabilities candidates against the biases in the subjective analysis. The priority weights of the financial and non-financial measures were tested for ± 50% variation, and consequences of these changes are studied to see if there is any change to the analysis of capabilities of CCD. The priority weights were determined for the financial measures as 0.558 for Sales Growth; 0.122 for Operating profit; and 0.320 for Return on Capital employed. Every financial measure is presented by sensitivity graphs showing its actual value and then followed by + 50% and − 50% variations.

7.6.1 Sensitivity Analysis of the Sales Growth Measure

Fig. 7.4 shows the sensitivity graph for Sales Growth measure in which a vertical solid line refers to the actual priority of this attribute of (0.558). Every capability crosses the vertical line at a particular position indicating its priority weight with respect to Sales

Growth. It can be seen that Value added design, Quality management, Execution to specifications, and Innovative solutions, respectively are the relatively important candidates for key capabilities against Sales Growth. For a + 50% change in the priority weight of Sales Growth (i.e. 0.837), which is illustrated by a vertical dotted line, it can be noted in Fig. 7.5 that there is no change in the candidates of key capabilities, however, the priorities of Quality management and Innovative solutions are changed. On the other hand, for a −50% change in the priority weight of Sales growth (i.e. 0.279), it can be noted that the order of priority weights of key capabilities remains unchanged (See Fig. 7.6). This result suggests that the four evaluated key capabilities candidates are robust for the Sales growth measure.

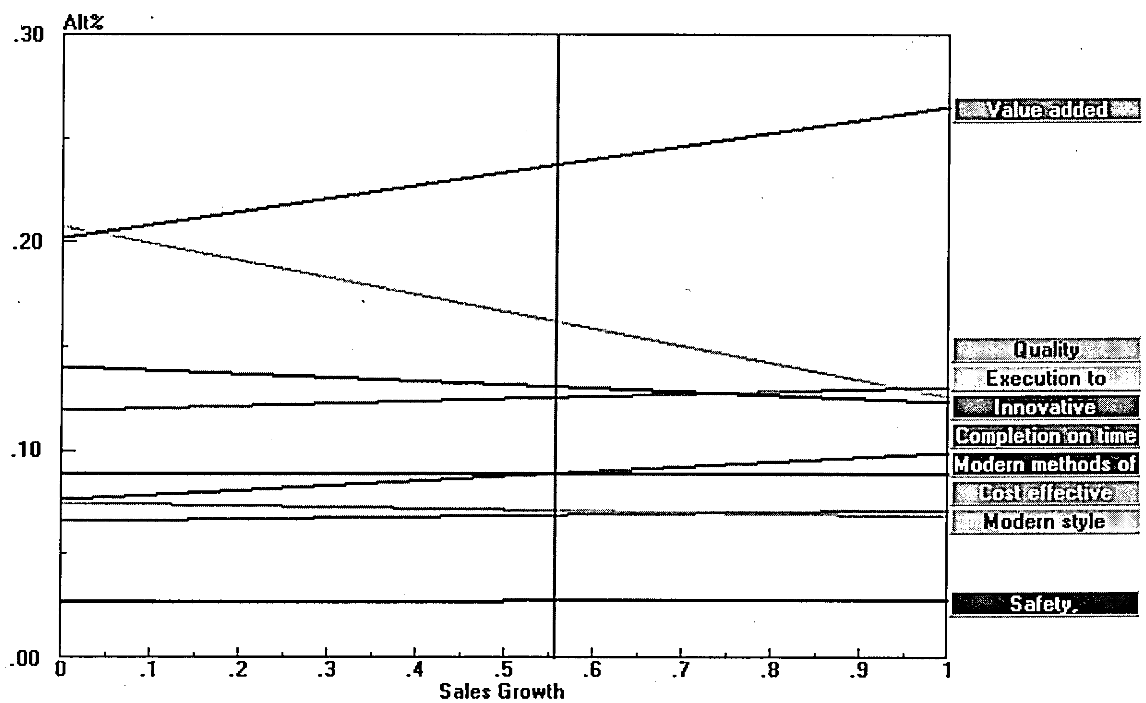


Fig. 7.4: The sensitivity graph with respect to the actual value of Sales growth priority.

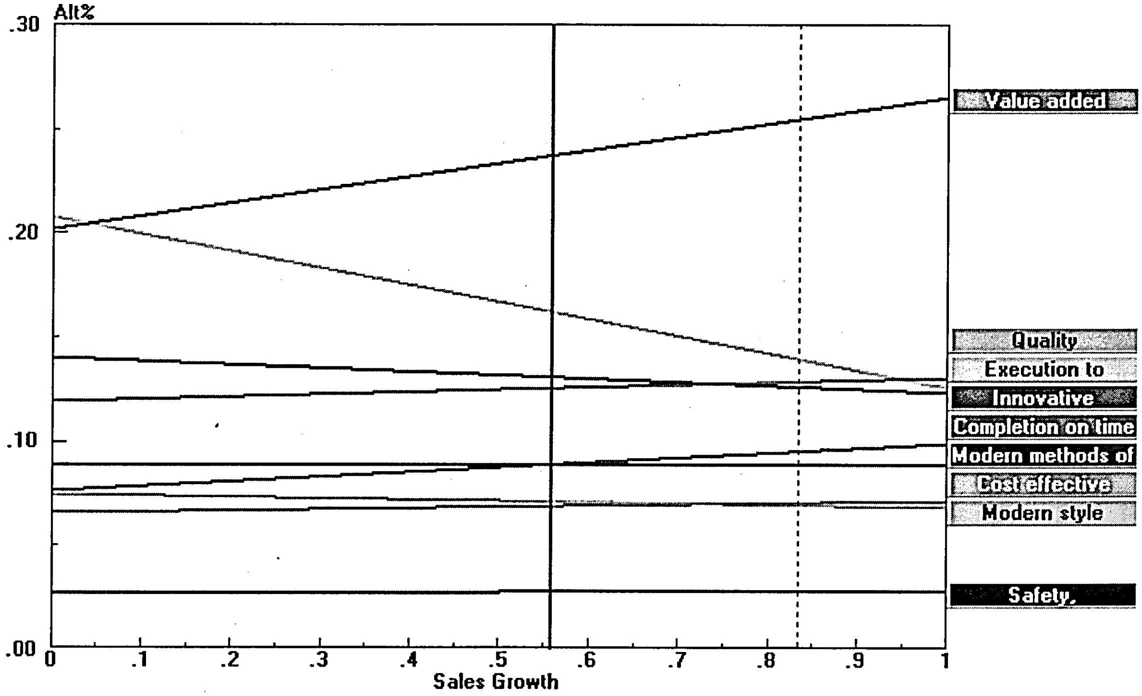


Fig. 7.5: The sensitivity graph with respect to changing the priority of Sales growth by +50%.

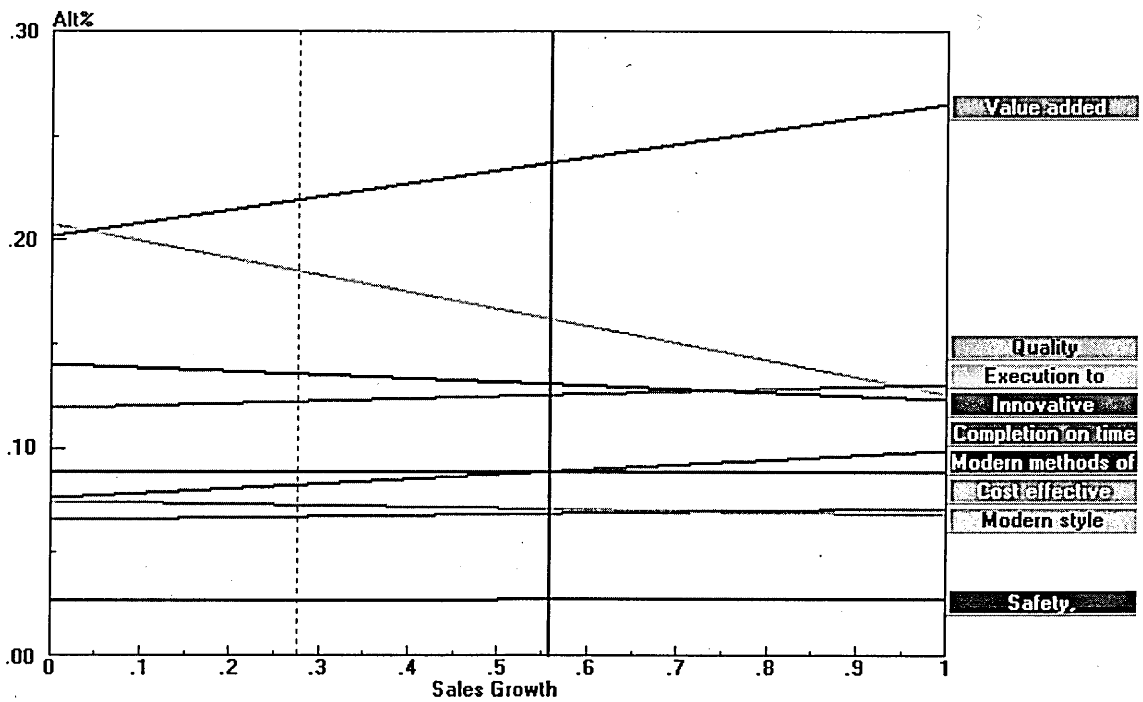


Fig. 7.6: The sensitivity with graph respect to changing the priority of Sales growth by −50%.

7.6.2 Sensitivity Analysis of the Operating Profit Measure

A similar sensitivity analysis is conducted for Operating profit measure (See Figures 1, 2, and 3 in Appendix J). With an actual priority weight (0.122) for this measure, four key capabilities candidates, namely, Value added design, Execution to specifications, Modern methods of construction, and Quality management respectively are determined. These key capabilities candidates against Operating profit remain unchanged as no impact occurs to the order neither for +50% nor for −50%. This reveals that the capabilities alternatives are not sensitive to this scale of change.

7.6.3 Sensitivity Analysis of the Return on Capital Employed (ROCE) Measure

For the Return on capital employed measure with an actual value (0.320), four key capabilities candidates are determined which are Value added design, Execution to specifications, Innovative solutions, and Quality management respectively (See Figures 4, 5, and 6 in Appendix J). For a variation of +50% to the actual value, there is no change to the key capabilities candidates. However, for a −50% change, the Innovative solutions capability, positioned in the third place, is replaced by Quality management to be the fourth in priority weight. Figure 6 in Appendix J shows that the priority order of key capabilities candidates with respect to ROCE is sensitive to a change of ≤60%.

7.7 Sensitivity Analysis of Non-Financial Performance Measures

As was done in Section 7.6, the three non-financial measures (Customer satisfaction, Market share, and New product introduction) are subject to sensitivity analysis. The priority weights are determined as 0.352 for Customer satisfaction; 0.559 for Market share; and 0.089 for New product introduction. These measures are tested for a ± 50% variation, and consequences of these changes are studied to ascertain whether there is any change to the analysis of capabilities of CCD.

7.7.1 Sensitivity Analysis of the Customer Satisfaction Measure

The sensitivity graphs for Customer satisfaction are illustrated in Figures 7, 8, and 9 in Appendix j. The most relatively important capabilities are Execution to specifications, Value added design, Quality management, and Innovative solutions, respectively. In summary, when the priority weight of this measure (0.352) is changed to (0.528) (i.e. + 50% change), the position of Quality management capability is exchanged with Innovative solutions. However, for − 50% the fourth capability in preference, namely, Innovative solutions is replaced by Modern methods of construction, which was never one of the four most important capabilities against the financial and non-financial measures.

7.7.2 Sensitivity Analysis of the Market share Measure

The Market share measure secures the highest relative priority weight (0.559) for the non-financial measures. The four most relatively important capabilities against Market share measure are Execution to specifications, Value added design, Quality management, and Innovative solutions, respectively. These capabilities remain the most relatively important even if the priority weight of Market share is decreased to (0.280: i.e. − 50%). However, for + 50% (i.e. 0.839), although Execution to specifications and Value added design still occupy the top two places respectively, Innovative solutions capability is replaced by Modern methods of construction indicating that Market share measure is sensitive to this scale of change. The graphs of this test are shown in Figures 10, 11, and 12 in Appendix J.

7.7.3 Sensitivity Analysis of the New product introduction Measure

The final sensitivity analysis with respect to non-financial performance is performed for the New product introduction measure. Its actual priority weight (0.089) is the lowest. The most four relatively important capabilities against the Market share measure at its actual value are Execution to specifications, Value added design, Innovative solutions and Quality management respectively. However, the outcomes of this test regarding key capabilities candidates and their priority weights are slightly different to the other non-financial measures. For instance, Completion on time capability, which never appeared as a key capability candidate for all financial and non-financial measures, secures the fourth relatively important position for a − 50% change to the actual priority weight (See Figures 13, 14, and 15 in Appendix J).

7.8 Stage III: Identifying Competences of CCD

In this stage, the aim is to evaluate the collectiveness and uniqueness of key capabilities in order to determine CCD competences. In contrast to the procedure conducted with the ESCA case study (Chapter Five) in which competence assessment is performed based on subjective value analysis, AHP is used to conduct a pair-wise comparison amongst competence measures and key capabilities of CCD. The present author believes that conducting competence analysis according to merely subjective evaluation may lead to unreliable results.

7.8.1 Collectiveness Evaluation of Key Capabilities

The collectiveness evaluation is conducted by designing a typical AHP model of a three-level hierarchical structure. The model appears to be smaller than the model applied at the key capability stage at the lower level due to the fact that the number of key capabilities is usually less than the number of capabilities. In this model, the goal is collectiveness determination; the criteria are collectiveness attributes (across-function, across-product, across-business); and the alternatives are CCD's key capabilities as shown in Fig. 7.7. The evaluation exercise proceeded at the second level by performing a pair-wise comparison revealed by the management of CCD using a (1-9) scale of related weights offered by the Expert Choice software. Similarly, at the third level, key capabilities of CCD, namely, Value added design, Innovative solutions, Quality management, and Execution to specifications are also compared pair-wise by the management of CCD against each criterion employing the same range of numeric scores. The overall synthesis results of the evaluation task are presented in Tables 7.9 and 7.10.

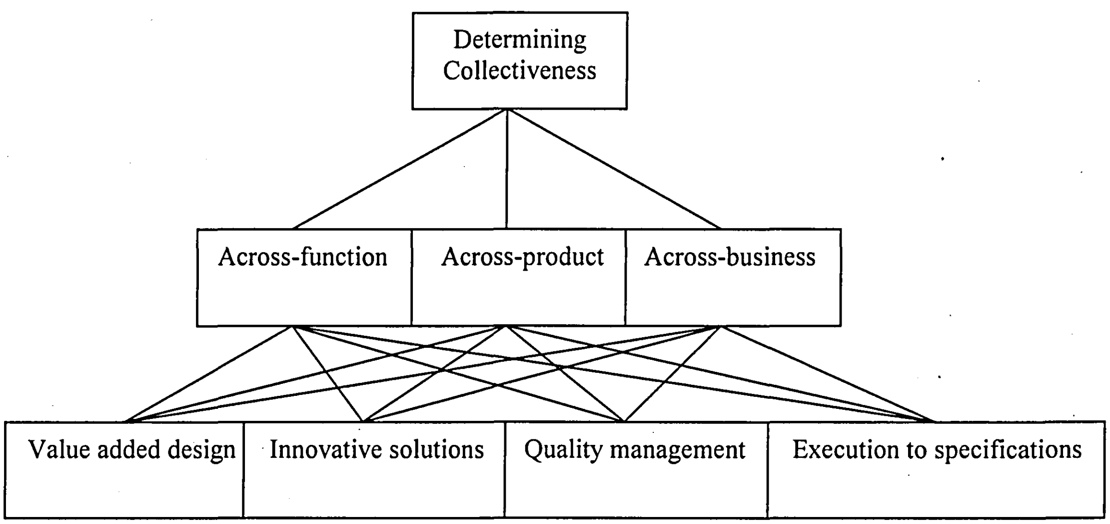


Fig. 7.7: The collectiveness evaluation AHP model for CCD.

Table 7.9 illustrates that, in accordance with the CCD management perception, the results of comparison amongst the collectiveness attributes indicate that across-business is relatively the most important attribute scoring (0.493) regarding the integration of the organisation operations and activities, followed by the across-function attribute (0.311). The Across-product attribute is last with a value of 0.196. This result may be owed to the fact that in the construction industry it is difficult to define the product as a single unit as it can be made up of synergy of operations and combined projects. In addition, the CCD business operates through a wide range of units and locations and this makes the across-business attribute appear at the top of their priorities. Table 7.10 shows also that the overall analysis of collectiveness considers Innovative solutions as relatively the most important key capability with a weight of 0.308 followed by Execution to specifications with 0.295 and Quality management (0.260). Value added design, on the other hand, scored the lowest weight of importance (0.137). This gap is believed to be because the Value added design key capability is limited to particular projects and niche markets. Lastly, as the overall inconsistency ratio (CR) of collectiveness analysis equals 0.05, which is within the acceptable range of data consistency (≤ 0.10) (See Section 3.8.4.4 for details), there was no need to review or amend data.

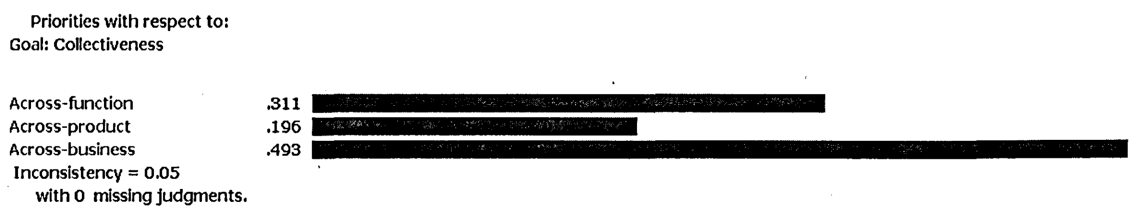


Table 7.9: The priority weights for collectiveness attributes.

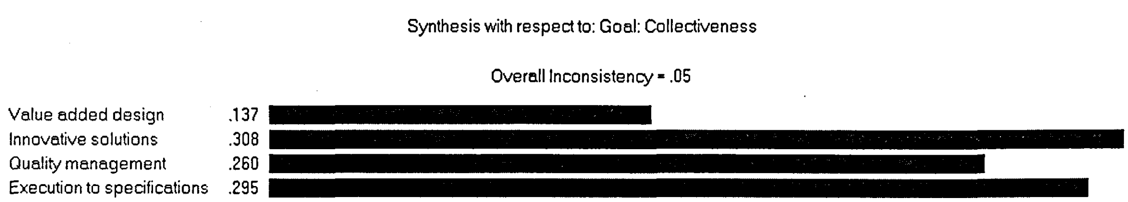


Table 7.10: The priority weights of collectiveness analysis for CCD key capabilities.

7.8.2 Uniqueness Evaluation of Key Capabilities

Using a similar procedure to collectiveness evaluation, uniqueness evaluation is conducted for CCD's key capabilities with the adoption of a comparable three-level AHP hierarchical structure model. The model is formed by considering uniqueness determination as the goal; the attributes of uniqueness (rareness, inimitability, non-substitutability) as the criteria; and CCD's key capabilities as the alternatives (See Fig. 7.8). The interviewee was asked for a subjective priority pair-wise comparison at the second and third levels of the model as was done earlier. So, the three attributes of uniqueness measure are pair-wise compared against the uniqueness determination goal and then the four key capabilities are also pair-wise compared against each attribute.

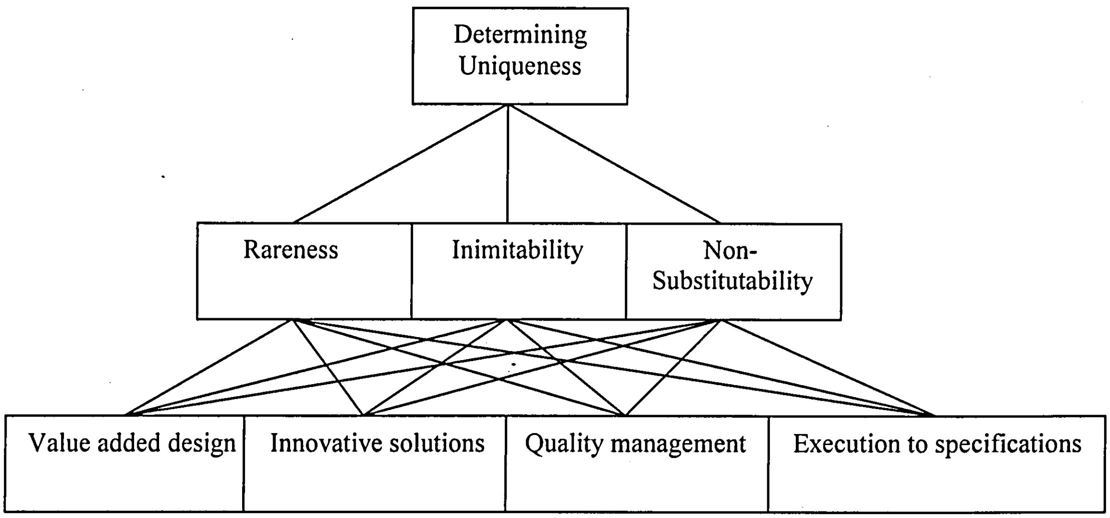


Fig. 7.8: The uniqueness evaluation AHP model for CCD.

The pair-wise comparison of uniqueness attributions evaluation and the overall synthesis results are presented in Table 7.11. Once more, according to the CCD management, the analysis clearly demonstrates that both the Rareness and Inimitability attributes secure the highest weight of relative importance (0.429) and are consequently regarded as more important than the Non-substitutability attribute for CCD's competitiveness. The subsequent assessment of key capabilities against the uniqueness attributions (See Table 7.12) indicates that Execution to specifications scores as relatively the most important key capability with a relative important weight of (0.307). This is followed closely by Innovative solutions as the second important key capability with a preference weight of 0.294. The Value added design and Quality management key capabilities, in turn, score relative weights of 0.249 and 0.151 respectively. Finally, the overall assessment of uniqueness is regarded as reliable as the overall inconsistency ratio of uniqueness synthesis analysis is 0.03 together with zero missing judgements.

Priorities with respect to:
Goal:Uniqueness

Rareness	.429
Inimitability	.429
Non-substitutability	.143

Inconsistency = 0.
with 0 missing judgments.

Table 7.11: The priority weights for uniqueness attributes.

Synthesis with respect to: Goal:Uniqueness

Overall Inconsistency = .03

Value added design	.249
Innovative solutions	.294
Quality management	.151
Execution to specifications	.307

Table 7.12: The priority weights of uniqueness analysis for CCD key capabilities.

7.9 Sensitivity Analysis of Collectiveness

Sensitivity analysis with a ± 50% adjustment is conducted only for the Across-business measures of collectiveness exercise as it is relatively the most important with a relative weight of (0.493) (See Table 7.9). The goal is to evaluate any possible changes on priority weights of CCD key capabilities which represent potential competences. The key capabilities to be studied are Value added design, Execution to specifications, Innovative solutions, and Quality management. The results are summarised in Table 7.13, while the graphs are presented in Appendix J.

Across-business	
Weight of the Measure	The Relative Importance of Key Capabilities
Actual Value (0.493)	**1-Innovative solutions 2-Execution to specifications 3-Quality management 4-Value added design**
+50% Change (0.740)	**1-Innovative solutions 2-Execution to specifications 3-Quality management 4-Value added design**
–50% Change (0.247)	**1- Execution to specifications 2-Innovative solutions 3-Quality management 4-Value added design**

Table 7.13: The outcomes of sensitivity analysis for Across-business.

Table 7.13 shows that the relative importance of key capabilities changes only when the weight of Across-business is decreased by 50%, as Execution to specification key capability replaces the Innovation solutions position. On the other hand, the +50% change causes no impact on the priorities of key capabilities. The analysis reveals that the test is resilient up to a −25% change.

7.10 Sensitivity Analysis of Uniqueness

A similar test with ± 50% changes is performed for Rareness and Inimitability as the most relative important measures for uniqueness with an equal relative weight (0.429) as seen in Table 7.11. It can be noted that the relative importance of key capabilities with respect to uniqueness is different to Collectiveness. They are prioritised as Execution to specifications, Innovative solutions, Value added design, and Quality management, respectively (See Table 7.12).

Rareness	
Weight of the Measure	The Relative Importance of Key Capabilities
Actual Value (0.493)	1- Execution to specifications 2-Innovative solutions 3-Value added design 4-Quality management
+50% Change (0.740)	1- Execution to specifications 2-Innovative solutions 3-Value added design 4-Quality management
−50% Change (0.247)	1- Execution to specifications 2-Innovative solutions 3-Value added design 4-Quality management

Table 7.14: The outcomes of sensitivity analysis for Rareness.

Table 7.14 illustrates that no change occurs to the relative importance of all key capabilities either with a +50% or −50% change to the actual value of Rareness. Further analysis for Inimitability (See Figures 19 - 24 in Appendix J) provides identical outcomes to the Rareness measure test.

7.11 Competences of CCD

The competences of CCD are determined by converting the priority weights of Tables 7.10 and 7.12 into a two-dimension matrix form as shown in Table 7.15. The competences determination process encompasses quantitative assessments throughout particular steps. First, the respective mean values of key capabilities' weights against both competence measures, namely, collectiveness and uniqueness are calculated and used as a standard. The mean is computed by calculating the individual values secured by key capabilities for each criterion and then dividing it by the number of key capabilities. It is assumed that any key capability which has a simultaneous priority weight equal to or higher than the respective mean value of both dimensions can be considered a competence candidate. However, in practice, not all key capabilities would achieve this target and it would not be uncommon to discover a key capability has a value greater than the mean against only one attribute. Subsequently, in such a case, the two mean values are multiplied together as they constitute corresponding theoretical concepts. The resultant value of multiplying the two means represents indeed the total standard contribution of a key capability against its competence evaluation. Therefore, the multiplication rule would be employed if any key capability does not secure a value equal to or greater than the respective mean value of one of the competence attributes.

Key Capabilities	Collectiveness	Uniqueness
Value added design	0.137	0.249
Innovative solutions	0.308	0.294
Quality management	0.260	0.151
Execution to specifications	0.295	0.307
Mean Value	**0.249**	**0.249**

Table 7.15: The competences determination of CCD.

As is seen in Table 7.15, only two key capabilities, namely, Innovative solutions and Execution to specifications secure weights greater than the respective mean values of both attributes of competence and clearly can be deemed as candidates of CCD competences. Quality management, on the other hand, appears to have secured a weight higher than the respective mean value only for collectiveness (0.260), while its weight against uniqueness (0.151) is below the mean value. On the contrary, Value added design met one condition as it secured a weight equals to the uniqueness attribute mean value (0.249). As a result, it is decided to employ the multiplication of respective mean values rule explained earlier to examine whether they can be considered for further analysis. Accordingly, the multiplication value of the mean values for both Quality management and Value added design are calculated and compared with the standard multiplication value for all key capabilities (See Table 7.16).

Key Capabilities	Collectiveness	Uniqueness	Multiplication Value
Value added design	0.137	0.249	0.034
Quality management	0.260	0.151	0.039
Mean Value *(all key capabilities)*	**0.249**	**0.249**	**0.062**

Table 7.16: The multiplication values of potential competences.

It can be seen from Table 7.16, the respective multiplication value for both Quality management (0.039) and Value added design (0.034) are still below the standard multiplication value of all key capabilities of CCD (0.062). This means they may not be considered competences of CCD as such, however, as each one secured a relatively high value for at least one attribute, they are regarded as potential competences of CCD and subjected for further analysis.

7.12 Stage IV: Identifying CCD Core Competences

A similar AHP procedure to competence evaluation is adopted to assess the strategic flexibility of CCD competence in order to isolate core competences from competences. A three-level hierarchical structure AHP model is designed, however, using two attributes; Resource re-deployment and Routines re-organisation. The competences of CCD considered include Value added design, Innovative solutions, Quality management, and Execution to specifications as alternatives as shown in Fig. 7.9. The evaluation process here is performed by conducting a pair-wise comparison amongst the two attributions against the goal strategic flexibility, and similarly amongst the alternatives at the third level. The same scale introduced by Expert Choice software of (1-9) is used for the judgement. The main outcomes of the strategic flexibility analysis are shown in Tables 7.17 and 7.18.

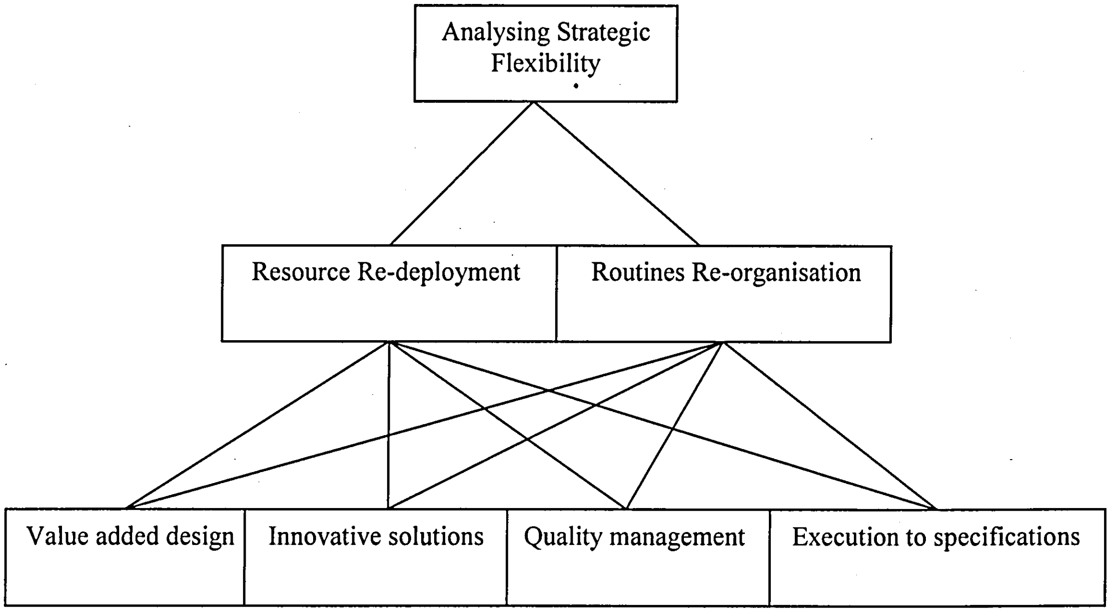


Fig. 7.9: The core competence evaluation AHP model for CCD.

Priorities with respect to:
Goal:Strategic Flexibility

Resource Re-deployment	.667
Routines Re-organisation	.333

Inconsistency = 0.
with 0 missing judgments.

Table 7.17: The priority weights for strategic flexibility attributes.

Synthesis with respect to: Goal:Strategic Flexibility

Overall Inconsistency = .05

Innovative solutions	.335
Execution to specifications	.267
Quality management	.242
Value added design	.156

Table 7.18: The priority weights of strategic flexibility analysis for CCD competences.

Tables 7.17 and 7.18 translate the judgement of CCD management regarding the strategic flexibility evaluation to identify core competences of the organisation. It can be seen that the Resource re-deployment attribute with a preference weight of 0.667 is considered relatively more strategically flexible than Routines re-organisation (0.333). This result was discussed with the management of CCD who confirmed that Resource re-organisation is regarded much more important as a strategic flexibility concept due to their capacity to re-deploy various resources such as within design management to develop new projects and enter further markets. However, in this author's view, as the second level of the strategic flexibility AHP model consists of only two attributes, this may lead to over simplification with regards to the pair-wise comparison to merely one value, and may lead to form considerable difference in the relative priority weights. The results of competences evaluation which is at the lowest level of the model are also presented in Table 7.19. The overall inconsistency ratio of strategic flexibility synthesis analysis is acceptable (0.05).

7.12.1 Core Competences of CCD

Tables 7.16 and 7.17 illustrate the overall contribution made by each competence against the strategic flexibility attributes. The respective mean value is computed to isolate core competences which secure relatively higher weights. Innovative solutions with a preference weight of 0.335 followed by Execution to specifications with 0.267 scored greater than the respective mean value (0.250) and are considered core competences of CCD.

Competence	Strategic Flexibility
Value added design	0.156
Innovative solutions	0.335
Quality management	0.242
Execution to specifications	0.267
Mean Value	**0.250**

Table 7.19: Identifying core competences of CCD.

7.13 Sensitivity Analysis of the Strategic Flexibility Evaluation

As was done earlier, a sensitivity test is performed for the strategic flexibility exercise (See Figures X, Y, and Z in Appendix J). The priority weights for both measures; Resource re-deployment and Routines re-organisation; are calculated. Then, for each measure the relative importance of competences are computed. The relative importance weight of Resource re-deployment (0.667) is double the Routines re-organisation measure (0.333). The main conclusion is that the relative importance of competences remains unaffected for both measures despite a ±50% change. The non-response of competences to such changes confirms the robustness of analysis. The overall results are summarised in Table 7.20.

Resource re-deployment	
Weight of the Measure	The Relative Importance of Competences
Actual Value (0.667)	**1- Innovative solutions 2-Execution to specifications 3- Quality management 4-Value added design**
+50% Change (0.999)	**1- Innovative solutions 2-Execution to specifications 3- Quality management 4-Value added design**
−50% Change (0.333)	**1- Innovative solutions 2-Execution to specifications 3- Quality management 4-Value added design**

Table 7.20: The outcomes of sensitivity analysis for Strategic flexibility.

7.14 Stage V: Linking Organisational Competences and Individuals' Competencies

In the final stage of the integrated framework, the most relevant individuals' competencies are linked with the identified core competences. Three key steps are therefore implemented. First, the composition of core competence in terms of human, organisation, and technological contributions is considered. Second, the organisational competences are differentiated and prioritised according to the influence and contribution of the individuals' competencies. Third, the most appropriate individuals' competencies to be linked with identified core competences are determined. The first step is accomplished by assigning percentage values, whereas the second and third steps are performed using AHP.

7.14.1 Core Competence Composition of CCD

The interviewee was asked to evaluate the composition of CCD core competences (Innovative solutions and Execution to specifications) in terms of human, organisational, and technological contributions. Table 7.21 presents the assessment of CCD management regarding the contents of core competences.

Core Competence	Human contribution	Organisational contribution	Technological contribution	Total %
Innovative solutions	65	10	25	100
Execution to specifications	60	30	10	100

Table 7.21: The structure of CCD core competences.

It is noted from Table 7.21 that there is a significant domination of intangible assets (human and organisational) on the CCD core competences. The share for human and organisational contributions towards Innovative solutions is 75% and for Execution to specifications it reaches 90%. This means that both core competences are highly influenced by individuals' competencies, supporting the hypothesis that organisational core competences are strongly linked with individuals' competencies (Bergenhenegouwen *et al.*, 1996; Godbout, 2000; Gilgeous and Parveen, 2001).

7.14.2 Individuals' Competencies Contribution

It can be seen earlier in Chapter Six that a qualitative subjective value analysis adopting these numeric values (0, 1, and 2) is used to evaluate the individuals' competencies contribution towards organisational competences of ESCA. By contrast, in this case study, all CCD competences are compared in a pair-wise manner to gauge the influence of individuals' competencies, but using the AHP method. This goal is realised by introducing this question to the interviewee: *On which of these competences, do individuals' competencies have the most influence and contribution?* (See Table 7.23). This process is analysed by the Expert Choice programme and a matrix of results is produced (See Table 7.22).

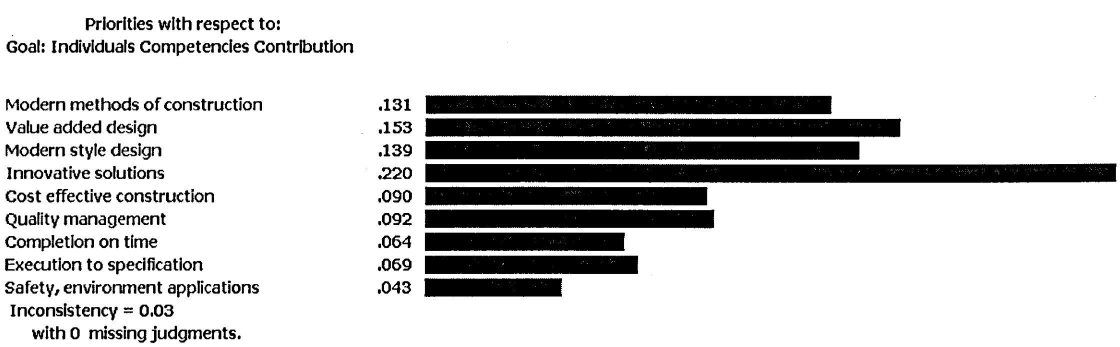


Table 7.22: The priority weights of individuals' competencies contribution on CCD organisational competences.

Table 7.22 shows the relative influence and impact of individuals' competencies on the examined organisational competences of CCD. The outcomes appear consistent as the inconsistency ratio (0.03) lies within the acceptable range without missing judgements.

This table is re-formed by presenting the data in descending order to clearly distinguish the rank of individuals' competencies (See Table 7.23).

Question: On which of these competences do individuals' competencies have the most influence and contribution?	
Competence	Relative Importance
Innovative solutions	0.220
Value added design	0.153
Modern style design	0.139
Modern methods of construction	0.131
Quality management	0.092
Cost effective construction	0.090
Execution to specifications	0.069
Completion on time	0.064
Safety, environment applications	0.043

Table 7.23: Contributions of individuals' competencies towards the organisational competences of CCD.

Table 7.23 gives the relative importance weights of CCD's nine capabilities in a descending order. It can be seen that Innovative solution, with a relative importance of 0.220, is by far the most important organisational competence on which individuals' competencies have a major contribution and impact. Interestingly, the other competence/core competence, namely, Execution to specification achieves a low relative score of (0.069) securing the seventh position in the priority order. This striking point is further discussed in Section 7.15.

7.14.3 Determination of Related Individuals' Competencies

AHP is again used to determine the most relevant individuals' competencies linked with organisational core competences. Therefore, for each core competence, a table, which shows the relative importance priorities amongst the seven tested competencies, is generated by the AHP software. The results of analysis are presented in Table 7.24 and then re-scheduled in Table 7.25 in a descending order.

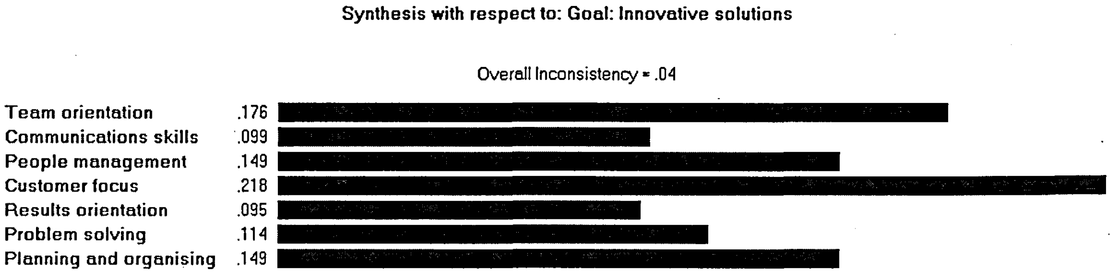


Table 7.24: The priority weights of individuals' competencies on Innovation solution core competence.

Core Competence: Innovative solutions	
Individual Competency	**Relative Importance**
Customer focus	0.218
Team orientation	0.176
People management	0.149
Planning and organising	0.149
Problem solving	0.114
Communication skills	0.099
Results orientation	0.095

Table 7.25: The prioritisation process of individuals' competencies against Innovation solutions core competence

Table 7.25 indicates that Customer focus with a relative importance score of 0.218 is relatively the most crucial underlying competency for the Innovative solutions core competence. Team orientation is the second most important individual competency (0.176) that needs to be associated with Innovative solutions, followed by People management and Planning and organising competencies with an identical ratio of relative importance (0.149).

A similar procedure is conducted with regard to the Execution to specifications core competence as seen in Table 7.26. The seven competencies are headed by Team orientation as the most important competency with a relatively important score of 0.239. Problem solving competency (which showed relatively less importance for Innovation solutions) is considered second for this competence with a score 0.202. People management and Planning and organising competencies interestingly remain in the same position of significance; the third and fourth, respectively. In contrast, the

Customer focus competency is at the bottom of Table 7.27 indicating a low relative importance (0.078) with regards to this competence, despite scoring the top position with respect to the previous core competence; Innovative solutions.

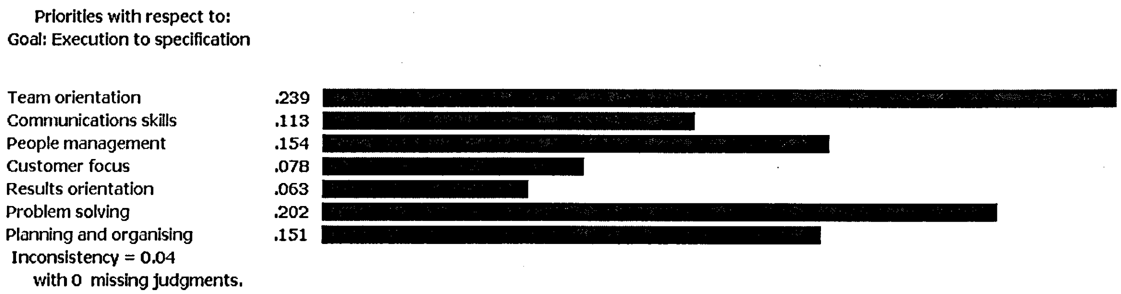


Table 7.26: The priority weights of individuals' competencies on Execution to specifications core competence.

Core Competence: Execution to specification	
Individual Competency	**Relative Importance**
Team orientation	0.239
Problem solving	0.202
People management	0.154
Planning and organising	0.151
Communication skills	0.113
Customer focus	0.078
Results orientation	0.063

Table 7.27: The prioritisation process of individuals' competencies against Execution to specifications core competence.

7.15 Discussion

For the CCD case study, the integrated framework is pursued only at one organisational management level. Two core competences are determined and then evaluated to match their most appropriate individuals' competencies from the proposed seven competencies. The use of AHP methodology at all stages of the integrated framework provided very consistent outcomes. The results of the study were reviewed and validated with the CCD management expectations and a strong congruence was found. In particular, the CCD management perception and conjecture regarding the company's potential core competence, which was provided in the questionnaire, was identical to the outcomes of the study.

The overall analysis reveals that the major contribution towards CCD business performance rests on Innovative solutions and Execution to specifications. They are the most collective key capabilities that govern its internal activities and operations, and also serve as the most unique tools it has against its rivals. In addition, they are the most flexible organisational competences for investing and developing their resources and routines for strategic decisions. Value added design, alternatively, appears to be a potential competence, however, its collectiveness assessment is poor revealing that it does not extend over a wide range of functions and products. Overall, the case study shows that the composition of its capabilities is dominantly governed by intangible assets' contributions.

From Table 7.21 it is clear that CCD's core competences significantly gravitate towards human contribution. However, results of the pair-wise study in Table 7.22 illustrates that the respondent did not feel that individuals' competencies would have any significant impact (score 0.069) for the Execution to specifications core competence. In fact, the Execution to specifications core competence lags behind several organisational competences against this criterion. In addition, there are some competences such as Value added design which are largely dominated by individuals' competencies but not identified as a core competence. One explanation of this could be that although in theory intangible competences are thought to make up the bulk of any organisational competence, however, it is not the only and necessary condition. In this author's view, the nature of business and the type of industry sector may play an important role in this regard. Moreover, the specific goal the management sets for each competence and the role it plays to run its operations and activities and explore its potentials, especially in dynamic business environments (construction industry), may create such contradicting facts. For instance, the CCD management considers the Innovative solutions core competence is largely reliant on individuals' competencies, whilst more usage of tangible assets is needed for Execution to specification. The other possible reason could be attributed to the fact that, unlike the second and third steps, the task of evaluating the composition of core competences was not performed according to AHP where subjective and inconsistent data could emerge.

7.16 Summary

Based on subjective value analysis, nine capabilities were mapped out during a structured interview with CCD senior management. The financial and non-financial contributions of the capabilities towards the organisation's business performance were evaluated using the AHP pair-wise comparison. Only four capabilities scored high weighting values for both measures and consequently are determined as key capabilities. These are Value added design, Innovative solutions, Quality management, and Execution to specifications. Key capabilities, therefore, are evaluated against their collectiveness and uniqueness to determine CCD potential competences candidates. The analysis shows Innovative solutions and Execution to specifications are clearly the CCD organisational competences. Interestingly, while carrying out strategic analysis, they both achieved relative values greater than the respective mean value and qualified as CCD core competences. The outcome was validated and found identical to the management preliminary perception regarding their competitive areas.

In the second key stage of the framework, the impact of individuals' competencies contribution on the core competences was investigated. Individuals' competencies are those particular human skills and knowledge that can enhance core competence development. The AHP was further used to evaluate the most related individuals' competencies based on the CIPD (2004) list of most used competencies. The AHP prioritisation analysis confirms that with regard to Innovative solutions, Customer focus, and Team orientation are the most related individuals' competencies. On the other hand, regarding Execution to specifications, Team orientation, and Problem solving are revealed as the most involved competencies. Interestingly, whilst the Customer focus competency was the second most important regarding Innovative solutions, it secured a low rank against Execution to specifications. This author believes that the proposed integrated framework can help the organisation to explore its potential strength areas to reach its business goals, and highlight the most appropriate individuals' competencies which they need to develop in the immediate future.

Ch. Eight: Discussion, Conclusions and Recommendations

8.1 Introduction

The overall aim of this research was to examine the potential link between organisational core competences and individuals' competencies. To achieve this goal, the research introduced an integrated conceptual framework comprising of two key stages. Firstly, it proposed a structured framework to identify core competences developed by Hafeez *et al.* (2002a-c) using a sequential filtration process for particular building blocks of core competences. Secondly, based on a pair-wise comparison mechanism, particular individuals' competencies were evaluated to map out the most appropriate ones that can be linked to the identified core competences. In this final chapter, the main conclusions and lessons which emerged from the research process are presented and evaluated. In addition, the factors that have an impact on the research process are extensively discussed. Finally, the Chapter ends with an outline of the research limitations and recommendations for future work.

8.2 The Research Map

This thesis is devoted to re-evaluate and extend the Hafeez *et al.* (2002a-c) core competence identification framework by testing it in new industries, namely, construction, utility, energy services, and manufacturing. Once core competences are identified, the most appropriate related individuals' competencies are highlighted within an integrated framework. This research proceeded with reviewing literature on core competence with a primary focus on previous work conducted on the Hafeez *et al.* (2002a-c) framework. At this stage, a pilot case study was conducted on Celltech - a global pharmaceutical company - based on secondary data to examine the architecture of the framework. Subsequently, a combined methodology of case study and postal questionnaire-based survey was implemented to develop and evaluate the proposed integrated framework to link the most appropriate related individuals'.competencies with the identified core competences.

It is critical to indicate that the research was accomplished using two paradigms to collect data. Firstly, it adopted a subjective value analysis approach based on using a weights and scores method for all the stages of the framework. Secondly, it used the Analytical Hierarchy Process technique (AHP) with different extents of application. The first method was used for the pilot case study in addition to specific case studies (Chapters Four, Five, and Six), whereas the latter was implemented for the remainder of the case studies. However, both methods were together applied for a number of case studies due to procedural requirement (See Section 3.8.6 for more details). Although the present author found no major challenges to collect data according to subjective analysis, some key issues emerged which entailed applying the AHP method either at particular or the entire framework stages for the remaining surveyed organisations.

8.3 Research Main Findings

This thesis represents an exploratory study which sought to develop the core competence identification process as per Hafeez *et al.'s,* (2002a-c) work at the individuals' competencies level in line with several theoretical concepts and frameworks. To reach this goal, specific stages were followed and therefore a number of lessons and findings emerged. These findings are discussed in the following sub-sections.

8.3.1 Mapping the Structure of Capability

The proposed framework to identify core competences considers analysing the structure of capability in terms of its assets. This is critical and represents the corner stone from which to build towards identifying core competence. This thesis assumes that capability is a composition of tangible and intangible assets and, hence, their contribution should be evaluated. Recognising a capability in the form of tangible and intangible assets was a clear and understandable concept to the study's participants, and represented a key element to assist management to take strategic decisions with this regard. For instance, once the organisation's capabilities are presented as contributions of tangible and intangible assets, it would be possible for decision-makers for business purposes to choose whether some assets within a particular capability can be reallocated to another area, developed, or outsourced.

Literature shows that in the US, for example, the proportion of tangible and intangible assets of thousands of non-financial companies changed from 80% as tangible assets against 20% of intangibles in 1978 to the reverse with 20% tangible assets against 80% of intangibles in 1998 (Sullivan and Sullivan, 2000). Such dramatic change may be attributed to increasingly fierce competition in the first place, and also to the nature of the business environment the organisation works within.

In light of this fact and according to the results presented, this thesis clearly introduces two paradigms of which the contributions made by tangible and intangible assets of the presented cases are entirely different. It shows that ESCA's capabilities are on average 72.22% as tangibles and 27.78% as intangibles, whereas the ratio is significantly different with 16.67% tangibles and 83.33% intangibles for the CCD case study (See Table 8.1). The results were validated with the ESCA management who indicated that the nature of their business environment is characterised by massive tangible assets such as power stations and substantial electricity supply networks. In addition, being ESCA is a public company operating in a monopolistic environment, in addition to its complacency due to its exclusive licensing to supply electricity contributes to less use of intangible assets. However, in practice, it is not necessarily that the amount of either tangible or intangible assets that could influence capabilities, rather it is the distinctive value of particular assets. Fahy (2000), for example, indicates that in some sectors the use of specific intangible assets such as patents and licensing is crucial for creating competitive advantage. On the other hand, the validation of outcomes with CCD management reveals their awareness of the value of the intangible assets role towards competitiveness in the construction industry market. This is reflected on the governance of intangible assets contribution (See Section 7.14.1) towards its capabilities (Innovative solutions, and Execution to specification) which became its core competences.

The overall results of the fifteen surveyed organisations demonstrate that, in general, capabilities are approximately formed by similar contributions of both assets as they are made of 48.30% as tangible assets and 51.70% as intangible assets. However, it is necessary to note that significant differences can be recognised with respect to capabilities' compositions between the examined sectors and also amongst organisations within the same industry. It is imperative to indicate that the justification of presenting the average values with respect to this evaluation and the assessment of composition of core competences (See Section 8.6.1) is to portray the overall trends of human, organisational, and technological dimensions of the surveyed organisations and make comparisons. These are un-weighted calculations, however, it can be seen that the results become more readable. These are for illustrative purposes only as in reality these organisations are different in sizes, sectors, and structures.

Industry	Case Study	(%) The Composition of Capability		
		Tangible Assets	Intangible Assets	Total (100%)
Utility	ESCA	72.22	27.78	100
	WSSC	55.00	45.00	100
	WSWC	70.00	30.00	100
	QEWC	68.00	32.00	100
Average		***66.30***	***33.70***	100
Construction	CCA	54.38	45.62	100
	CCB	39.17	60.83	100
	CCC	52.00	48.00	100
	CCD	16.67	83.33	100
	CCE	40.00	60.00	100
	CCF	58.60	41.40	100
Average		***43.47***	***56.53***	100
Manufa-cturing	TCC	62.65	37.35	100
	AESC	71.30	28.70	100
Average		***66.98***	***33.02***	100
Oil Services	TOS/OP	12.50	87.50	100
	TOS/ PM	06.88	93.12	100
	SOC	30.00	70.00	100
Average		***16.46***	***83.54***	100
Average (all case studies)		48.30	51.70	100

Table 8.1: The composition of core competences as tangible and intangible assets.

Taking the utility organisations as an example, it is noted from Table 8.1 that the structure of capabilities' compositions is on average constituted of 66.30% as tangible assets and 33.70% as intangible assets. The preferred use of tangible assets across utility organisations (two thirds of the total) can be owed to the nature of the infrastructure of the business which requires wide and extensive employment of resources such as power stations, tangible networks and operating units. In contrast, for the oil services industry, the capabilities tend to be largely dominated by intangible assets with an overall ratio of 83.54% - which is about five times the composition of tangible assets - due to the wide application of IT and advanced technology used by skilled and qualified employees. It can also be seen that the figure with respect to the construction and manufacturing sectors is almost identical as two thirds of their capabilities (~66%) are in general constituted by tangible assets.

Therefore, in accordance with such differing outcomes, the present author concludes that the amount of particular assets that constitute a capability is proportionate to its business function. For instance, it is common to discover that R & D or innovation capability are largely reliant on intangible assets such as knowledge and experience, and on the contrary, supply chain management may extensively depend on tangible assets such as transport facilities. This thesis, consequently, stresses that there are three factors which may have a major impact on the structure of an organisation's capabilities, namely, whether it owns or acquires its assets; the infrastructure of the industry; and the business environment it works within. Therefore, it is imperative for decision-makers to understand and analyse the contributions of assets to capabilities as a key element in order to identify the potential core competences of their organisations. The task of classifying capabilities into tangible and intangible assets and consequently decomposing them into business activities and operations can guide management, in whatever aspect of business they operate within, to develop the appropriate assets that have the potential to create core competences.

Another essential reason for mapping the structure of capability in the form of tangible/intangible assets is indeed to discuss, in a later section of the research, the contributions specifically made by individuals' competencies to organisational competences and examine the potential link between them. The results generally reveal that it is not always the case that either intangible or tangible assets can be a direct source of building core competence. This point is further discussed in Section 8.6.1.

8.3.2 Key Capability Determination

Key capability determination is a critical stage of the integrated framework of this thesis. One assumption of this research considers that key capabilities are those valuable capabilities which add strategic contribution to the business performance of an organisation. In all case studies within this research, key capabilities tend to be differentiated from capabilities due to their strategic value to boost business performance which is reflected in achieving business goals through particular business areas. It can be noted that only a few capabilities significantly contributed to their organisations' performance and met the applied standards. For instance, as was seen in Chapter Five regarding the ESCA case study, only five out of nine capabilities demonstrated relatively high business performance and were then selected as key capabilities. Similarly, in the CCD case study (Chapter seven), the analysis shows that only four key capabilities were differentiated from eight evaluated capabilities as they play a more critical role in achieving CCD's business objectives.

Since the literature views that relying only on the financial issues to judge business performance may have implications (Zhang, 1999), the implemented framework introduced a method by which all mapped capabilities are screened using specific financial and non-financial measures to determine key capabilities. This methodology was applied throughout many case studies at different management levels. However, due to some administrative difficulties and time limitations for some interviews, it was decided, after discussion with interviewees in some cases, to determine key capabilities according to subjective values analysis using the weight and scores method.

The applied financial measures (sales growth, operating profit, and return on capital employed) and non-financial measures (customer satisfaction, market share, and new product introduction) were comprehensible to interviewees and postal questionnaires' respondents alike. To put it simply, financial criteria represent quantitative measures, whereas non-financial criteria refer to qualitative measures. However, it was realised that not all managers, especially those in lower organisational management levels or who come from an engineering and technical background, are fully aware of the distinctions between the used measures.

8.3.2.1 The Mechanism of Determining Key Capabilities

This thesis introduced a pair-wise comparison mechanism to determine key capabilities utilising the AHP technique. The pair-wise comparison methodology aims to compute the weight and relative importance of the used measures and also the key capabilities. Regardless of the number of key capabilities to be judged, the AHP - driven by an EXPERT CHOICE intelligent programme - is considered a powerful tool to conduct paired comparisons and, therefore, to provide coherent data for this stage. For instance, on some occasions, inconsistent data were found and consequently reviewed with the surveyed organisations. Although it was possible to determine key capabilities after obtaining two individual complete tables of calculations of both financial and non-financial performance, this process was supported by using a Minitab statistical programme to produce two-dimensional plots. This programme can enable the user to manipulate the average values of both financial and non-financial weights and subsequently recognise both the potential key capabilities and what happens if some values are altered. Therefore, this feature is of great importance for the decision-making process as it enables the decision-maker to navigate through the key capability zone to examine the performance of each capability and recognise any potential key capabilities.

8.3.3 The Importance of Applying Financial and Non-financial Measures

The main finding with this regard is that balancing the capability business performance in terms of financial and non-financial contributions is a critical factor to eliminate any reliance on just one extent of performance. It is very probable to discover that a particular capability secures high scores with respect to the financial dimension but low scores with the non-financial contribution or vice-versa. Capabilities that may secure high values for financial and non-financial contributions alike at the same time are scarce. Therefore, the thesis indicated that considering financial and non-financial aspects to determine key capabilities candidates is an effective method to trade-off differences in the business performance of capabilities resulted from securing different scores against either financial or non-financial measures. It proved that using both measures can prevent presenting biased results that could be obtained if assessment is performed only on the financial or non-financial side. Additionally, to build a durable core competence and sustain its competitive position, an organisation should not only focus on financial achievements but also consider non-financial capacities. The research witnessed a number of examples where different outcomes regarding key capabilities determination were found if both measures were not used. In the analysis of the TOS case study, for instance (See Appendix I), the result shows that its key capabilities would not be the same if the assessment was only conducted according either to financial or non-financial performance (See Table 8.2).

Key Capabilities of TOS	
With Respect to Financial Performance	**With Respect to Non-Financial Performance**
1. Project Management (0.199)	**1.** Technology Transfer (0.159)
2. Engineering and Design (0.161)	**2.** Project Management (0.154)
3. Oil Field Equipment Supply (0.144)	**3.** Engineering and Design (0.138)
4. Consultancy Services (0.139)	**4.** Quality Management (0.129)
5. Procurement Services (0.136)	**5.** Consultancy Services (0.127)

Table 8.2: The financial and non-financial performance of TOSC.

It can be clearly seen from Table 8.2 that the key capabilities of TOS based on financial measures are quite different to those candidates with respect to non-financial measures. Whilst its key capabilities with regard to financial performance are, with a descending order, Project management, Engineering and design, Oil field equipment supply, Consultancy services and Procurement Services, they are with regard to non-financial performance Technology Transfer, Project Management, Engineering and Design, Quality Management, and then Consultancy services. It can also be noted that two financial-based key capabilities which are Oil Field Equipment Supply and Procurement Services are not considered for non-financial evaluation, and, on the other hand, two non-financial-based key capabilities which are Technology Transfer and Quality Management are not selected for financial evaluation. Therefore, it can be concluded that it is critical to take into account both financial and non-financial performance evaluation in order to trade off any differentiations that result from a single dimension evaluation.

Similarly, looking at the ESCA case study (Table 8.3) it can be noted that although key capabilities tend to be coincidently the same for both financial and non-financial contributions, their priorities and rank of importance is significantly changed if every measure is individually considered. Whilst for the financial performance, Electricity supply management is the most important key capability and Services and training management is relatively the lowest one, R & D is the most important key capability and Sales is relatively the lowest one for non-financial performance (See Table 8.3). More specifically, Sales is the second most important key capability against the financial contribution but the last important key capability regarding the non-financial contribution. This detailed result is critical and can help ESCA management to develop the resources of a particular capability under certain measures of performance for any strategic decision.

The Relative Importance of Capability	
Financial weight	**Non-financial weight**
Electricity supply management (0.189)	R & D (0.187)
Sales (0.185)	Electricity supply management (0.143)
R & D (0.172)	Purchasing and inventory (0.142)
Purchasing and inventory (0.135)	Service & training management (0.138)
Service & training management (0.111)	Sales (0.120)

Table 8.3: The relative difference in importance of capabilities of ESCA against both measures.

8.3.4 Sensitivity Analysis of Key Capability

One of the main features that make a distinction for the AHP applications is providing sensitivity analysis. The main goal of sensitivity analysis is to produce answers to "what-if" propositions for specific interrelated alternatives presented in the form of graphs. It is executed to investigate the response of changing the values of alternatives at a particular level of the AHP model. It also works as a predictive tool that can assist management to extrapolate potential outcomes and anticipate for impacts resulting from such assumed changes. In addition, sensitivity analysis is considered an effective application to test the robustness of determined key capabilities. With respect to the stage of determining key capabilities, sensitivity analysis was implemented to test the consequences of altering the actual results of all of the financial and non-financial measures used on examined capabilities. The main goal of this test was to present the change in relative importance and priorities of the case studies' capabilities.

In Chapter seven, the overall results of applying sensitivity analysis for the CCD case study were illustrated in the form of several graphs. Hence, for every financial and non-financial measure, sensitivity analysis was conducted by making definite plus and minus percentage adjustments (± 50%) to the actual values and studying the impact on the priorities and relative importance of capabilities. The thesis demonstrates that with the application of a considerably wide scope of data alteration (i.e. ± 50%), two important lessons are learnt. Firstly, as there were no major changes to the relative importance and priorities of key capabilities' candidates following the alterations to the weighted values of measures, the research affirms that the pair-wise comparison accomplished by CCD management is robust and reliable. Secondly, it emphasises that sensitivity analysis is a critical factor to differentiate and magnify the role every measure plays towards capabilities priorities. In other words, sensitivity analysis proved that key capabilities candidates are a function on the weight of the relative importance of used measures, and consequently, management may become able to identify potential key capabilities according to proposed theoretical values to the applied measures. Therefore, it concludes that if the respected weight of a particular measure is relatively high compared with other measures, then it is likely that changes to the rank of priorities of capabilities or at least an increase or decrease in the gap between them would be seen. An example of this can be seen in Fig. 7.5 regarding the Sales growth measure of the financial performance of CCD's capabilities. It illustrates that although the leading four capabilities remained unchanged, the +50% change led to a substitution of the third important capability (Innovative solutions) with the fourth (Execution to specifications). In parallel, this outcome can also be clearly seen in (Fig. 11 in Appendix J) which illustrates the impact of +50% to Market share - the most important non-financial measure with a weight of 0.559. Therefore, it can be seen that there is a significant change to the priorities of CCD's capabilities such as the third capability (Quality management) moving to become the fourth capability; the move of the fifth capability (Modern methods of construction) to be the third most important one; and the replacement of the sixth capability (Completion on time) by the seventh capability (Modern style design).

On the other hand, if the values of relative importance of measures are relatively low, or are similar or close to each other, this would mean a lesser impact on the prioritisation process of capabilities, and subsequently, changes to the order of relative importance of capabilities would be unlikely to occur or could exist within a limited margin. Once again, with regard to Figures 2 and 3 (Appendix J) regarding the Operating profit measure, it can be seen that the plus and minus incremental changes has a minor impact on the ranking of capabilities of CCD.

8.4 Competences Determination

The competences determination stage involved two key steps which are evaluating the collectiveness and uniqueness degrees of key capabilities. Collectiveness was defined to interviewees and survey participants as the internal integration of key capability in terms of across-function, across-product, and across-business attributions; and uniqueness as the external differentiation to competitors in terms of rareness, inimitability, and non-substitutability attributions. In this research, two approaches were followed to determine competences of organisations. These approaches are discussed in the next sub-sections.

8.4.1 Competence Determination Based on Subjective Value Analysis

Similar to the manner applied by Hafeez *et al.'s,* (2002a-c) work, a scale of (1-4) scores was used to evaluate the collectiveness and uniqueness of key capabilities based on subjective value analysis. This method was successfully applied, as presented in Chapters four and five, in the Celltech and ESCA case studies in addition to a number of further organisations. However, a number of critical issues were posed. For instance, this research discovered that a reliance on human subjective value analysis would likely generate inconsistent and inaccurate results due to human bias. It also realised that the used scale of assessment numbers (1-4) is not flexible enough to enable the interviewee or respondent to provide more accurate data that reflects the actual situation. More importantly, the contribution this research has made in this stage is to perform collectiveness and uniqueness evaluation simultaneously and not sequentially as was done in previous research (Hafeez *et. al.*, 2002a; Zhang, 1999). In brief, in accordance to the results of the Celltech case study, this thesis confirms that analysing collectiveness and uniqueness results simultaneously has provided more reliable outcomes that can assist management to identify potential competences which could be excluded if the sequential manner is employed. (This point was discussed in detail in Section 2.10.1). In addition, with a conclusion originated from literature, this thesis emphasises that the attributions of collectiveness and uniqueness all are valuable measures to distinguish a competence from key capability because they interpret the business's internal integration and external differentiation aspects. However, this method by which the numerical values of Rareness, Inimitability, or Non-substitutability, for example, are accumulated, lacks a coherent articulation amongst them and therefore each attribute tends to have an individual impact and consequently a poor interaction with other attributes. In other words, the research found that having a poor value for Rareness may be balanced by a high value for Inimitability or Non-substitutability or vice-versa. Taking the CCB case study as an example, (See Appendix K: Table 3) it can be seen that although the Contract management key capability secured a score of 8 in total against the Uniqueness evaluation, with a poor value of 2 for the Inimitability attribute, it passed the following evaluation to become a core competence. This in reality means that the uniqueness of a particular key capability could be overestimated or, on the other hand, diminished due to evaluating those attributes on an equal basis. To sum up this section, the thesis concludes that performing the competence analysis purely on subjective value analysis using a scope of discrete numbers had impacts on the data consistency of results for some case studies mainly due to human bias.

8.4.2 Competence Determination Using AHP

The competences determination task was also effectively conducted using the AHP approach for both steps of the collectiveness and uniqueness evaluation. As was done at the key capabilities determination stage based on AHP, a similar procedure of pair-wise comparisons was executed. In contrast to the procedure of evaluating competences according to their value characteristics, AHP enabled the present author to evaluate the relative importance and weight of each attribute prior to assessing the candidates of competences. This mechanism, therefore, effectively led to recognise the impact each attribute may have on differentiating and realising the potential competences. While the subjective value-based assessment considers an equal level of importance for the attributes of collectiveness and uniqueness, the AHP evaluation method demonstrated a considerable differentiation between them. For example, with respect to the collectiveness assessment of CCD, (See Section 7.81 and Table 7.9) it was seen that the relative weight of importance of across-business (0.493) is two and a half times the weight of across-product (0.196); also the relative importance of rareness and inimitability (0.429) is three times the amount of the non-substitutability attribute (0.143) of uniqueness measure (See table 7.10). The effectiveness of using AHP to evaluate the competence determination task is also supported and verified via conducting sensitivity analysis within which manipulation of attributes values produced different outcomes of competences candidates' priorities.

8.5 Core Competences Identification

In the core competence identification stage, this research once again adopted two approaches which are subjective-value analysis and AHP. In Chapter four, both methods were presented using case studies. These approaches are discussed in the next sub-sections.

8.5.1 Core Competence Identification Based on Subjective Value Analysis

Once again a scale of (1-4) points was applied at the stage of identifying core competences of some organisations. The strategic flexibility analysis was performed and data was drawn according to subjective value assessment of interviewees. Although the scoring method enabled straightforward identification of core competences, some procedural and mathematical issues emerged which then affected the outcomes. In particular, using the mean value of total scores assigned to the analysed competences of organisations resulted in ignoring a number of potential core competences. For instance, the strategic flexibility analysis of the WSSC case study (See Section 5.3.3) shows that the Sewerage management competence was excluded to be a core competence, although it was highly valued with 3 out of 4 for both attributes of resource re-deployment and routines re-organisation. In addition, within the same company, the analysis of Water management area demonstrates that the Disinfectant processes competence is not considered as a core competence despite its high scores. Alternatively, relying on the use of the mean value as a tool to separate core competences led to identify candidates with poor scores regarding a particular attribute of strategic flexibility. For example, it can be noted from the TOS case study (See Appendix I) that the Consultancy services competence was considered a core competence, although its score regarding the resource re-organisation attribute was only 2 out of 4.

8.5.2 Core Competence Identification Using AHP

As was explained in Chapter Seven, the competence evaluation stage is conducted using the AHP technique to isolate core competences. The procedure is identical to that applied at the competence determination stage. In brief, a typical three-level hierarchical model was designed and a pair-wise comparison amongst competences was conducted. In this method, it was possible to evaluate to relative importance and priority of strategic flexibility attributes. In contrast with the mechanism established for subjective value assessment in which resource re-deployment and routines re-organisation is considered equally important, using AHP allowed the researcher to distinguish between their contributions and, hence, deliver more robust and coherent data. Whilst in subjective value analysis every competence is individually considered and assigned a discrete value, in the AHP method competences are comparably and collectively evaluated and their impact on each other is taken into account. As a consequence, the value of strategic flexibility of every competence represents its respected weight of importance against the other competences and not its exclusive value. Furthermore, by processing sensitivity analysis for each attribute of the strategic flexibility evaluation, changes in priorities of competences can be seen and, therefore, core competences candidates become conspicuous and identifiable.

8.6 Core Competence and Individuals' Competencies

In the second key stage of the integrated framework, the goal is to evaluate the potential link between core competences and the related individuals' competencies. Specific assumptions were established and three basic steps were followed to achieve this objective. In the first step, the composition of core competence in terms of human, organisational, and technological contributions is considered. Then, the contribution made by individuals' competencies towards organisational competences is evaluated. In the third step, derived from the CIPD (2004) competency framework, the most relevant individuals' competencies that can be matched and linked with identified core competences are determined.

8.6.1 Composition of Core Competence

In this step, the task was to explore the composition of core competence in terms of three complementary dimensions, namely, human, organisational, and technological contribution. In the present author's view, core competence is a blend of these three elements and, therefore, each core competence has its own gene that constitutes its structure. It is critical, for strategic purposes, for organisation to decompose its core competence and evaluate the contribution made by each element. The overall assessment of core competences' contents of particular case studies is presented in Table 8.4.

As can be noted from Table 8.4, throughout the presented twenty four core competences, human element is, by far, the most dominant contributor towards the composition of core competence with an average of 45.54%. The organisational contribution, which is also considered a human aspect, constituted 23.38% on average of the structure of the studied core competences which increased their share to 68.92%. On the other hand, on average, 31.08% of the investigated core competences are made up by technological contribution.

Organisation		Core Competence	Overall contribution (%)		
			Human	Organisational	Technological
Utility	ESCA	Testing	70	20	10
		On-time repairing	50	10	40
	WSSC	Secure network	40	20	40
		Water quality tests	35	25	40
	WSWC	Health standards exercise	40	30	30
	QEWC	Technology applications	30	25	45
Average (Utility)			***44.16***	***21.67***	***34.17***
Construction	CCA	Low cost estates	35	30	35
		New architecture design	70	10	20
	CCB	Business relationships	60	30	10
		Projects scheduling	40	20	40
		Concrete works	40	15	45
	CCC	Construction management	45	25	30
		Performance management	50	40	10
	CCD	Innovative solutions	65	10	25
		Execution to specifications	60	30	10
	CCE	Project management	50	25	25
	CCF	Regeneration business	40	33	27
		Engineering services	40	25	35
Average (Construction)			***49.58***	***24.42***	***26.00***
Oil	TOS	Consultancy services	33	33	34
		Engineering and design	45	30	25
	SOC	Engineering and design	30	25	45
Average (Oil)			***36.00***	***29.33***	***34.67***
Manufacturing	TCC	Product development	45	20	35
		Marketing	50	10	40
	AESC	Engineering management	30	20	50
Average (Manufacturing)			***41.66***	***16.67***	***41.67***
Average (All industries)			45.54	23.38	31.08

Table 8.4: Composition of core competences of the case studies.

An important lesson was learnt from this Table showing that core competence of the examined industries and organisations is to a large extent controlled by individuals' competencies. This result introduces clear evidence that individuals' competencies play a key role in creating core competence. The management must give priority to the competencies of employees once core competence strategy is adopted (Bergenhenegouwen *et al.*, 1996) as they represent the necessary conditions for developing and driving the maximum benefit from organisational core competences (Godbout, 2000). In the construction sector, for instance, (See Table 8.5) the overall human contribution towards the structure of core competences is approximately half

(49.58%). The structure of core competences of the CCD case study, in specific, and some other core competences of this industry, tends to be dominantly shaped by individuals' competencies ranging between 60% - 70%. In addition, the technological contribution (26.00%) tends to be the least amongst all industries. This conclusion, in the present author's view, can be owed to the fact that the contribution of knowledge and skills of individuals which is reflected in the design and consultancy areas has a major impact in running this business compared with the technological contribution. In the same vein, as argued by (Drejer, 2000), the dynamics of technological changes may pose threats and destroy the competence as the technological contribution towards competence is not discussed in literature in detail.

Organisation	Core Competence	Human contribution (%)	Organisational contribution (%)	Technological contribution (%)
CCA	Low Cost Estates	35	30	35
	New architecture design	70	10	20
CCB	Business Relationships	60	30	10
	Projects Scheduling	40	20	40
	Concrete Works	40	15	45
CCC	Construction management	45	25	30
	Performance management	50	40	10
CCD	Innovative solutions	65	10	25
	Execution to specifications	60	30	10
CCE	Project management	50	25	25
CCF	Regeneration business	40	33	27
	Engineering services	40	25	35
	Average	**49.58**	**24.42**	**26.00**

Table 8.5: The composition of core competences of construction case studies.

On the other hand, the analysis demonstrates some contradictory significant outcomes with this regard. For instance, it can be noted from Table 8.4 that there are a number of core competences within the same industry and/or organisation in which the technological contribution has a major impact. For example, with respect to the utility industry, core competences of the presented case studies are largely formed by the technological dimension. Four out of six core competences of those case studies are constituted by 40% to 45% of technological competences. Furthermore, it can be seen that the technological element has considerable involvement on the contents of core competences of manufacturing case studies. The interpretation of this is that the manufacturing industry for a large extent depends on the use of machinery and technological resources. Unland and Kleiner (1996) point out that for some firms, technology has a critical impact on forming core competence as it provides the key attributes of processes and products that might satisfy customers.

Overall, irrespective of the type of organisation and business nature, the analysis shows that there is no sole configuration that shapes the composition of core competence. It is a unique combination of technologies, knowledge, and skills possessed by a particular company in a particular market (Petts, 1997; Bergenhenegouwen *et al.*, 1996). Core competence is a heterogeneous sum of human, organisational, and technological contribution with different scales. The distribution of those contributions is a function in business corporate objectives and context. This conclusion is consistent with the argument that core competence of the organisation is an integration of technologies, processes, know-how skills within a technical subsystem which confers value-added and competitive advantage (Tampoe, 1997). The construction of this subsystem is not given to the organisation but needs to be built from within it according to its strategies (Post, 1997).

8.6.2 Organisational Competences and Individuals' Competencies

The conjecture of this research with this regard emphasises that individuals' competencies have a major impact on organisational competences and in turn play a critical role in achieving business objectives. The objective of this task was to evaluate the extent of influence and contribution made by individuals' competencies on organisational competences. To achieve this target, a pair-wise comparison amongst the organisational competences with respect to individuals' competencies contribution on them was performed. Two approaches for evaluation were followed. In the first model, competences were pair-wise compared using the Whiddett and Hollyforde (1999) method of (0, 1, and 2) scores, whereas in the second approach, a two-level AHP model was used for comparison. Both methods were presented and discussed in Chapters Six and Seven.

The use of a (0-2) range in several case studies allowed for recognising and prioritising in which organisational competences, individuals' competencies have the most impact and influence. It was possible to evaluate if there are differences or similarities with regard to the impact of individuals' competencies on organisational competences. The analysis of the WSSC case study, for instance, (Chapter Six) introduced an important conclusion, as the most relative influence and contribution made by individuals' competencies was on its two core competences, namely, Secure network and Water quality tests. Therefore, this supports the research assumption that core competence is potentially linked with individuals' competencies.

However, the present author realised that this method could not provide real differentiation between examined organisational competences and potential core competences due to the rigidity of using a complementary scale of 0, 1, and 2. Also, if the group of competences to be examined is limited, it is not likely to obtain a reasonable comparison. For example, taking the ESCA case study's results presented in Chapter Six, the assessment shows no differentiation with respect to the influence of individuals' competencies amongst its organisational competences indicating an interestingly equivalent impact. The present author interprets this may be partially attributed to the fact that the number of evaluated organisational competences for WSSC is higher than those evaluated for ESCA (5 and 3 respectively). However, this author would suggest that although the pair-wise comparison approach works effectively to evaluate on which organisational competences the individuals' competencies have more influence, the scale of judgement (0-2) points seems to be restricted and inflexible to deliver more precise results.

Alternatively, employing AHP methodology for this task allows the delivery of more consistent results of which organisational competences were successfully weighted and ranked according to the contribution of individuals' competencies on them. In contrast to the previous method of using bi-numeric scores, AHP helped to compare and distinguish between evaluated organisational competences and translate their differentiation into clear quantitative values. For instance, in the CCD case study presented in Chapter Seven, the nine examined organisational competences were articulated and prioritised according to the extent of individuals' competencies contribution on them.

However, an important lesson was learnt. The results reveal that it is not necessarily individuals' competencies that have the most influence and contribution within core competences. The analysis shows that the rank of one of CCD's core competences (Execution to specifications) with respect to individuals' competencies contribution on it was relatively low, although this is significantly composed of human contributions. On the contrary, there are some competences such as Value added design, which is largely dominated by individuals' competencies that were not identified as a core competence. This could be attributed to the strategies adopted by the CCD management to capitalise those individuals' competencies. As Bergenhenegouwen *et al.*, (1996) point out, the degree to which the employees are appreciated by the management and how their competencies embedded in the business strategy are a critical factor to find the right match between the individuals' competencies and core competence. However, this author interprets this outcome for a wide extent to the fact of judging the core competence content according to subjective value analysis and not AHP. This point was further discussed in Section 7.15.

8.6.3 Determining the Related Individuals' Competencies

In this final stage of the proposed integrated framework after core competences were identified, the goal was to match them with the most relevant individual competencies. The seven used competencies derived from the CIPD (2004) framework (Team orientation, Communication skills, People management, Customer focus, Results orientation, Problem solving, and Planning and organising) were evaluated and compared in a pair-wise manner against the identified core competence. The research followed two approaches to conduct this task. In the first approach, similar to the procedure applied at the stage of assessing contribution of individuals' competencies towards core competences, the (0-2) points scale (Whiddett and Hollyforde, 1999) was implemented. In the second approach, a two-level AHP model was broadly used. Therefore, the seven competencies were evaluated and prioritised according to their significance to develop core competences.

Both approaches equally led to differentiate the role of each individual's competency with respect to core competence. Even though the pair-wise mechanism applied within both approaches is identical, the quantitative evaluation practice offered by AHP provided results which were more easily understood and analysed. This is primarily because AHP provides a wider margin of quantitative choices (i.e. 1-9) scores, whereas in the first method the scale was limited between (0-2) scores.

Finally, the results of the case studies within which individuals' competencies were explored are presented in Table 8.6. It can be seen that the potential role and contribution of the tested individuals' competencies towards core competence is rather different and, therefore, each core competence requires a specific set of related competencies. A summary regarding the three most relevant individuals' competencies that match with identified core competences can be seen in Table 8.6.

Organisation	Core Competence	The 1st Important Competency	The 2nd Important Competency	The 3rd Important Competency
ESCA	Testing	TO	CS	PM
	On-time repairing	TO	P&O	RO
WSSC	Secure network	CF	PM/PS/P&O	
	Water quality tests	CF	PS	TO
CCA	Low cost estates	RO	CS/PM	
	New architecture design	RO/PS	CF	
CCB	Business relationships	PM	TO/CF	
	Projects scheduling	TO/RO/P&O		
CCD	Innovative solutions	CF	TO	PM/P&O
	Execution to specifications	TO	PS	PM
TOS	Consultancy services	RO	PM	TO
	Engineering and design	PM	P&O	RO
SOC	Engineering and design	CF	TO	PM
TCC	Product development	CF	P&O	TO
	Marketing	CF	CS	PM
AESC	Engineering management	PS	TO	CS

Table 8.6: The three most related individuals' competencies with core competences.
**Abbreviations used: (TO= Team orientation, CS= Communication skills, PM= People management, CF= Customer focus, RO= Results orientation, PS= Problem solving, and P&O= Planning and organising)*

Table 8.6 illustrates the three most appropriate individuals' competencies, out of the seven used competencies, with core competences of the presented organisations. In order to make a distinction amongst the selected competencies and translate the results into quantitative data, a numerical code is assigned to the three ranks according to their priorities. The coding process is summarised in Table 8.7.

Rank of Competency	Score Assigned
First	3
Second	2
Third	1

Table 8.7: The coding process of competencies.

As a consequence, the frequencies of used competencies were converted into quantitative values reflecting their importance and association with core competences according to their prevalence (See Table 8.8).

Individual Competency	Prevalence	Total Score
Team orientation	11	23
Customer focus	8	22
People management	10	17
Results orientation	6	14
Planning and organising	6	12
Problem solving	5	10
Communication skills	4	7

Table 8.8: The prevalence of individuals' competencies linked with core competences.

The figures in Table 8.8 are shown in descending order to highlight the order of the individuals' competencies according to their prevalence against the determined core competencies. It demonstrates that Team orientation, with a score of 23 points, is the most selected competency which needs to be related with the identified core competences, followed by Customer focus with 22 points. The Communications skills competency, on the other hand, has the least matches with core competences. These results, however, represent the overall analysis and, do not reflect the relative importance and priorities of individuals' competencies for each industry and case study.

In order to illustrate the most three appropriate individuals' competencies related with the identified core competences for each industry, a similar weighting method is applied according to their prevalence. The overall results are presented in Table 8.9.

Industry	The Most Three Important Individuals' Competencies	Total Score
Utility	Team orientation	7
	Customer focus	6
	Planning & organising	4
Construction	Team orientation	10
	Results orientation	9
	People management	7
Oil Services	People management	6
	Results orientation	4
	Customer focus	3
Manufacturing	Customer focus	6
	Communication skills	3
	Team orientation	3

Table 8.9: The prevalence of individuals' competencies linked with core competences for each industry.

Table 8.9 shows the most three important individuals' competencies according to their prevalence to be matched with identified core competences for each industry individually. It can be clearly seen that the outcomes are reasonably different. For instance, whilst Team orientation is relatively the most important competency for utility and construction industries and the third for manufacturing, did not appear amongst the oil services case studies' top competencies. It can be also noted that Customer focus competency is, in turn, more important for utility and oil services, whereas Results orientation competency is more important for construction and oil services core competences. Overall, it can be concluded that it is not only particular individuals' competencies can be considered more important for each industry, but also for each core competence.

Although the seven investigated individuals' competencies are considered the most widely used competencies (Armstrong, 2003; CIPD, 2004), the outcomes of the analysis present contradict results. This author recognises that despite the fact that the seven individuals' competencies introduced by (CIPD, 2004) competency framework are essential for the examined industries, their prioritisation and appropriateness for each company's core competences is rather different. It can be then argued that the diverse amongst the examined industries with respect to the relative importance of the individuals' competencies is attributed first, to the nature and complexity of each industry; and second, to the "uniqueness" composition of core competences which requires particular skills to achieve the organisation's corporate values and objectives.

This conclusion is in line with the literature where individuals' competencies are considered mutually related to each other and therefore it is difficult at times to focus solely on one element (Drejer, 2000). Problem solving skills, for example, may be more important to a specific area than another one within construction industry context (DFEE, 2000). Core competences are very dynamic and influenced by collective individuals' skills (Unland and Kleiner, 1996). They form the basis for developing competence at individuals' level (Godbout, 2000) and therefore particular individuals' competencies can be nurtured and developed to give expression to core competence.

8.7 Evaluating the (Hafeez *et al.*, 2002a-c) Core Competence Framework

The core competence identification framework (Hafeez *et al.*, 2002a-c) was successfully tested and validated in manufacturing and services sectors (Hafeez *et al.*, 2002a; 2002b; 2002c; Zhang, 1999) helping the surveyed companies identifying their core competences. Compared with other frameworks in this field such as (Tampoe, 1994) and (Javidan, 1998) which were discussed in Chapter two, the (Hafeez *et al.*, 2002a-c) framework is more generic and can be implemented not only in manufacturing industry but also in further industries such as construction, utility, and oil services. In addition, it is more structured and has clear definitions of its units of analysis considering quantitative and qualitative measures for assessment. In the present author's view, the framework added valuable contribution to the core competence literature representing an important attempt to bridge the gap of core competence identification within a structured process. In particular, there are several constructive achievements that can be outlined as follows:

- The framework proposes a practical structured process in which key capabilities, competences, and core competences are systematically determined and evaluated.
- For each stage, it introduces a set of understandable attributes stem from the literature on evaluating core competence. For instance, it uses collectiveness and uniqueness concepts for competence determination and strategic flexibility attribute to distinguish core competences. More importantly, every attribute is assessed using measurable criteria representing conceptual terms (See Section 2.10).

- In order to distinguish key capabilities, the framework suggests evaluating capabilities considering not only the financial contribution, but also the non-financial performance applying quantitative and qualitative attributes for this task. This is, in particular, a significant contribution as the literature emphasises the problem of relying only on the financial dimension to evaluate key capabilities (See Section 2.10.1). This task is supported by using the AHP technique to isolate key capabilities.

On the other hand, the framework, as any other conceptual model, is not without its limitations. This author views that the limitations tend to be procedural occurring in the implementation process. These limitations were discussed in (Sections 2.10.2 and 2.15), however, are outlined in Table 8.10 showing how they are addressed in this research.

The Limitation	How is it addressed?
The attributes of competences and core competences are equally considered and weighted.	The AHP technique is used to distinguish the attributes and show the priority and relative importance of each attribute.
The scale of used scores (1-4) to evaluate the competences and core competences candidates, is limited and inflexible.	The AHP technique with wider scale (1-9) is used to enable the respondent to evaluate with more flexibility.
Competence and core competence determination tasks are conducted based merely on subjective value analysis.	The AHP technique is used to eliminate subjective anomalies and provide more robust results.
At the competence determination stage, collectiveness and uniqueness exercises are sequentially conducted affecting the reliability of competences' candidates.	The collectiveness and uniqueness exercises are simultaneously conducted to avoid discarding any potential competences.

Table 8.10: The weaknesses of the process to implement (Hafeez *et al.*, 2002a-c) framework.

8.8 Evaluating the (CIPD, 2004) Competency Headings Framework

The (CIPD, 2004) framework is used at the stage of evaluating the appropriate individuals' competencies to be linked with the identified core competences. Although it is developed by a professional organisation, it has roots in the academic arena as it is derived from (Armstrong, 2003) work. The (CIPD, 2004) framework is designed in a way to save time and minimise efforts by focusing on the most widely used individuals' competencies. This author adopted this framework due to its simplicity for application and being understandable to the practitioners involved in this study. In addition, the competencies introduced can be analysed and linked to different levels of organisation. With looking to the outcomes emerged from this research, the framework helped to distinguish the most appropriate individuals' competencies for each core competence. In general, although the (CIPD, 2004) framework worked successfully to prioritise individuals' competencies with respect to identified core competences, the implementation process encountered some weaknesses which need to be addressed. This can be summarised as follows:

- Degree of details: the framework introduces a set of essential competencies; however, they tend to be more generic. This author found that the competencies that might be relevant for particular industry may not be applicable for other industry.
- Level of analysis: the framework is not designed for particular level of organisation. For instance, it does not provide more descriptions for each competency as competencies related to top management are frequently different than those associated with lower levels of management.
- Lack of technical competencies: with except to Communication competency, the framework does not include further technical competencies which are important for individuals at lower levels of management.

8.9 The Research Objectives: Revisited

As seen in Chapter One, the stated objectives this research attempted to achieve were to:

- Test the Hafeez *et al.* (2002a-c) core competence identification framework using secondary data, as a pilot case study, to become familiarised with the process.

The research proceeded with testing the Hafeez *et al.* (2002a-c) core competence identification framework at Celltech pharmaceutical company using secondary data. This pilot case study presented in Chapter Four helped the author to be familiarising with implementing the framework and introduced key important lessons to the subsequent case studies. Also, the framework was tested by five groups of independent individuals using same secondary data to confirm the robustness of the (Hafeez *et al.*, 2002a-c) framework.

- Test the Hafeez *et al.* (2002a-c) core competence identification framework in the construction, utility, oil services, and manufacturing industries.

The second objective was accomplished in Chapter Five where two case studies from utility industry were evaluated and discussed. The results of the other case studies from construction and manufacturing were presented in Appendices K, L, M, and N.

- Develop a competence identification framework at the individual competency level using the CIPD (2004) competency headings framework and link it with the core competence model.
- Develop an integrated framework to determine the most relevant individuals' competencies to be linked with the identified core competences.

In Chapter Six, the third and fourth objectives of developing the Hafeez *et al.* (2002a-c) core competence identification framework at the individual competency level using the CIPD (2004) competency headings framework were achieved. Two case studies were analysed relying on the outcomes resulted from using Hafeez *et al.* (2002a-c) framework in Chapter Five.

- Test the proposed integrated framework in the industries indicated in the second objective and make comparisons.

The fifth objective was met in Chapter Seven as the proposed integrated framework to link the appropriate individuals' competencies with identified core competences was introduced and tested. A construction case study was comprehensively analysed and evaluated using the proposed integrated framework followed by a comparison amongst the outcomes of the presented case studies presented in Chapter eight.

- Use the Analytic Hierarchy Process (AHP) technique at multiple levels as a research method to ensure relatively more robust analysis than previous research.

The final objective which is using the Analytic Hierarchy Process (AHP) technique as a reliable research method was achieved. The AHP was partly implemented (in key capabilities determination stage) in Chapter Five, however, comprehensively used at all stages of the integrated framework as shown in Chapter Seven.

8.10 Contribution to Knowledge

This research is an exploratory investigation which attempts to examine the potential link between individuals' competencies and core competence. It aims to identify core competences of an organisation and the appropriate related individuals' competencies using an integrated framework. In particular, the thesis is dedicated to extend the context of the Hafeez *et al.* (2002a-c) core competence identification framework to the individuals' competencies level throughout further industries such as utility, construction, and oil services. Therefore, the primary development and contribution this research has made to knowledge is an investigation of the applicability of developing the Hafeez *et al.* (2002a-c) core competence identification framework at the individuals' competencies level across the construction, utility, oil services, and manufacturing industries. This contribution is further enhanced by the use of AHP methodology for more robust results. In particular, the exclusive contributions achieved through this study are outlined as follows:

1. The exchangeable use of the terms competence and competency was posed and discussed and, hence, their meanings were clearly differentiated and explained.
2. The research tested the Hafeez *et al.* (2002a-c) core competence identification structured framework in the construction, oil services, utility and manufacturing industries. Accordingly, fifteen organisations were investigated with different levels of organisational levels and participants.
3. The Hafeez *et al.* (2002a-c) framework was applied in some cases at two organisational management levels to examine functional and operational capabilities within the same organisation. In addition, it was implemented in particular departments and business areas of some large organisations.
4. The research made an important change to the mechanism of the competence determination stage by performing the collectiveness and uniqueness assessments simultaneously to avoid excluding any potential competences from evaluation due to subsequent analysis.
5. The Hafeez *et al.* (2002a-c) framework was developed at the individuals' competencies level. An integrated framework proposed comprises the (Hafeez et al., 2002a-c) framework and (CIPD, 2004) most widely used competency headings framework was developed.

6. The potential link between individuals' competencies and core competences was examined by evaluating the contribution made by individuals' competencies towards core competences.
7. The content of core competence was studied and separated into human, organisational, and technological contributions.
8. The appropriate portfolio of individuals' competencies to match with the identified core competence(s) was established on the CIPD (2004) competency headings framework.
9. With contrast to previous research by Zhang (1999) based on Hafeez *et al's.* (2002a) work within which the AHP technique was implemented only at the key capability determination stage, this research effectively used the AHP method at all stages of the integrated framework.

The detailed contributions of this research can be summarised into three main achievements which are considered in the following sections.

8.10.1 Identifying Core Competence

Although the role core competences play to assist business to compete is critically valued by academics and practitioners, the challenge is how they can be systematically identified. Literature highlighted that there is a lack of a structured organisational process to identify core competence of organisations. In response, this research attempted to address this disparity by introducing and testing the Hafeez *et al.* (2002a-c) core competence identification framework in new industries and environments. In particular, the research has demonstrated how the model can be systematically implemented using specific measures throughout sequential and associated stages.

The research established a structured mechanism by which core competences can be isolated throughout a sequential process of four steps defining capabilities, key capabilities, and competences. In brief, firstly, capabilities are defined according to the functional areas that constitute the organisation's business. They are considered the sum of particular tangible and intangible assets and resources used by an organisation to perform specific activities and operations. Key capabilities are distinguished as those particular capabilities that play a critical role to achieve the business objectives of organisation in terms of financial and non-financial contributions. Thirdly, competences are determined by assessing the collectiveness and uniqueness of key capabilities.

Finally, core competences are isolated from competences by evaluating the degree of flexibility to which competences can be re-deployed and routines re-organised to achieve new developments.

The process was applied in several business organisations from the manufacturing, utility, construction, and oil services sectors. This research has shown that the Hafeez *et al.* (2002a-c) model can be flexibly implemented at both the top organisational management level and a lower management level. Core competences were identified in the functional business areas and within those areas at the operational level. Furthermore, the model was constructively tested to identify core competences of particular business areas and departments of large organisations where it is difficult to assess the organisation at one management level. Interestingly, the model succeeded in realising that a number of case studies had no core competences according to the measures used.

The research has also effectively developed the competence determination stage to perform the analysis of its two measures, namely, collectiveness and uniqueness simultaneously and not in a sequential manner.

8.10.2 Linking Core Competences and Appropriate Individuals' Competencies

The second principal contribution this research has made is studying the relationship between identified core competences and individuals' competencies by developing the Hafeez *et al.* (2002a-c) core competence identification framework at the individuals' level. This research explored the potential link between core competences and individuals' competencies by considering the structure of core competences in terms of human, organisational, and technological contributions to show the impact of individuals' competencies on core competences. It has also analysed and differentiated the organisational competences according to the contribution of individuals' competencies on them. Subsequently, for each identified core competence, the most relevant and related individuals' competencies were determined and matched using a pair-wise comparison methodology.

This work has demonstrated that core competence is a heterogeneous structure of human, organisational, and technological contributions irrespective of the type of business. It has shown how the components of core competences are considerably different even within the same organisation and, consequently, every core competence has its own configuration due to business functions and objectives that shape core competence. The research proved that it is not necessary to discover that in human skills-based areas, core competence is dominated by individuals' competencies. Instead, the research has shown that in some cases the technology use by individuals has added to the importance of the technological contribution. Alternatively, the organisational contribution, which is implicitly considered as a human contribution, constituted a critical element to sustain the role of human contribution to create core competence.

On the other hand, the impact and contribution made by individuals' competencies towards core competences was addressed and evaluated and subsequently competences were accordingly ranked. In addition, with the adoption of the CIPD, (2004) competency heading framework, the research has shown that specific individuals' competencies can be linked with core competence(s). Taking into account the nature and objectives of business, the research confirmed that the seven examined individuals' competencies are equally critical to the identified core competences, however, different in their relative importance.

8.10.3 Using the AHP Technique

The AHP technique was widely applied throughout this study to conduct pair-wise comparison amongst particular variables and measures at several stages of the used integrated framework. It was effectively used to translate the outcomes of human pair-wise judgement into analysable quantitative data. The main advantage offered by AHP is eliminating any human bias that would result from human subjective-value judgement and providing consistent and robust results. Also, with the use of AHP related software - EXPERT CHOICE - the research conducted sensitivity analysis at all stages of the framework which produced a variety of "what-if" scenarios which assist management for future strategic decisions.

Compared with subjective-value analysis in which some variables may be discarded because of using discrete numbers, the AHP approach has provided more consistent and coherent data due to the interrelated comparison amongst variables. Specifically, it has effectively helped to rank and prioritise the used variables according to their relative importance. Finally, AHP enabled the researcher to re-consider and validate data utilising the advantages of consistency ratio (CR) and sensitivity analysis offered by the software.

8.11 Research Limitations

As with any piece of academic work, this research suffered several limitations which have a degree of impact on the results and lessons which emerged. These limitations are classified into methodological and conceptual difficulties, and summarised as follows:

8.11.1 Methodological Limitations

- Since the framework is designed into two subsequent related key stages, i.e. identifying core competences and then linking the relevant individuals' competencies, this goal entailed designing two complementary questionnaires by which the results of the first questionnaire determine the structure of the second questionnaire.
- The full questionnaire used is relatively long and requires some time to be answered.
- It was time consuming to exchange the postal questionnaire with the original respondent.
- Unavailability of interviewees especially at the top management level to conduct several face-to-face interviews as the questionnaire requires.
- The research sample size is relatively limited due to reliance on face-to-face structured interviews with senior and high ranking managers which requires a considerable amount of time to arrange.
- Reluctance of some managers to complete the questionnaire built on the AHP approach as it requires more time than subjective value assessment.
- A lack of understanding by some managers from an engineering and technical background of some concepts and terms used such as the financial measures at the key capability determination stage.

In brief, it can be argued that, unless there is sufficient contact with the surveyed organisation, the response rate of adequately-completed returned postal questionnaires is unlikely to be reasonable due to its length and the dependency between its two main parts.

8.11.2 Conceptual Limitations

- Some terms used in the integrated framework to link appropriate individuals' competencies with identified core competences such as resources re-deployment and routines re-organisation are not widely practised within the context of this research.
- In contrast to the AHP approach, the main rational behind using the (1-4) points scoring method is to differentiate the most valuable candidates at each stage of the framework. However, there were some challenges. For instance, the range (1-4) was inflexible to allow a wider range of choices by the respondent and led in some cases to discard some potential key capabilities/competences from analysis due to having poor scores at specific measures. Also, taking the average of accumulated values may have implications and uncertainty. It is not uncommon to apply this technique for data analysis purposes despite some disadvantages (Andrich, 1978: URL: http://en.wikipedia.org/wiki/Rating_scale). However, the main goal of computing the average value was to describe the tendency of data and therefore locate the value on which data can be compared. This is important to facilitate the task of electing the candidates for the subsequent stage of the evaluation process. The present author considers that this method tends to be more theoretical and therefore this challenge should be taken into account as the results are to be read in line with the quality of collected data.
- Whilst the research investigated essential individuals' competencies introduced by the (CIPD, 2004) competency heading framework, it lacks further competencies that might be effectively linked according to the type of organisation and business context such as technology related individual competencies i.e. technical knowledge and know-how.
- The extent of used individuals' competencies has not been clearly addressed.

8.12 Recommendations for Future Research

In accordance with these research achievements and in order to ensure the delivery of more robust and useful outcomes in future, the present author believes that further work needs to be performed to fill the existing gaps in knowledge regarding this area. Therefore, the author recommends that, in particular, a number of methodological and conceptual issues should be considered. These issues are summarised in the following two sub-sections.

8.12.1 Methodological Considerations

When looking at the methodological limitations this research had experienced, the present author recommends that the proposed integrated framework can be effectively tested using questionnaire-based structured interviews despite the relatively long time they require to complete. Structured interviews are a far more viable tool compared with administrative questionnaires for this research. Face-to-face structured interviews with top management and key decision-makers of surveyed organisations are critical to ensure the gaining of valuable data especially at the first interview stage. In addition, to reduce the time and work required for completion of the questionnaire, the pair-wise comparisons amongst the framework components (capabilities, key capabilities, competences, and individuals' competencies) can be conducted in the form of matrices of comparison rather than paired questions.

With regard to the examined industries, the present author considers that focusing on one industry i.e. construction with a larger sample size would provide more robust results and deliverables that would produce a valid test for the integrated framework. In addition, it would be more efficient to test the framework by concentrating on the pillar business area/s of large organisations or a particular business unit. For instance, it is worth considering and implementing the integrated framework on key business areas such as the construction management or project management functional areas of construction organisations as they primarily represent the potential areas of core competences.

8.12.2 Conceptual Considerations

There are three particular conceptual recommendations that should be taken into account for future research. Firstly, despite the time issue, it is essential to apply the AHP technique at every stage of the proposed integrated framework in order to obtain firm conclusions. Secondly, it is imperative to conduct the interviews with senior management and/or key decision-makers of targeted organisations as they have the greatest knowledge and experience of the organisation's performance and its strengths and weaknesses. Thirdly, with respect to the portfolio of used individuals' competencies, it is essential to provide more details regarding the content of each competency and the extent to which each organisational level in the organisation should be linked. In brief, it is vital to clarify, for example, the level of Communication skills the individuals at senior management and/or lower management should have. In addition, it is recommended to include further individuals' competencies that might be appropriate for some industries and imperative for specific core competences, but were not investigated.

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Appendix A

The Cover Letter of the Survey Questionnaire

Dear Sir/Madam,

Evaluating Individuals' Competencies and Organisational Core Competences of Your Company

Core competences are those capabilities which would give your company real competitive advantage. Usually these capabilities are rare, and not easily imitated or substituted by your competitors. In fact, core competences are crown jewels of your company and should be carefully maintained in-house and nurtured. In relation with this, individuals' competencies may have a critical impact on the core competence identification process and therefore should be explored.

We at Bradford University and the Sheffield Hallam University are devising a generic model to help firms identify their core competences and to provide a framework for maintaining, nurturing, and/or outsourcing various capabilities. Also, we propose a methodology to map a set of the appropriate individuals' competencies that match with identified core competences. This short questionnaire is designed to collect data by which means we can identify your company organisational core competences and determine the relevant portfolio of related individuals' competencies.

Please fill it in, or pass it on to the best qualified individuals who would be able to fill it in. Alternatively, you can make a few copies and give it to the relevant people in your company. More responses we would have, statistically we would be more confident to validate your competences (a pre-paid S.A.E. is included).

All responses would be treated in strict confidence and no names would be identified. We would send you a copy of the analysis for your company.

Thank you

Yours sincerely,

Dr. Khalid Hafeez
Director of studies

Mr. Essmail Ali Essmail
Researcher

Appendix B

The Questionnaire

Part I: Core Competence Identification

1. Capability is defined as the capacity for a team of assets to perform some task or activity. The definitions of the assets and the relevant examples are provided in Table 1. By the following example shown in Table 2, please assign the % contribution of the assets to the functional capabilities shown in Table 3.

Resources	Examples
Tangible assets	Plant, raw materials, location, equipment, machine, tools, etc.
Intangible assets	Brand name, reputation, patent, knowledge, copyright, relationship, etc. Belief, value, attitude, moral, perception, etc.

Table 1: Definitions and examples of assets

Capability	% Tangible asset	% Intangible asset	Total
Human resource management	25	75	100%

Table 2: Example of the assignment

Capability	% Tangible asset	% Intangible asset	Total
			100%
			100%
			100%
			100%

Table 3: The form for asset assignment

2. The definition of each uniqueness attribute is given in Table 4. Please put a circle on the appropriate number shown in Table 5 to indicate the degree of asset uniqueness.

Uniqueness	Definition
Rareness	The degree to which a particular asset is distinctive in competition
Inimitability	The degree to which a particular asset is inimitable by competitors
Non-substitutability	The degree to which a particular asset cannot be replaced by other assets

Table 4: The definitions of uniqueness attributes

	Rareness	Inimitability	Non-substitutability
Tangible assets (e.g., plant, machine, material)	1 2 3 4	1 2 3 4	1 2 3 4
Intangible assets (e.g., patent, brand name, knowledge, belief, value, attitude)	1 2 3 4	1 2 3 4	1 2 3 4

Table 5: Uniqueness assessment for assets
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

3. The definition of each uniqueness attribute has been given in Table 4. Please put a circle on the appropriate number shown in Table 6 to indicate the degree of capability uniqueness.

Capability	Rareness	Inimitability	Non-substitutability
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4

Table 6: Uniqueness assessment for capabilities
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

4. The definition of each collectiveness attribute is given in Table 7. Please put a cross in the appropriate box shown in Table 8 to indicate the degree to which each capability has the attributes.

Collectiveness	**Definition**
Across-function	The extent to which a capability is an indispensable element of one or more cross-functional processes
Across-product	The extent to which a capability is shared by various products
Across-business	The extent to which a capability is an indispensable element of various business units

Table 7: The definitions of collectiveness attributes

Capability	Across-function	Across-product	Across-business
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4	1 2 3 4

Table 8: The collectiveness assessment for functional capabilities
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

5. The definition of each strategic flexibility attribute is given in Table 9. Please put a cross in the appropriate box shown in Table 10 to indicate the degree to which each capability has the attributes.

Strategic flexibility	**Definition**
Resource re-deployment	The ease with which baseline resources of a competence may be re-deployed to develop new capabilities
Routine re-organisation	The ease with which the manifested routines may be re-organised to support future business development

Table 9: The definitions of strategic flexibility attributes

Capability	Resource re-deployment	Routines re-organisation
	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4
	1 2 3 4	1 2 3 4

Table 10: The strategic flexibility assessment for functional capabilities
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

6. Please indicate which **TWO** of the functional capabilities are more likely the core competences of your company.

☐ ☐

☐ ☐

☐ Other (Please specify) ________ ☐

7. What is the nature of the business carried out at your establishment?

Manufacturing	☐	Services	☐
Distribution	☐	Transport	☐
Retailing	☐	Agriculture	☐

Other (Please specify) ______________________ ☐

	under 100	100-199	200-499	500-999	over 1,000
Number of employees at your company	☐	☐	☐	☐	☐

	under 5	5-50	50-500	over 500
Estimated sales of your company for the last financial year (£m, per annum)	☐	☐	☐	☐

Part II: Organisational Competences & Individuals' Competencies

1. Core competence is a combination of (tangible and intangible assets) human, organisational, and technological contributions. Such contributions are largely influenced by the nature of core competence. Assign the % contribution of these three dimensions to each competence.

Competence	Human contribution	Organisational contribution	Technological contribution	Total 100%
C1	45	30	25	100%

Table 11: Example of competence structure

Competence	Human contribution	Organisational contribution	Technological contribution	Total 100%
				100%
				100%
				100%
				100%
				100%

Table 12: Human, organisational, and technological contributions to competences

2. Individuals' competencies play essential role to achieve the company's business objectives and have major impact on the organisational competences. Please compare the following organisational competences in pair-wise style (the competence in column first against the competences in rows and so on) in terms of the influence of individuals' competencies.

On which of these competences, do individuals' competencies have the most influence and contribution?					
Competence	C1	C2	C3	C4	C5
C1					
C2					
C3					
C4					
C5					
Total Score					

Table 13: The relative importance of individuals' competencies to organisational competences
Score: More important=2, Equally important=1, Less important=0.

3. Compare in pair-wise style between the following individuals' competencies with respect to the indicated core competence.

Core Competence: CC1							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation							
Communication skills							
People management							
Customer focus							
Results orientation							
Problem solving							
Planning and organising							
Total Score							

Table 14: The relative importance of individuals' competencies to core competence
Score: *More important=2, Equally important=1, Less important=0.*

4. Compare in pair-wise style between the following individuals' competencies with respect to the indicated core competence.

Core Competence: CC2							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation							
Communication skills							
People management							
Customer focus							
Results orientation							
Problem solving							
Planning and organising							
Total Score							

Table 15: The relative importance of individuals' competencies to core competence
Score: *More important=2, Equally important=1, Less important=0.*

Appendix C

CCA Case Study
The Questionnaire

1. Capability is defined as the capacity for a team of assets to perform some task or activity. The definitions of the assets and the relevant examples are provided in Table 1. By following the example shown in Table 2, please assign the % contribution of the assets to the functional capabilities shown in Table 3.

Resources	Examples
Physical assets	Plant, raw materials, location, equipment, machine, tools, etc.
Intellectual assets	Brand name, reputation, patent, knowledge, copyright, relationship, etc.
Cultural assets	Belief, value, attitude, moral, perception, etc.

Table 1 Definitions and examples of assets

Capability	% Physical asset	% Intellectual asset	% Cultural asset	Total
Human resource management	20	35	45	100%

Table 2 Example of the assignment

Capability	% Physical asset	% Intellectual asset	% Cultural asset	Total
Contract Management				100%
Financial & Managerial Affairs				100%
Construction Management				100%
Estates Investment				100%
Information & Development				100%

Table 3 The form for asset assignment

2. The definition of each uniqueness attribute is given in Table 4. Please put a circle on the appropriate number shown in Table 5 to indicate the degree of asset uniqueness.

Uniqueness	Definition
Rareness	The degree to which a particular asset is distinctive in competition
Inimitability	The degree to which a particular asset is inimitable by competitors
Non-substitutability	The degree to which a particular asset cannot be replaced by other assets

Table 4 The definitions of uniqueness attributes

	Rareness				Inimitability				Non-substitutability			
Physical assets (e.g., plant, machine, material)	1	2	3	4	1	2	3	4	1	2	3	4
Intellectual assets (e.g., patent, brand name, knowledge)	1	2	3	4	1	2	3	4	1	2	3	4

Table 5 Uniqueness assessment for assets
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

3. The definition of each uniqueness attribute has been given in Table 4. Please put a circle on the appropriate number shown in Table 6 to indicate the degree of capability uniqueness.

	Rareness				Inimitability				Non-substitutability			
Contract Management	1	2	3	4	1	2	3	4	1	2	3	4
Financial & Managerial Affairs	1	2	3	4	1	2	3	4	1	2	3	4
Construction Management	1	2	3	4	1	2	3	4	1	2	3	4
Estates Investment	1	2	3	4	1	2	3	4	1	2	3	4
Information & Development	1	2	3	4	1	2	3	4	1	2	3	4

Table 6 Uniqueness assessment for capabilities
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

4. The definition of each collectiveness attribute is given in Table 7. Please put a cross in the appropriate box shown in Table 8 to indicate the degree to which each capability has the attributes.

Collectiveness	**Definition**
Across-function	The extent to which a capability is an indispensable element of one or more cross-functional processes
Across-product	The extent to which a capability is shared by various products
Across-business	The extent to which a capability is an indispensable element of various business units

Table 7 The definitions of collectiveness attributes

	Across-function				Across-product				Across-business			
Contract Management	1	2	3	4	1	2	3	4	1	2	3	4
Financial & Managerial Affairs	1	2	3	4	1	2	3	4	1	2	3	4
Construction Management	1	2	3	4	1	2	3	4	1	2	3	4
Estates Investment	1	2	3	4	1	2	3	4	1	2	3	4
Information & Development	1	2	3	4	1	2	3	4	1	2	3	4

Table 8 The collectiveness assessment for functional capabilities
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

5. The definition of each strategic flexibility attribute is given in Table 9. Please put a cross in the appropriate box shown in Table 10 to indicate the degree to which each capability has the attributes.

Strategic flexibility	Definition
Ressource re-deployment	The ease with which baseline resources of a competence may be re-deployed to develop new capabilities
Routine re-organisation	The ease with which the manifested routines may be re-organised to support future business development

Table 9 The definitions of strategic flexibility attributes

	Resource re-deployment				Routines re-organisation			
Contract Management	1	2	3	4	1	2	3	4
Financial & Managerial Affairs	1	2	3	4	1	2	3	4
Construction Management	1	2	3	4	1	2	3	4
Estates Investment	1	2	3	4	1	2	3	4
Information & Development	1	2	3	4	1	2	3	4

Table 10 The strategic flexibility assessment for functional capabilities
Key: 1 = Very low; 2 = Low; 3 = High; 4 = Very high.

6. Please indicate which **TWO** of the functional capabilities are more likely the core competencies of your domain.

Contract Management ☐ Financial & Managerial Affair☐

Construction Management ☐ Estates Investment ☐

Information & Development ☐ Other (Please specify) ☐

7. What is the nature of the business carried out at your establishment?

Manufacturing ☐ Services ☐

Distribution ☐ Transport ☐

Retailing ☐ Agriculture ☐

Other (Please specify) ______________________________ ☐

8. Please provide the following information about you and your company.

Your name: ____________________ Tel: ____________________

Your position in the company ______________________________

Your company name: ________________________________

Number of employees at your company	under 100	100-199	200-499	500-999	over 1,000
	☐	☐	☐	☐	☐

Estimated sales of your company for the last financial year (£m, per annum)	under 5	5-50	50-500	over 500
	☐	☐	☐	☐

9. Please indicate whether you like to participate in a further survey.

Yes	No
☐	☐

Appendix D

The AHP Questionnaire

- **Notes about the level of comparison**

Please compare the following performance measures in pair-wise style. For each pair of measures to be compared, first indicate which item in the pair is more important to your company and then record your judgement as to the magnitude of its importance over the other item in the pair. The response scale for magnitude of importance is as follows:

Intensity of importance	Definition	Explanation
1	Equal importance	Two criteria contribute equally to the evaluation of performance
3	Weak importance of one item over another	Experience and judgement slightly favour one criterion over another
5	Strong importance	Experience and judgement strongly favour one criterion over another
7	Very strong importance	A criterion is strongly favoured and its dominance is demonstrated in practice
9	Absolute importance	The evidence favouring one criterion over another is of the highest possible
2, 4, 6, 8	Intermediate values between the two adjacent judgements	When compromise is needed

S Oil Company

- **Capabilities**

- Engineering & Design
- Communications
- Corrosion Protection
- Process Engineering
- Using Information Systems
- Project Evaluation
- Construction management

S Oil Company

- **Capabilities**

- Engineering & Design
- Communications
- Corrosion Protection
- Process Engineering
- Using Information Systems
- Project Evaluation
- Construction management

Measures	Financial Comparison	
	Which is more important?	**Value (1-9)**
Sales Growth X Operating Profit		
Sales Growth X ROCE		
Operating Profit X ROCE		
	Non-Financial Comparison	
Measures	**Which is more important?**	**Value (1-9)**
Market Share X Customer Satisfaction		
Market Share X New Product Development		
Customer Satisfaction X New Product Development		

Capabilities (Which is more important?)	Financial Comparison						Non-Financial Comparison					
	Return on Capital Employed	Value 1-9	Sales Growth	Value 1-9	Operating Profit	Value 1-9	Market Share	Value 1-9	Customer Satisfaction	Value 1-9	New Product Development	Value 1-9
Engineering & Design X Communications												
Engineering & Design X Corrosion Protection												
Engineering & Design Process Engineering X												
Engineering & Design X Using Information Systems												
Engineering & Design X Project Evaluation												
Engineering & Design X Construction management												
Communications X Corrosion Protection												
Communications X Process Engineering X												
Communications X Using Information Systems												
Communications X Project Evaluation												
Communications X Construction management												

Capabilities (Which is more important?)	Financial Comparison						Non-Financial Comparison					
	Return on Capital Employed	Value 1-9	Sales Growth	Value 1-9	Operating Profit	Value 1-9	Market Share	Value 1-9	Customer Satisfaction	Value 1-9	New Product Development	Value 1-9
Corrosion Protection X Process Engineering												
Corrosion Protection X Using Information Systems												
Corrosion Protection X Project Evaluation												
Corrosion Protection X Construction management												
Process Engineering X Using Information Systems												
Process Engineering s X Project Evaluation												
Process Engineering X Construction management												
Information Systems X Project Evaluation												
Information Systems X Construction management												
Project Evaluation X Construction management												

Measures	Collectiveness	
	Which is more important?	**Value (1-9)**
Across-function X Across- product		
Across-function X Across-business		
Across-product X Across-business		
	Uniqueness	
Measures	**Which is more important?**	**Value (1-9)**
Rareness X Inimitability		
Rareness X Non-substitutability		
Inimitability X Non-substitutability		

Capabilities (Which is more important?)	Collectiveness						Uniqueness					
	Across-function	Value 1-9	Across-product	Value 1-9	Across-business	Value 1-9	Rareness	Value 1-9	Inimitability	Value 1-9	Non-substitut-ability	Value 1-9
Engineering & Design X Communications												
Engineering & Design X Corrosion Protection												
Engineering & Design Process Engineering X												
Engineering & Design X Using Information Systems												
Engineering & Design X Project Evaluation												
Engineering & Design X Construction management												
Communications X Corrosion Protection												
Communications X Process Engineering X												
Communications X Using Information Systems												
Communications X Project Evaluation												
Communications X Construction management												

Capabilities (Which is more important?)	Collectiveness						Uniqueness					
	Across-function	Value 1-9	Across-product	Value 1-9	Across-business	Value 1-9	Rareness	Value 1-9	Inimitability	Value 1-9	Non-substitut-ability	Value 1-9
Corrosion Protection X Process Engineering												
Corrosion Protection X Using Information Systems												
Corrosion Protection X Project Evaluation												
Corrosion Protection X Construction management												
Process Engineering X Using Information Systems												
Process Engineering s X Project Evaluation												
Process Engineering X Construction management												
Information Systems X Project Evaluation												
Information Systems X Construction management												
Project Evaluation X Construction management												

Measures	**Strategic Flexibility**	
	Which is more important?	**Value (1-9)**
Resource Re-deployment X Routines Re-organisation		

Competences	**Strategic Flexibility**			
(Which competence is more important?)	**Resource Re-deployment**	**Value (1-9)**	**Routines Re-organisation**	**Value (1-9)**
Engineering & Design X Communications				
Engineering & Design X Corrosion Protection				
Engineering & Design X Process Engineering				
Engineering & Design X Using Information Systems				
Engineering & Design X Project Evaluation				
Engineering & Design X Construction Management				
Communications X Corrosion Protection				
Communications X Process Engineering				
Communications X Using Information Systems				
Communications X Project Evaluation				
Communications X Construction Management				
Corrosion Protection X Process Engineering				
Corrosion Protection X Using Information Systems				
Corrosion Protection X Project Evaluation				
Corrosion Protection X Construction Management				
Process Engineering X Using Information Systems				
Process Engineering s X Project Evaluation				
Process Engineering X Construction Management				
Information Systems X Project Evaluation				
Information Systems X Construction Management				
Project Evaluation X Construction Management				

Organisational Competences & Individuals' Competencies

Competence	Human contribution	Organisational contribution	Technological contribution	Total 100%
Engineering & Design				
Communications				
Corrosion Protection				
Process Engineering				
Using Information Systems				
Project Evaluation				
Construction management				

On which of these competences ,do individuals' competencies have the most influence and contribution?	Which one is more important?	Value (1-9)
Engineering & Design X Communications		
Engineering & Design X Corrosion Protection		
Engineering & Design X Process Engineering		
Engineering & Design X Using Information Systems		
Engineering & Design X Project Evaluation		
Engineering & Design X Construction Management		
Communications X Corrosion Protection		
Communications X Process Engineering		
Communications X Using Information Systems		
Communications X Project Evaluation		
Communications X Construction Management		
Corrosion Protection X Process Engineering		
Corrosion Protection X Using Information Systems		
Corrosion Protection X Project Evaluation		
Corrosion Protection X Construction Management		
Process Engineering X Using Information Systems		
Process Engineering s X Project Evaluation		
Process Engineering X Construction Management		
Information Systems X Project Evaluation		
Information Systems X Construction Management		
Project Evaluation X Construction Management		

Core Competence:							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation							
Communication skills							
People management							
Customer focus							
Results orientation							
Problem solving							
Planning and organising							

Core Competence:							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation							
Communication skills							
People management							
Customer focus							
Results orientation							
Problem solving							
Planning and organising							

Appendix E

Example of Pair-wise Comparison
(Whiddett and Hollyforde, 1999)

- **The Aim**

This method is used to conduct a pair-wise comparison amongst several variables (C1-C9) to determine the relative importance for a specific task or objective (See Table 1).

- **The Rule of Pair-wise Comparison**

First variable in the top row (C1) is compared with the second competency in the first column (C2) and so on. The competency in the top row is the first to be referred to. Diagonal squares are shaded because a variable can not be compared with itself.

Task/Objective: T1									
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**
C1									
C2									
C3									
C4									
C5									
C6									
C7									
C8									
C9									
Overall Score									

C: competency.*
***Score**: More important=2; Equally important=1; Less important=0.*
Table 1: The relative importance comparison.

- **Example**

This example presents the analysis of comparing the most relative influence and contribution made by individuals' competencies on organisational competences of CCA case study (Table 2). It also explains the relative importance of the examined individuals' competencies with respect to *New Architecture Design* core competence for CCA.

On which of these competences, do individuals' competencies have the most influence and contribution?					
	New Architect. Designs	Marble Works	Ventilation Systems Works	Electricity Works	Low Cost Estates
New Architecture Designs		0	0	0	2
Marble Works	2		0	2	2
Cooling / Heating Systems Works	2	2		2	2
Electricity Works	2	0	0		2
Low Cost Estates	0	0	0	0	
Overall Score	**6**	**2**	**0**	**4**	**8**

Table 2: The evaluation of the contribution of individuals' competencies on organisational competences for CCA.

Core Competence: New Architecture Design							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation		0	2	1	2	2	1
Communication skills	2		2	2	2	2	1
People management	0	0		2	2	2	0
Customer focus	1	0	0		1	1	1
Results orientation	0	0	0	1		1	1
Problem solving	0	0	0	1	1		1
Planning and organising	1	1	2	1	1	1	
Overall Score	**4**	**1**	**6**	**8**	**9**	**9**	**5**

Table 3: Determining the most related individuals' competencies for *New Architecture Design* core competence for CCA.

Appendix F

Celltech Case study

- **Celltech Overview**

Celltech is a leading European biotechnology company, with a substantial long-term commitment to innovative drug discovery and development. Celltech's extensive product pipeline provides excellent prospects for sustained growth, driving its goal of becoming a global biotechnology leader.

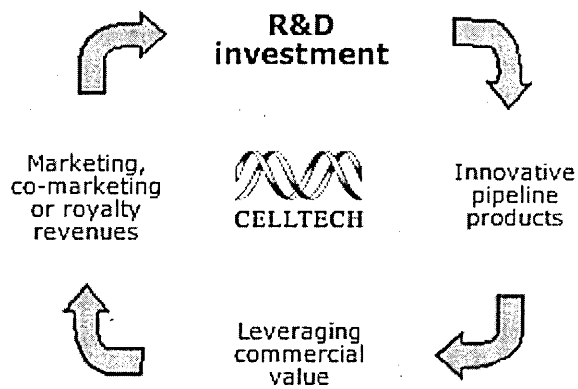

Fig.1: Corporate overview of Celltech.

Celltech is pursuing an R&D-centred strategy, with its substantial investment in R&D being sustained by revenues from its profitable and cash-generative pharmaceutical business. The company is focused upon maximising value retention from its products, whilst maintaining an appropriate risk/reward profile. This approach includes partnering for strength with major pharmaceutical companies who excel in a particular disease area, where Celltech retains co-marketing rights, profit-sharing arrangements, or substantial royalties.

The Group consists of two operating companies: Celltech R&D, the discovery and development business; and Celltech Pharmaceuticals, the marketing, distribution, and manufacturing business.

Celltech R&D

Celltech R&D pursues a dual-pipeline approach, focused in its core areas of autoimmune and inflammatory disorders and cancer. In the therapeutic antibody field, a combination of expertise and innovative technologies enables Celltech to move rapidly from antibody targets to clinical trials of engineered human antibodies. In addition, Celltech has strong capabilities in the design and production of small molecule therapeutics.

Celltech Pharmaceuticals

Celltech Pharmaceuticals is the international pharmaceutical business, with substantial operations in the US and a number of major European countries. The pharmaceutical business will provide a platform for the future commercialisation of Celltech's pipeline products in specialised therapy areas (www.celltech group.com).

Celltech's Key Research Areas

Celltech Group is a fully integrated biopharmaceutical company, with exceptional drug discovery capabilities focused in its core therapeutic areas of autoimmune and inflammatory disorders, cancer, and bone biology. Celltech R&D, the discovery and development business within Celltech Group, employs over 450 research scientists engaged in the discovery of novel human therapies.

Based at three research sites in Seattle (US), Slough (UK), and Cambridge (UK), Celltech R&D is pursuing both antibody- and small-molecule-based therapeutics, with a broad range of expertise, capabilities, and methods.

Celltech Pharmaceuticals is an international pharmaceutical business, employing 1600 staff in the US and a number of major European countries.

Marketed Products

Following is a listing of Celltech products, both owned and co-promoted:

- Cardiovascular
- Central Nervous System
- Dermatology
- Gastrointestinal
- General Products
- Powderject Products sold by Celltech Representatives
- Respiratory
- Rheumatology
- Respiratory
- Celltech Partnered products sold by partners

Appendix G

Water and Sewerage Services Company (WSSC)

- **Company Background**

    - Industry: Utility
    - Business: Water supply and sewerage services
    - Employees: › 700 employees
    - Turnover: › £7 million

- **The Examined Functional Capabilities**

    - Financial and Managerial Affairs
    - Performance & Development Management
    - Water Management
    - Facilities Management Electricity supply management
    - Sewerage Management
    - Project Management

Capability	Tangible assets %	Intangible assets %	Total %
Financial and Managerial Affairs	70	30	100
Performance & Development Management	25	75	100
Water Management	60	40	100
Facilities Management	70	30	100
Sewerage Management	65	35	100
Project Management	40	60	100

Table 1: The composition of capabilities of WSSC.

- **Key Capabilities**

    - Financial and Managerial Affairs
    - Performance & Development Management
    - Water Management
    - Facilities Management Electricity supply management
    - Sewerage Management
    - Project Management

- **Organisational Competences**

    - Water Management
    - Sewerage Management

- **Core Competences (at the top management level)**
    - Water Management

Analysis of Water management

• The Examined Operational Capabilities

- Exploration & excavation
- Continuous water supply
- Secure network
- Water quality tests
- Disinfectant processes

• Key Capabilities

- Exploration & excavation
- Continuous water supply
- Secure network
- Water quality tests
- Disinfectant processes

• Organisational Competences

- Secure network
- Water quality tests
- Disinfectant processes

• Core Competences (at the second management level)

- Secure network
- Water quality tests

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Exploration & excavation	60	40	100
Continuous water supply	70	30	100
Secure network	65	35	100
Water quality tests	80	20	100
Disinfectant processes	80	20	100

Table 2: The composition of capabilities of Water management.

Appendix H

Electricity Supply Company A (ESCA)

- **Company Background**
    - Industry: Utility
    - Business: Electricity supply
    - Employees: › 1000 employees
    - Turnover: › £20 million

- **The Examined Functional Capabilities**
    - Services and training management
    - Purchasing and inventory
    - Research and development: R&D
    - Sales
    - Electricity supply management
    - IT
    - Installation management
    - Safety management
    - Facilities management

- **Key Capabilities**
    - Services and training management
    - Purchasing and inventory
    - Research and development: R&D
    - Sales
    - Electricity supply management

- **Organisational Competences**
    - Purchasing and inventory
    - R&D
    - Electricity supply management

- **Core Competences (at the top management level)**
    - R&D
    - Electricity supply management

Analysis of R & D

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Network extension	70	30	100
Fault reduction research	25	75	100
Safety applications	80	20	100

Table 1: The composition of operational capabilities of R&D.

Operational Key Capability	**Collectiveness**			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Network extension	2	3	3	**8**
Fault reduction research	3	3	3	**9**
Safety applications	3	4	3	**10**

Table 2: Collectiveness analysis of R&D.

Operational Key Capability	**Uniqueness**			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Network extension	3	3	2	**8**
Fault reduction research	3	3	3	**9**
Safety applications	3	2	3	**8**

Table 3: Uniqueness assessment of R & D.

Operational Key Capability	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Network extension	**8**	**8**
Fault reduction research	**9**	**9**
Safety applications	**10**	**8**
Mean Value	***9.00***	***8.33***

Table 4: Determining competences of R & D.

Organisational Competence	**Strategic Flexibility**		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Fault reduction research	2	2	**4**

Table 5: Strategic flexibility analysis of R&D.

Analysis of Electricity supply management (ESM)

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Testing	60	40	100
On-time Repairing	70	30	100
Safety systems	80	20	100
Monitoring and control	70	30	100

Table 6: The composition of operational capabilities of ESM.

Operational Key Capability	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Testing	3	4	3	**10**
On-time Repairing	3	4	3	**10**
Safety systems	3	3	3	**9**
Monitoring and control	3	4	3	**10**

Table 7: Collectiveness analysis of ESM.

Operational Key Capability	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Testing	2	3	3	**8**
On-time Repairing	2	3	3	**8**
Safety systems	2	2	2	**6**
Monitoring and control	3	2	3	**8**

Table 8: Uniqueness assessment of ESM.

Operational Key Capability	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Testing	**10**	**8**
On-time Repairing	**10**	**8**
Safety systems	**9**	**6**
Monitoring and control	**10**	**8**
Mean Value	***9.75***	***7.50***

Table 9: Determining competences of ESM.

Organisational Competence	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Testing	3	3	**6**
Monitoring and control	2	3	**5**
On-time Repairing	3	3	**6**
Mean Value			***5.67***

Table 10: Strategic flexibility analysis of ESM.

- **Determining the most relevant individuals' competencies with *Testing* core competence**

Core Competence: Testing							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation T(O)		1	0	0	0	0	1
Communication skills (CS)	1		1	1	0	0	1
People management (PM)	2	1		0	0	0	1
Customer focus (CF)	2	1	2		1	1	1
Results orientation (RO)	2	2	2	1		1	1
Problem solving (PS)	2	2	2	1	1		1
Planning and organising (P&O)	1	1	1	1	1	1	
Overall Score	**10**	**8**	**8**	**4**	**3**	**3**	**6**

(Score: More important=2; equally important=1; less important=0).

Table 11: The relative weights of individuals' competencies against *testing* core competence.

Rule of Pair-wise Comparison: First competency in the top row (TO) is compared with the second competency in the first column (CS) and so on. The competency in the top row is the first to be referred to.

- **Determining the most relevant individuals' competencies with On-time *Repairing* core competence**

Core Competence: On-time Repairing							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation T(O)		0	0	0	0	0	1
Communication skills (CS)	2		1	0	2	1	2
People management (PM)	2	1		2	1	1	1
Customer focus (CF)	2	2	0		1	1	2
Results orientation (RO)	2	0	1	1		1	1
Problem solving (PS)	2	1	1	1	1		1
Planning and organising (P&O)	1	0	1	0	1	1	
Overall Score	**11**	**4**	**4**	**4**	**6**	**5**	**8**

Table 12: The relative weights of individuals' competencies against *on-time repairing* core competence.

Analysis of services and training management (S&TM)

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Personnel Management	30	70	100
Performance Review	20	80	100
Organisational Management	20	80	100
Relationships & Services	20	80	100
Training Development	45	55	100
Rewards system	25	75	100
Incentives policies	30	70	100

Table 13: The composition of operational capabilities of Services & training.

Operational Capabilities	**Collectiveness**			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Personnel Management	3	4	3	**10**
Performance Review	3	4	4	**11**
Organisational Management	3	4	3	**10**
Relationships & Services	3	3	3	**9**
Training Development	3	4	3	**10**

Table 14: Collectiveness assessment of Services & training operational capabilities.

Operational Capabilities	**Uniqueness**			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Personnel Management	3	2	3	**8**
Performance Review	2	2	3	**7**
Organisational Management	3	3	3	**9**
Relationships & Services	2	2	2	**6**
Training Development	3	2	3	**8**

Table 15: Uniqueness assessment of Services & training operational capabilities.

Operational Capabilities	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Personnel Management	**10**	**8**
Performance Review	**11**	**7**
Organisational Management	**10**	**9**
Relationships & Services	**9**	**6**
Training Development	**10**	**8**
Mean Value	**10.00**	**7.60**

Table 16: Determining competences of Services and training management.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Personnel Management	3	3	**6**
Organisational Management	3	3	**6**
Training Development	3	3	**6**
Mean Value			***6.00***

Table 17: Strategic flexibility analysis of Services and training management.

Appendix I

T Oil Services

- **Company Background**
    - Industry: Utility
    - Business: Electricity supply
    - Employees: 374 employees
    - Turnover: ≈ £50 million

- **The Examined Functional Capabilities**
    - Project management
    - Engineering & Design
    - Construction management
    - Procurement services
    - Technology transfer
    - Oil field equipment supply
    - Quality management
    - Consultancy services

- **Key Capabilities**
    - Engineering & Design
    - Consultancy services

- **Organisational Competences**
    - Engineering & Design
    - Consultancy services

- **Core Competences**
    - Engineering & Design
    - Consultancy services

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Project management	5	95	100
Engineering & design	10	90	100
Construction management	15	85	100
Procurement services	5	95	100
Technology transfer	5	95	100
Oil field equipment supply	5	95	100
Quality management	5	95	100
Consultancy services	5	95	100

Table 1: The composition of capabilities of TOS.

Capability	Financial Performance	Non-Financial Performance
Project management	0.199	0.154
Engineering & design	0.161	0.138
Construction management	0.099	0.088
Procurement services	0.136	0.086
Technology transfer	0.039	0.159
Oil field equipment supply	0.144	0.119
Quality management	0.083	0.129
Consultancy services	0.139	0.127
Mean Value	***0.125***	***0.125***

Table 2: Determining key capabilities for TOS using the AHP method.

Key Capability	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Total Score
Project management	4	1	4	**9**
Engineering & design	4	3	4	**11**
Consultancy services	4	4	4	**12**

Table 3: Collectiveness analysis of TOS.

Key Capability	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Total Score
Project management	3	3	2	**8**
Engineering & design	3	3	4	**10**
Consultancy services	2	3	4	**9**

Table 4: Uniqueness assessment of TOS.

Key Capability	Collectiveness Total Score	Uniqueness Total Score
Project management	9	8
Engineering & design	11	10
Consultancy services	12	9
Mean Value	**10.66**	**9.00**

Table 5: Determining competences of TOS.

Organisational Competences	**Strategic Flexibility**		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Total Score
Engineering & design	2	3	**5**
Consultancy services	2	4	**6**
Mean Value			***5.50***

Table 6: Strategic flexibility analysis of TOS.

Competence	Human contribution	Organisational contribution	Technological contribution	Total %
Project management	50	45	5	100
Engineering & design	45	30	25	100
Construction management	33	32	35	100
Procurement services	45	45	10	100
Technology transfer	45	45	10	100
Oil field equipment supply	25	25	50	100
Quality management	25	70	5	100
Consultancy services	33	33	34	100

Table 7: The composition of TOS's organisational competences.

Question: On which of these competences do individuals' Competencies have the most influence and contribution?	
Competence	Relative Importance
Project management	7
Engineering & design	7
Construction management	6
Procurement services	11
Technology transfer	6
Oil field equipment supply	10
Quality management	2
Consultancy services	7

Table 8: The contributions of individuals' competencies on TOS's organisational competences.

Core Competence: Consultancy services	
Individual Competency	Relative Importance
Customer focus	2
Team orientation	7
People management	9
Planning and organising	10
Problem solving	4
Communication skills	0
Results orientation	10

Table 9: The prioritisation process of individuals' competencies against the Consultancy service core competence.

Core Competence: Engineering and design	
Individual Competency	Relative Importance
Customer focus	2
Team orientation	5
People management	10
Planning and organising	9
Problem solving	5
Communication skills	4
Results orientation	7

Table 10: The prioritisation process of individuals' competencies against the Engineering and design competence.

Appendix J

Construction Company D

- **Company Background**
  - Industry: Construction
  - Business: Construction and development
  - Employees: 140
  - Turnover: £40 million

- **Capabilities**
  - Modern methods of construction
  - Value added design
  - Modern style design
  - Innovative solutions
  - Cost effective construction
  - Quality management
  - Completion on time
  - Execution to specifications
  - Safety, environment applications

- **Key Capabilities**
  - Value added design
  - Innovative solutions
  - Quality management
  - Execution to specifications

- **Competences**
  - Innovative solutions
  - Execution to specifications

- **Core Competences**
  - Innovative solutions
  - Execution to specifications

Sensitivity Analysis

- **Sensitivity Analysis of Operating Profit Measure**

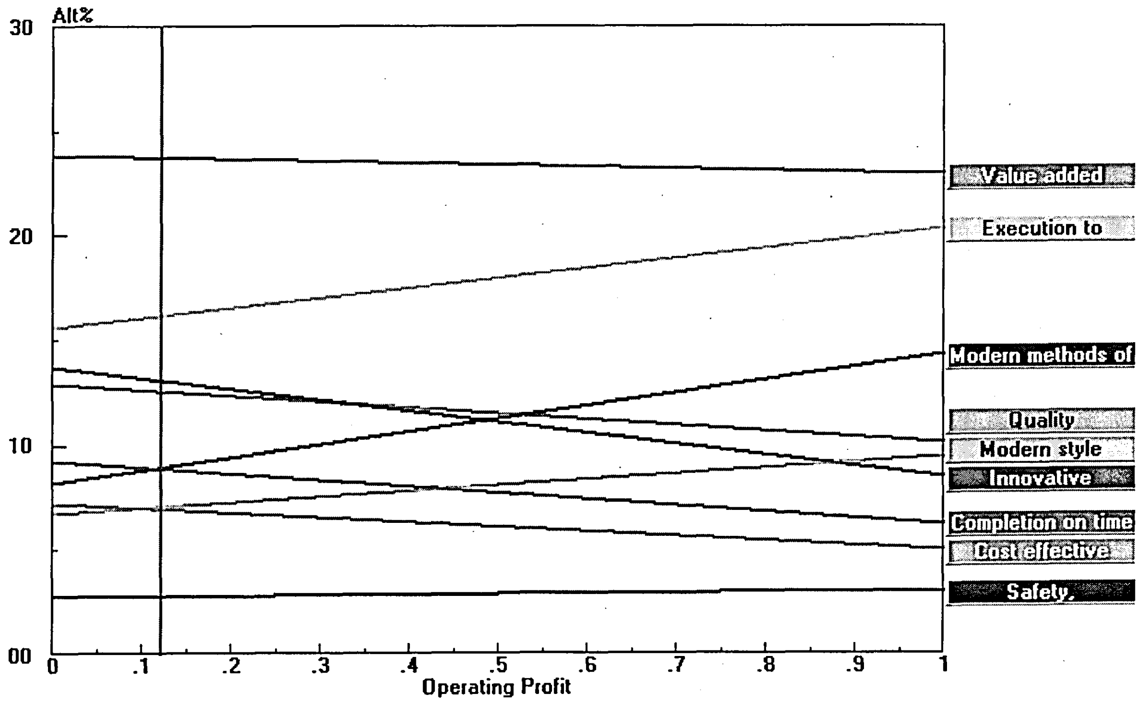

Fig. 1: The sensitivity graph with respect to the actual value (0.122) of Operating profit priority.

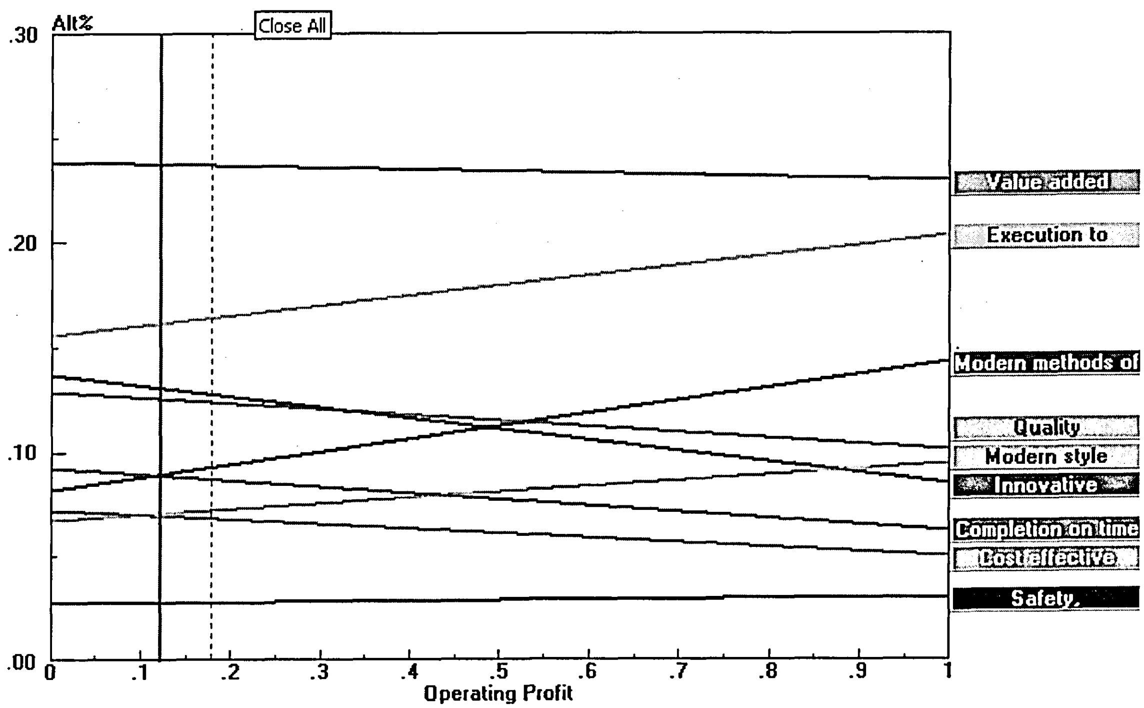

Fig. 2: The sensitivity graph with respect to changing the priority of Operating profit by +50%.

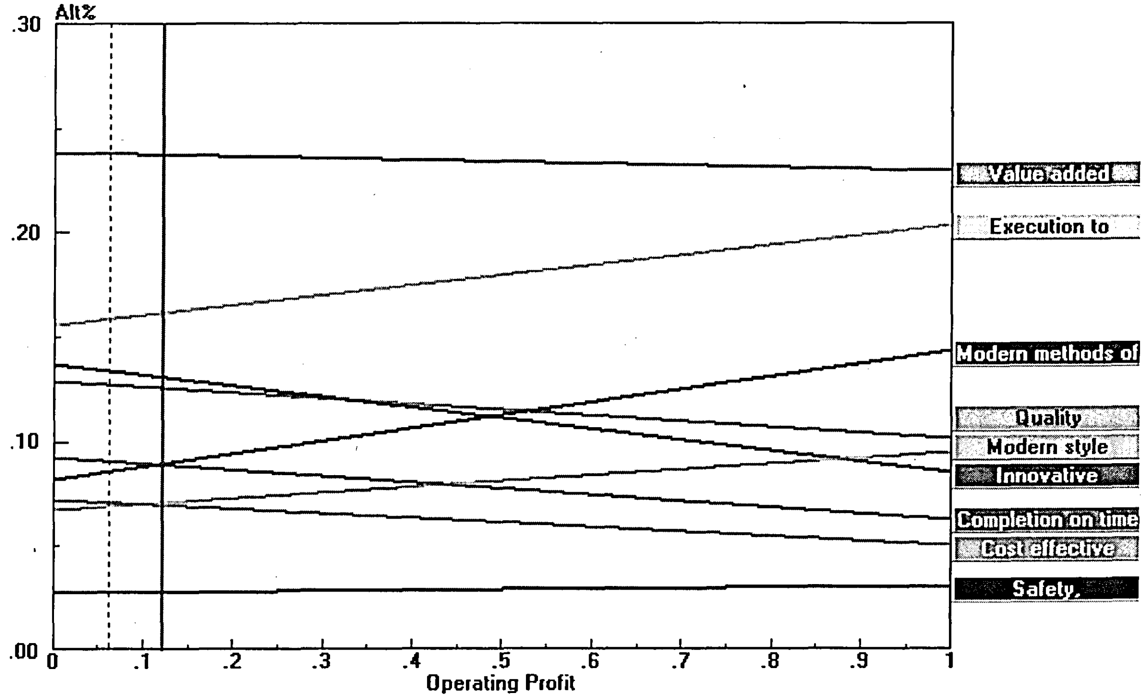

Fig. 3: The sensitivity graph with respect to changing the priority of Operating profit by −50%.

- **Sensitivity Analysis of Return on Capital Employed Measure**

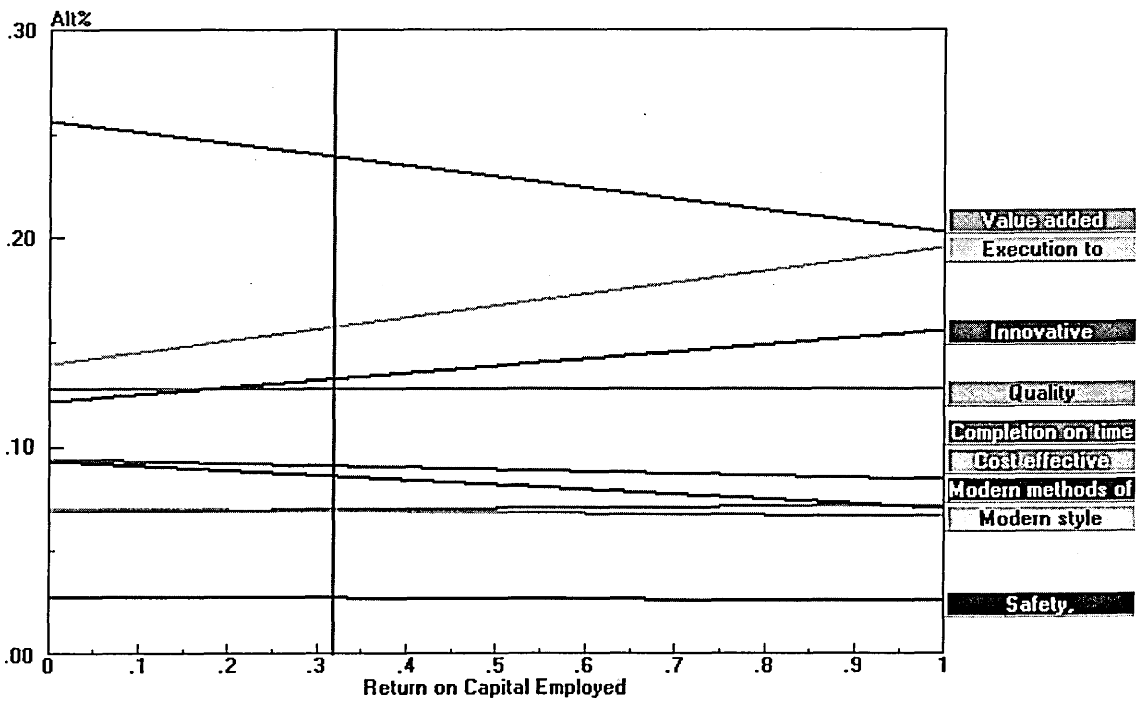

Fig. 4: The sensitivity graph with respect to the actual value (0.320) of Return on capital employed priority.

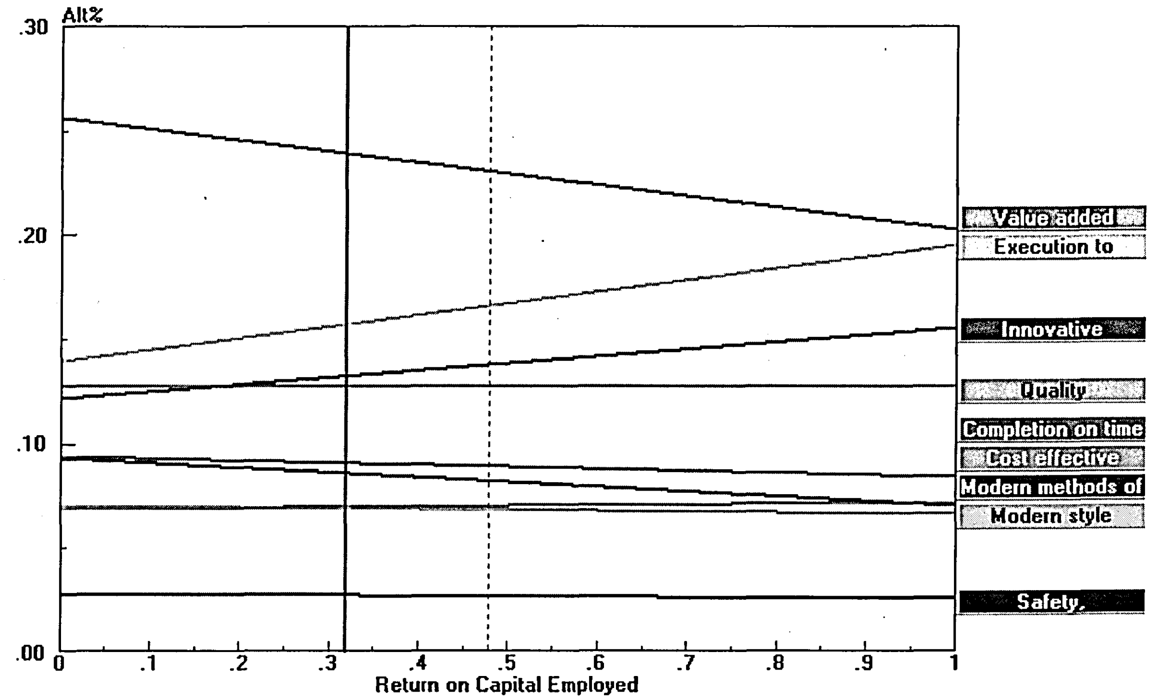

Fig. 5: The sensitivity graph with respect to changing the priority of Return on capital employed by +50%.

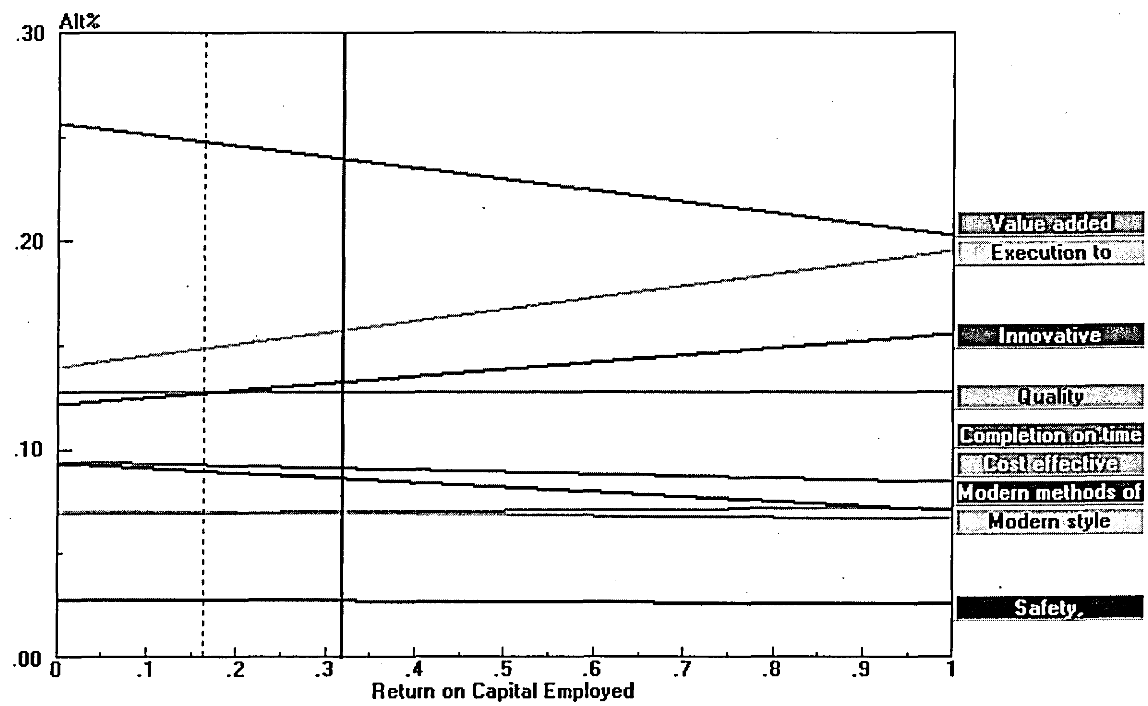

Fig. 6: The sensitivity graph with respect to changing the priority of Return on capital employed by −50%.

- **Sensitivity Analysis of Customer Satisfaction Measure**

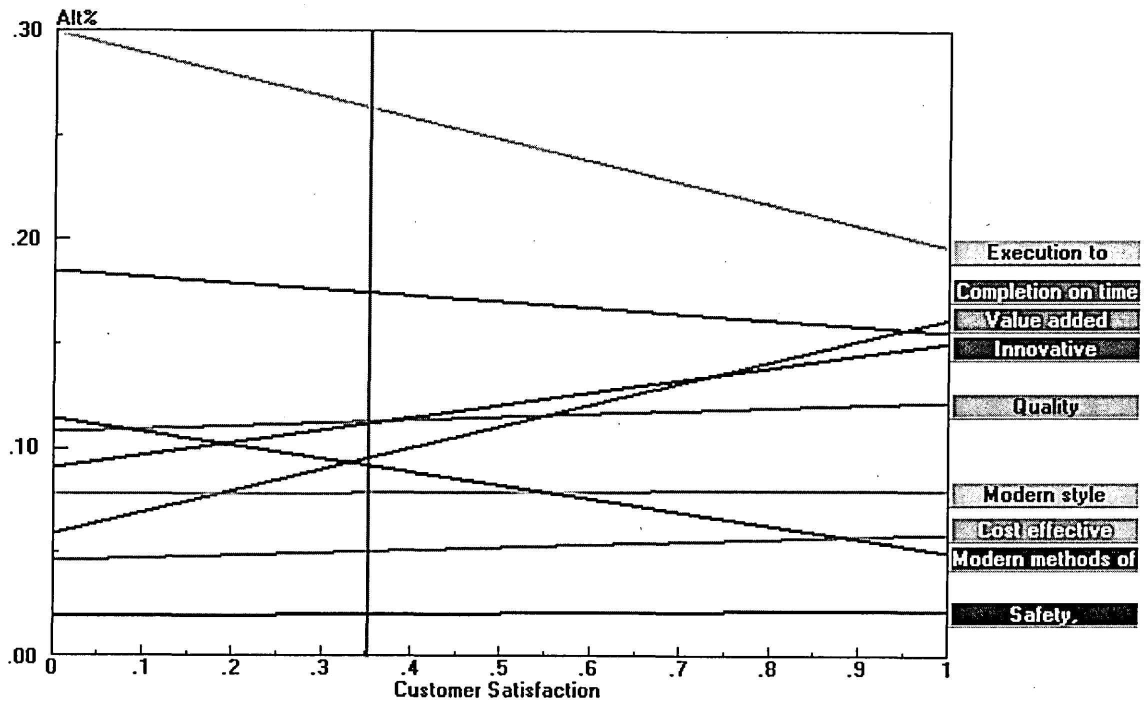

Fig.7: The sensitivity graph with respect to the actual value (0.352) of Customer satisfaction priority.

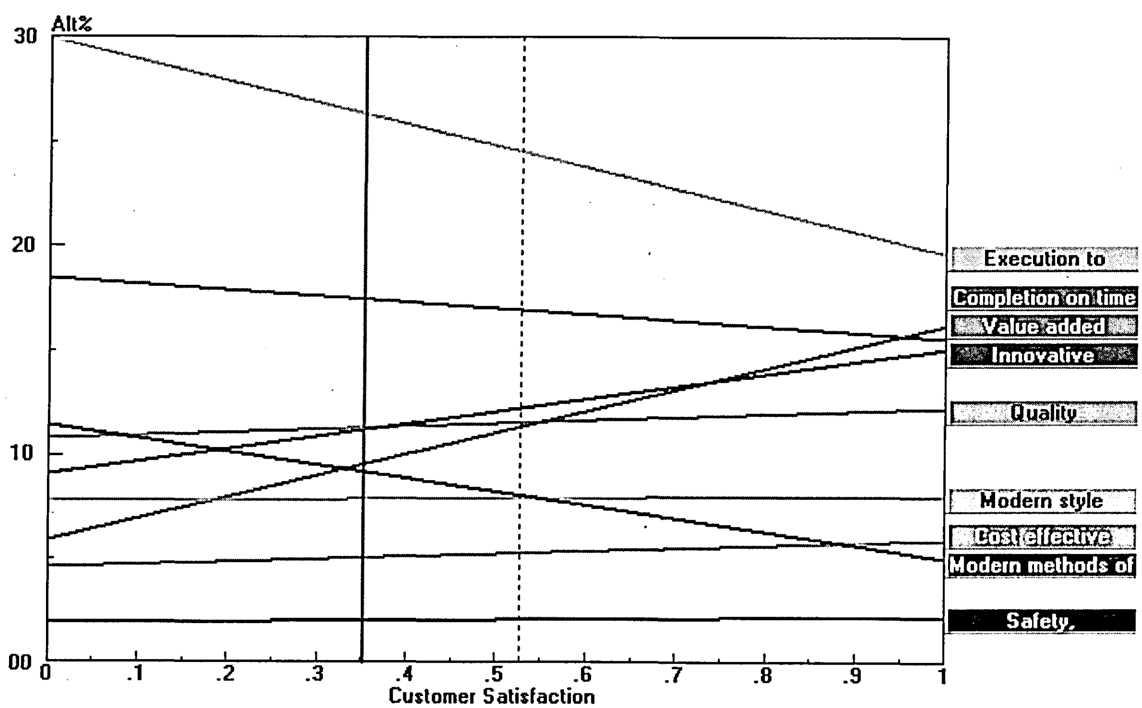

Fig.8: The sensitivity graph with respect to changing the priority of Customer satisfaction by +50%.

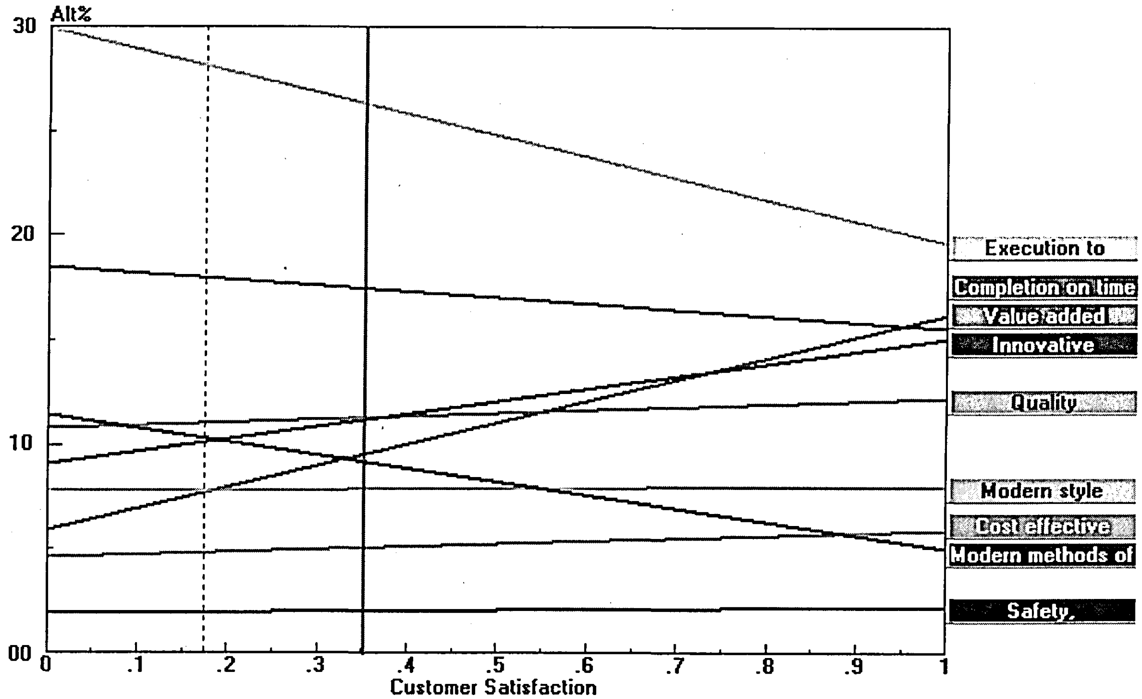

Fig.9: The sensitivity graph with respect to changing the priority of Customer satisfaction by −50%.

- **Sensitivity Analysis of Market Share Measure**

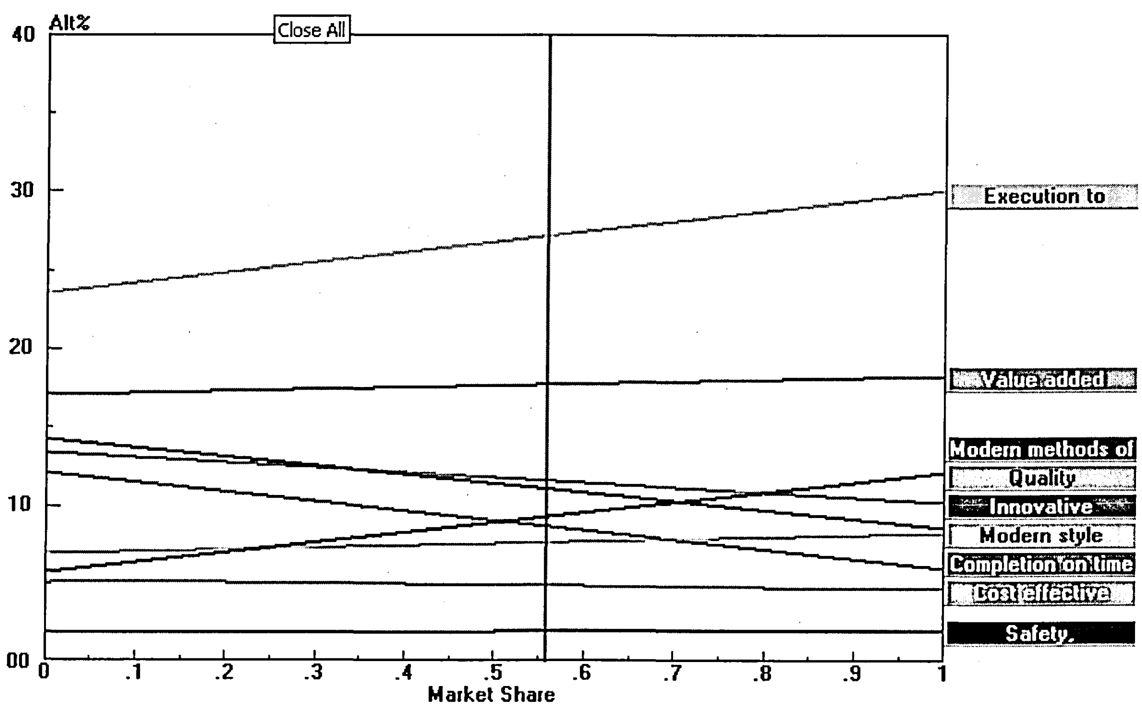

Fig.10: The sensitivity graph with respect to the actual value (0.559) of Market share priority.

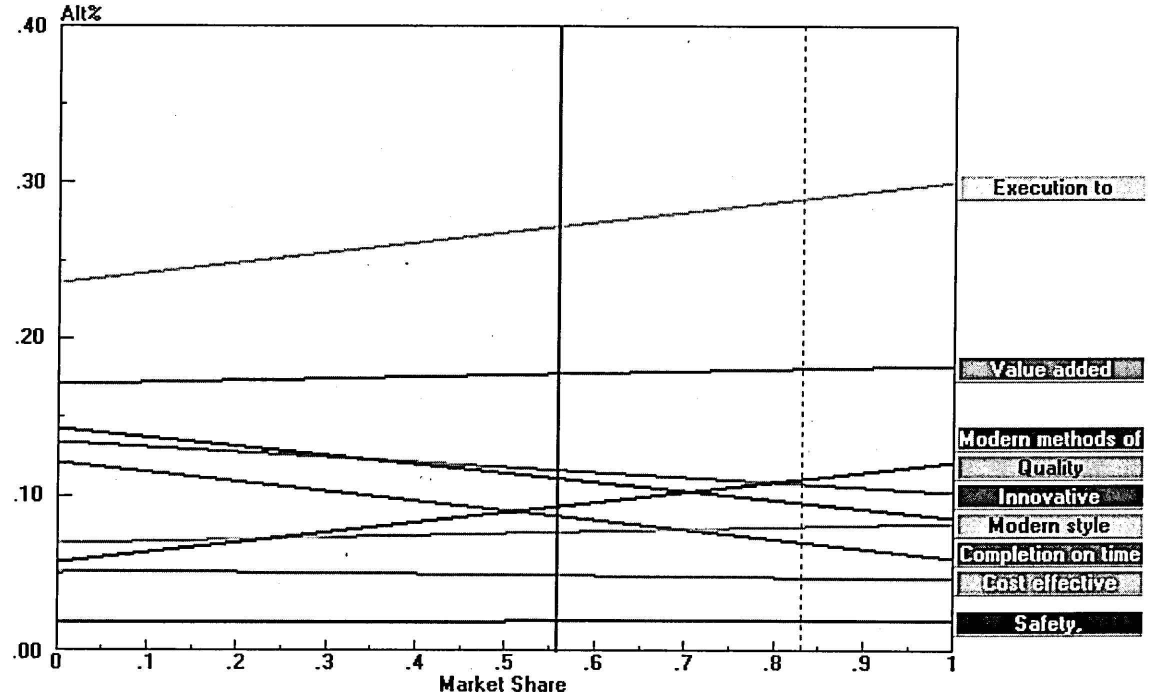

Fig.11: The sensitivity graph with respect to changing the priority of Market share by +50%.

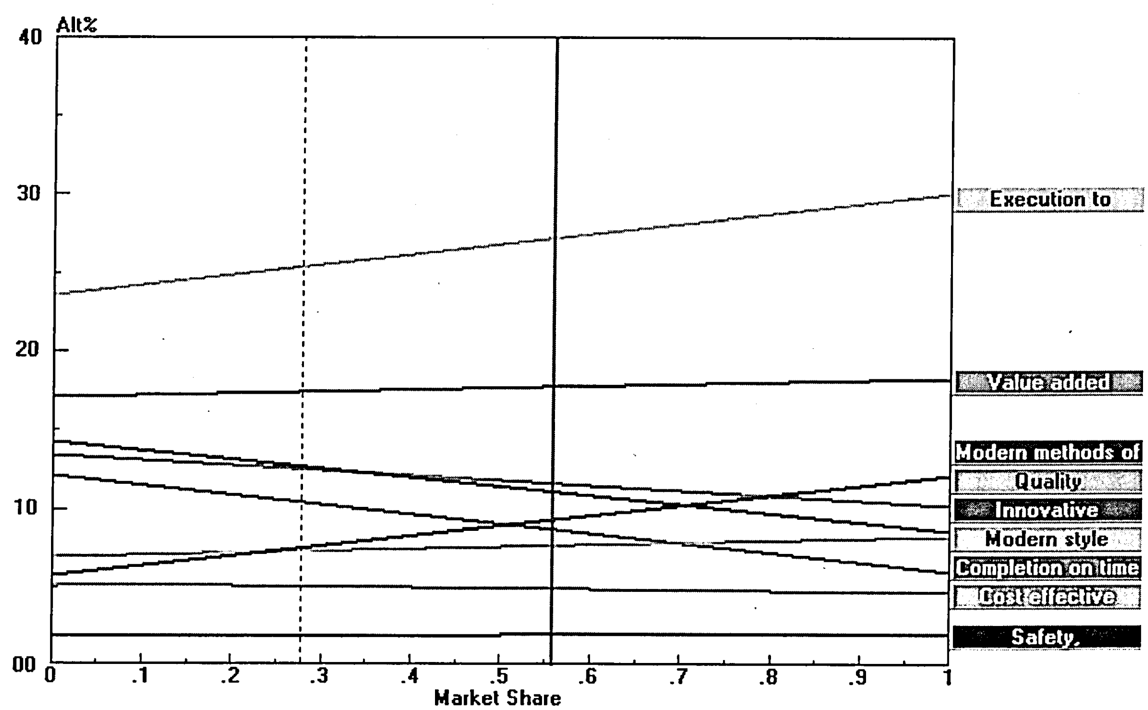

Fig. 12: The sensitivity graph with respect to changing the priority of Market share by −50%.

- **Sensitivity Analysis of New Product Introduction Measure**

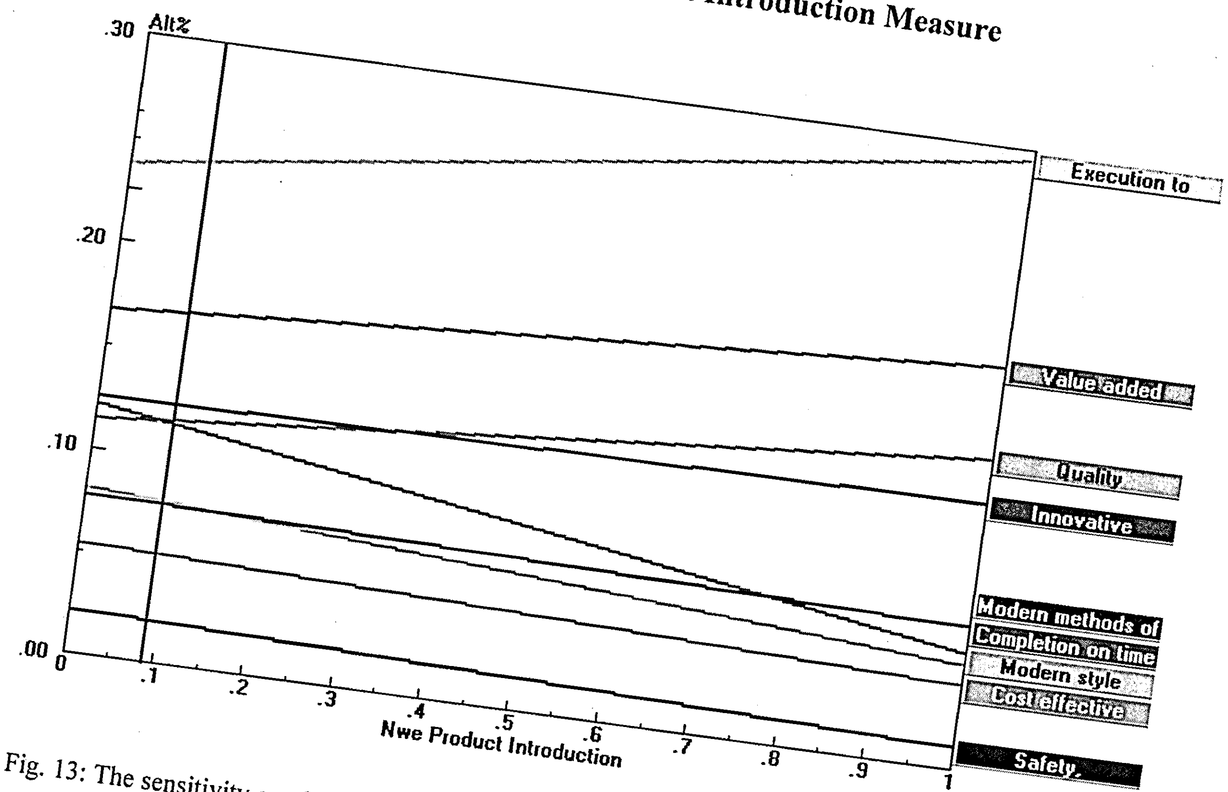

Fig. 13: The sensitivity graph with respect to the actual value of (0.089)New product introduction priority.

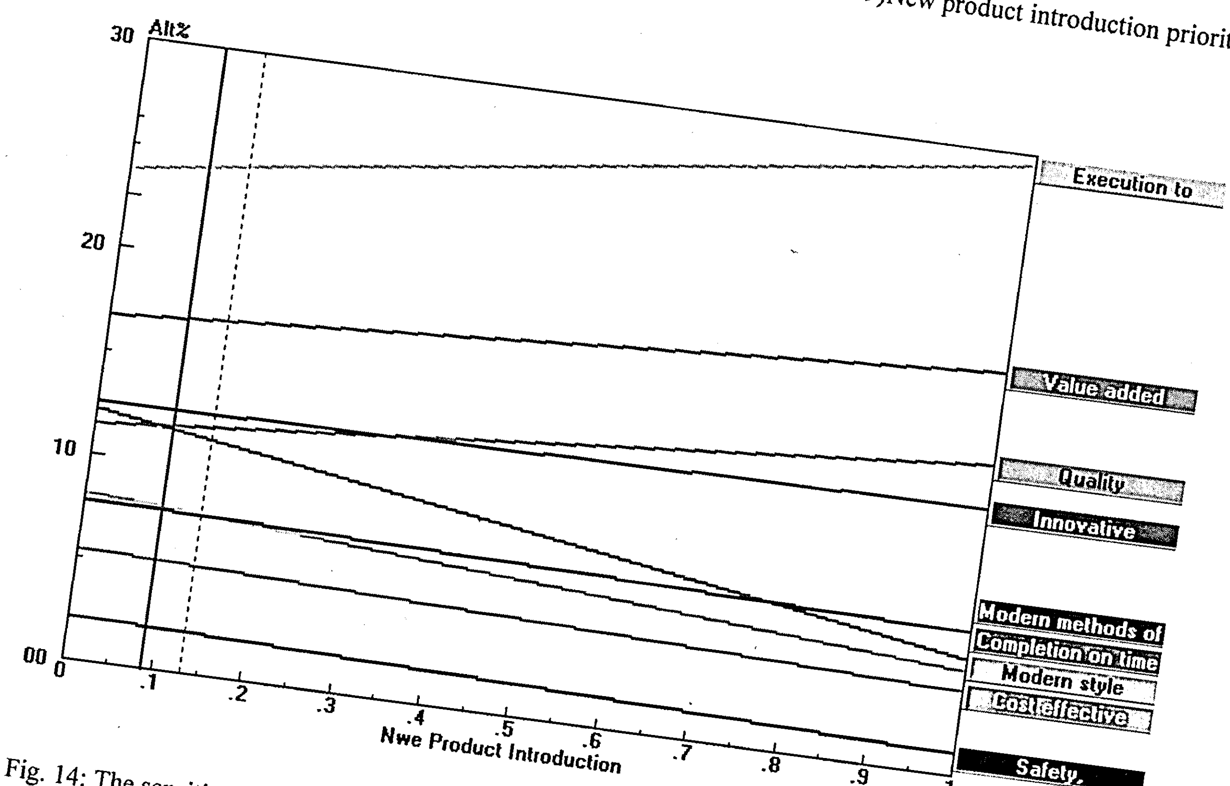

Fig. 14: The sensitivity graph with respect to changing the priority of New product introduction by +50%.

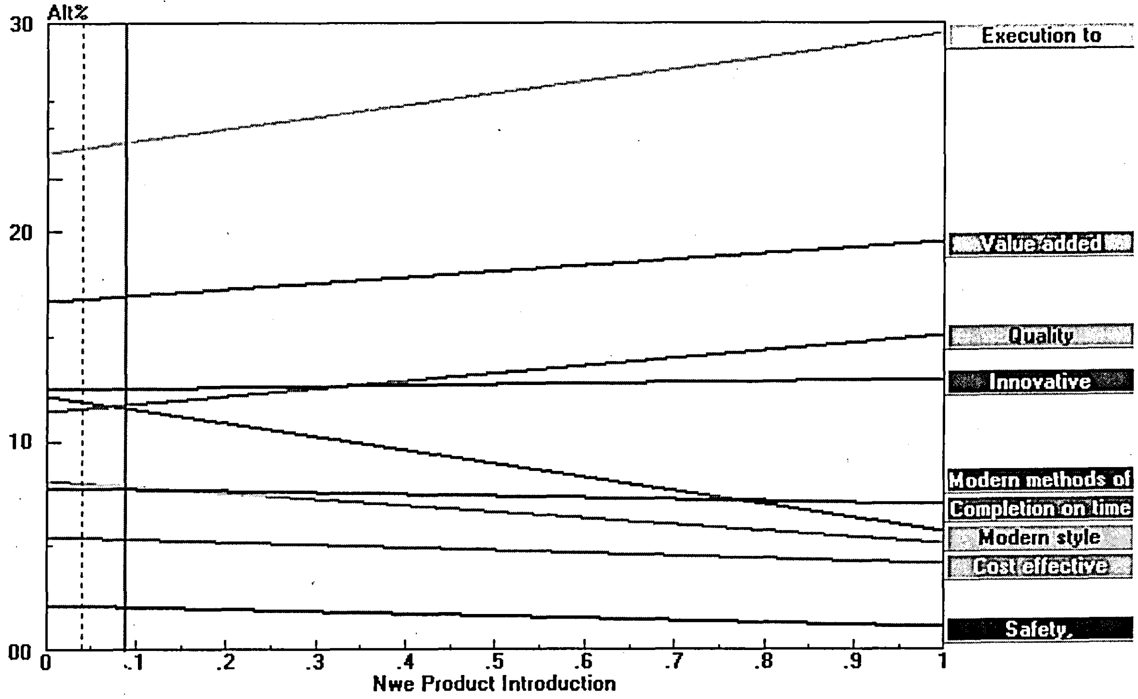

Fig. 15: The sensitivity graph with respect to changing the priority of New product introduction by −50%.

- **Sensitivity Analysis of Collectiveness (Across-business)**

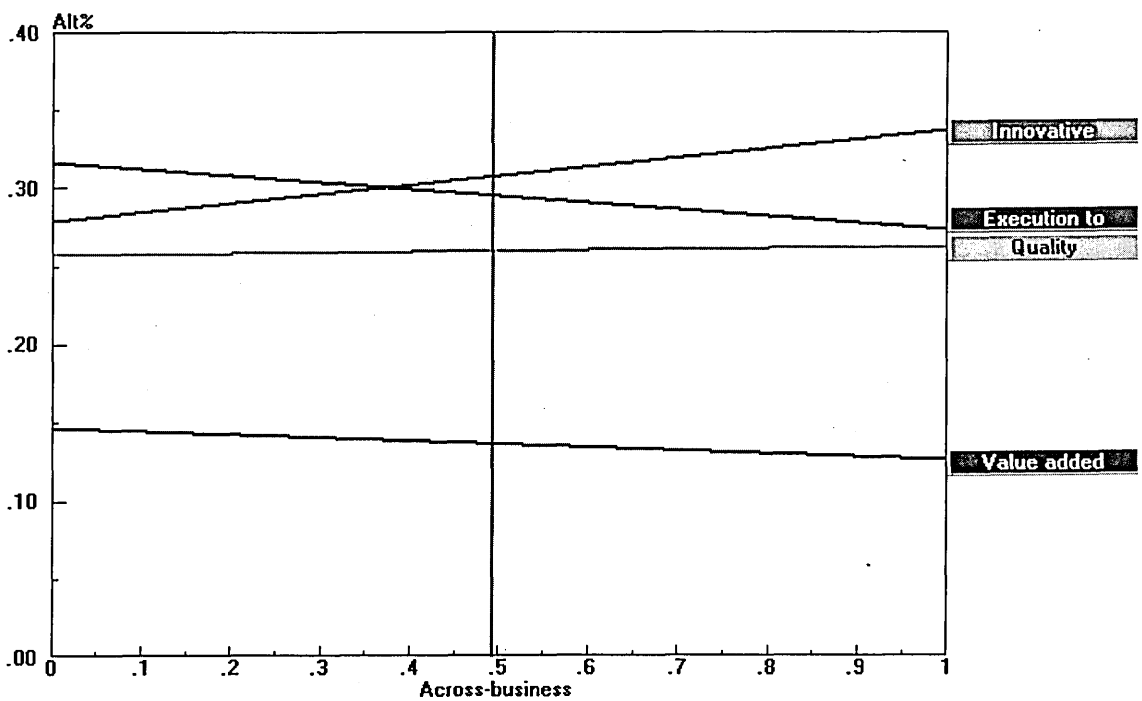

Fig. 16: The sensitivity graph with respect to the actual value (0.311) of Across-business attribute priority.

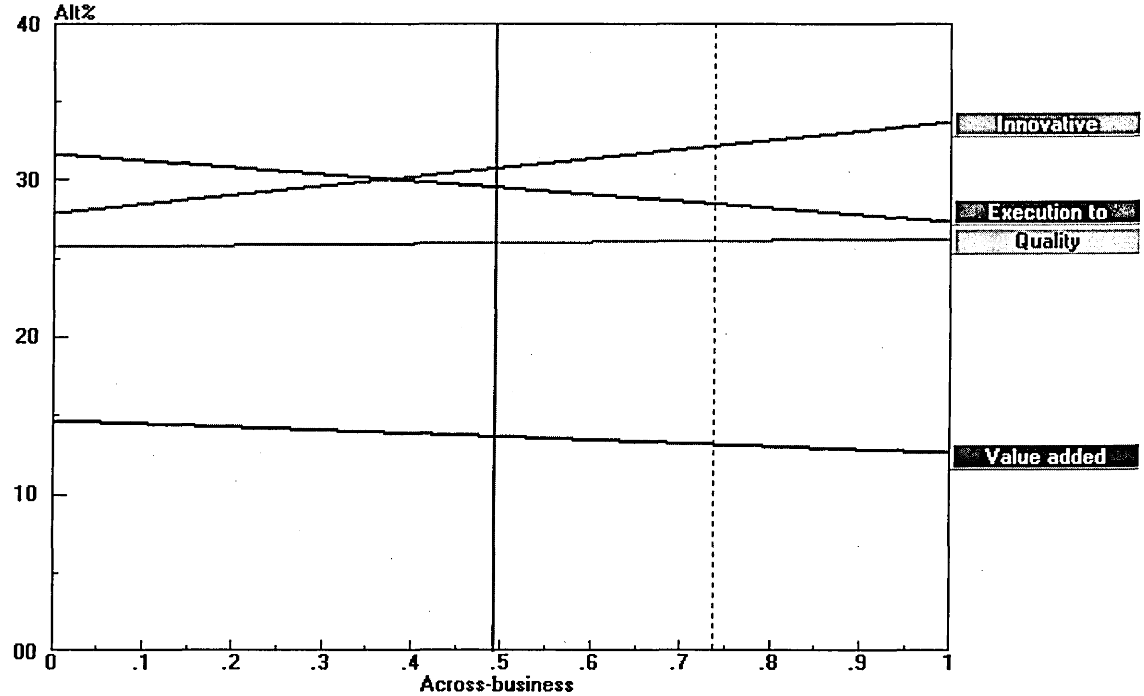

Fig. 17: The sensitivity with respect to changing the priority of Across-business attribute by +50%.

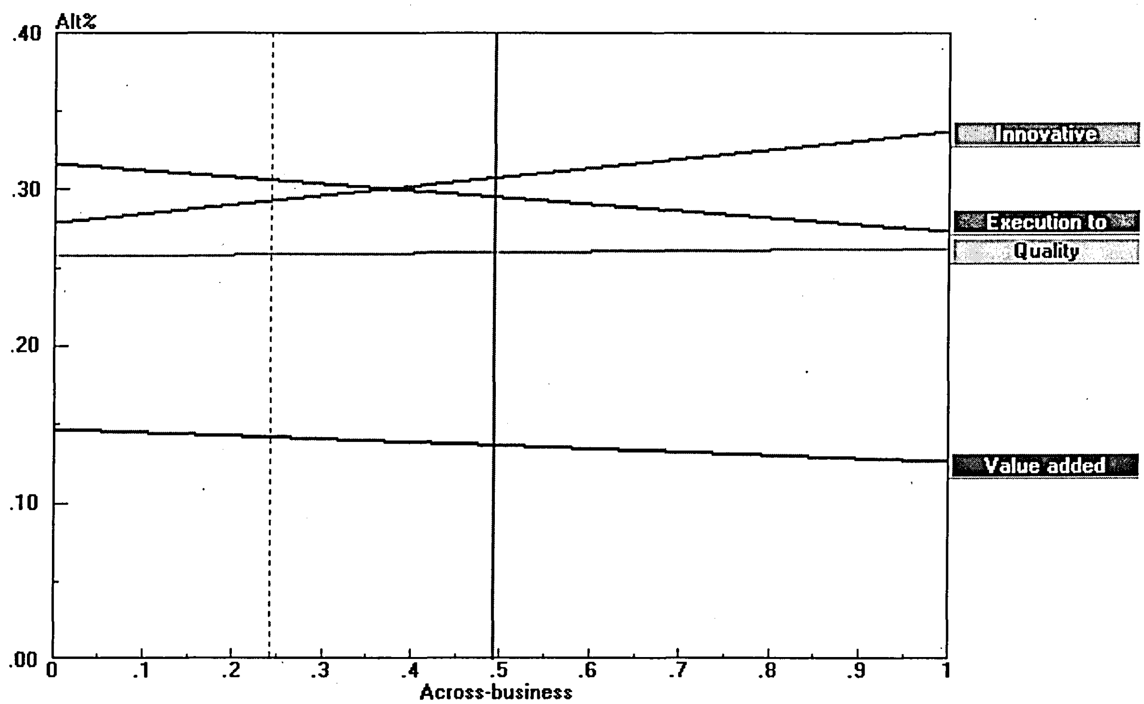

Fig. 18: The sensitivity with respect to changing the priority of Across-business attribute by −50%.

- **Sensitivity Analysis of (Rareness)**

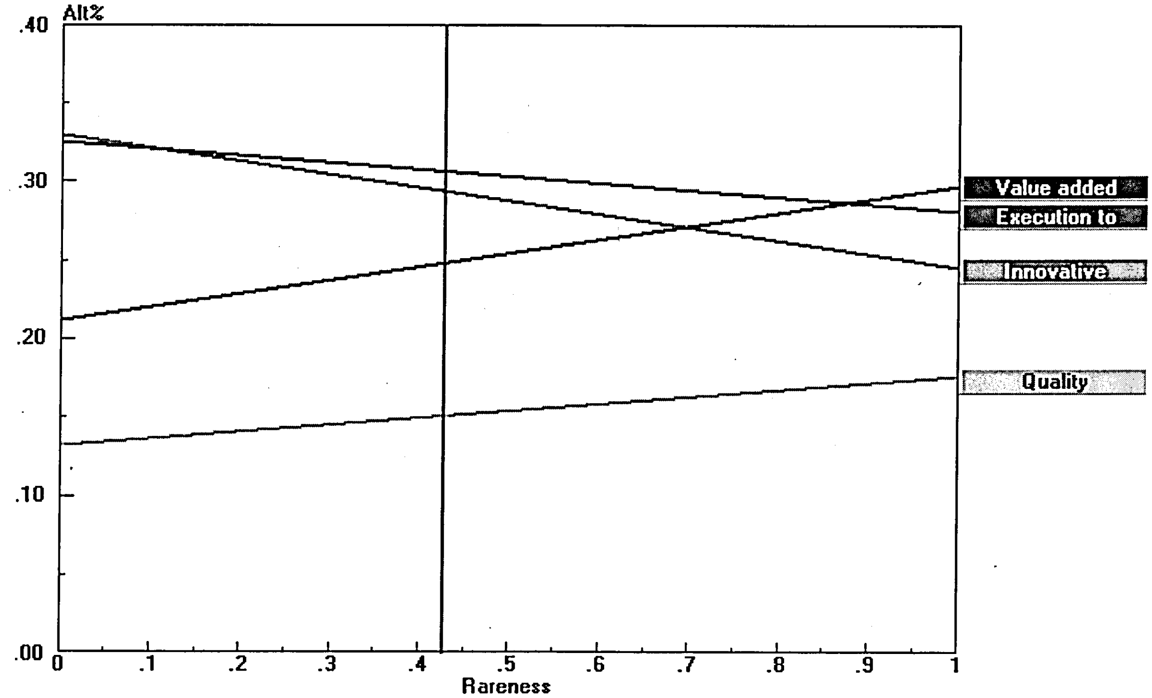

Fig. 19: The sensitivity graph with respect to the actual value (0.429)of Rareness attribute priority.

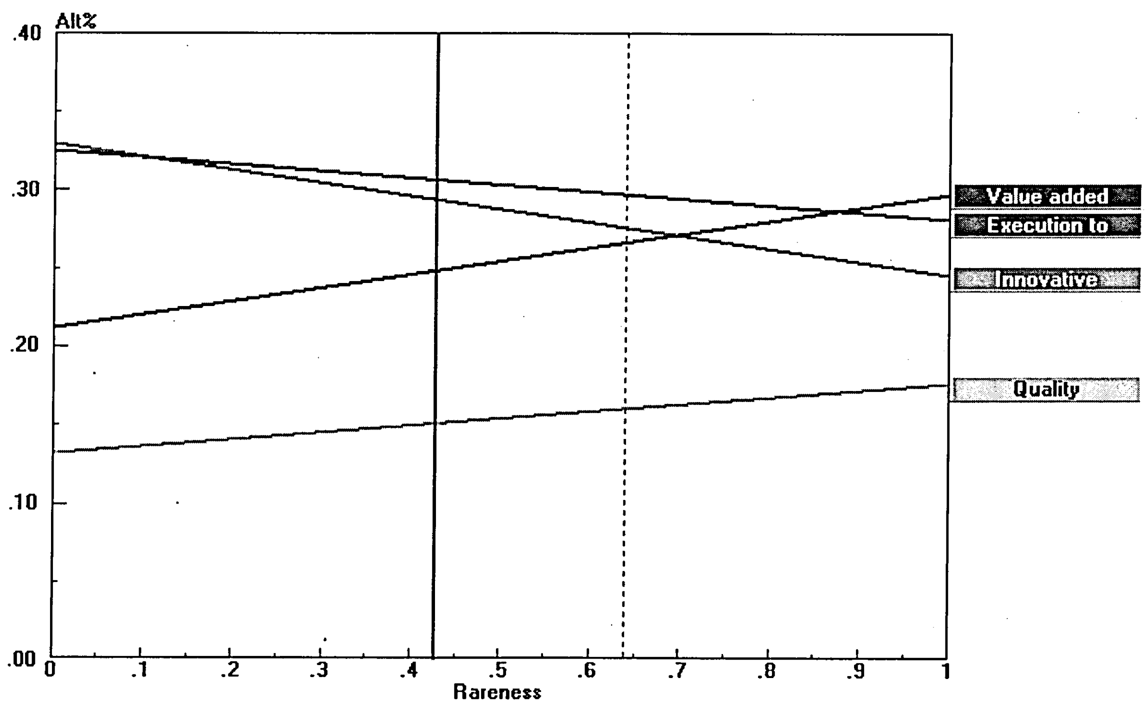

Fig. 20: The sensitivity with respect to changing the priority of Rareness attribute by +50%.

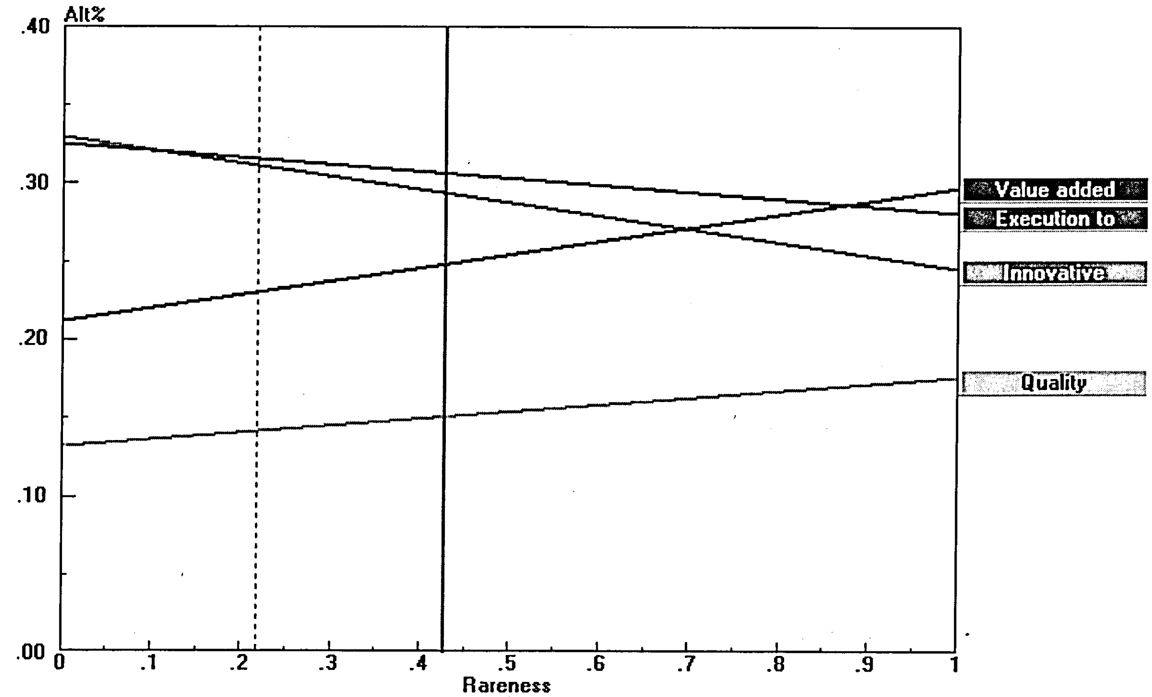

Fig. 21: The sensitivity with respect to changing the priority of Rareness attribute by −50%.

- ## Sensitivity Analysis of Inimitability

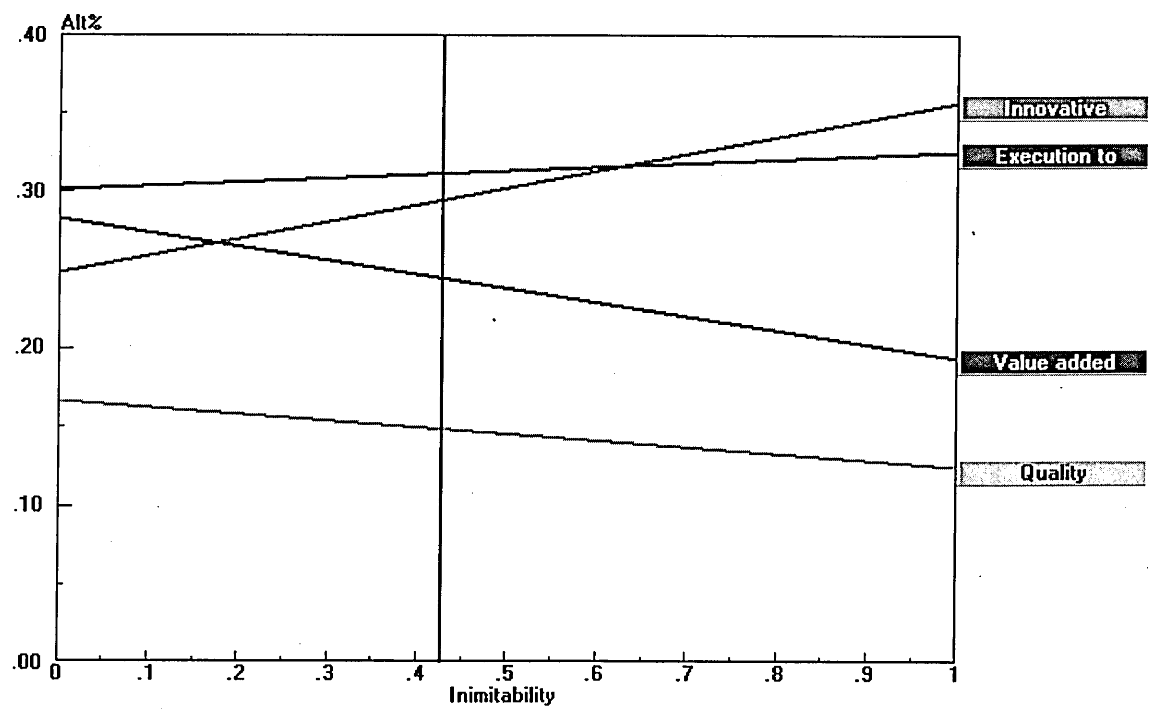

Fig. 22: The sensitivity graph with respect to the actual value of (0.429) Inimitability attribute priority.

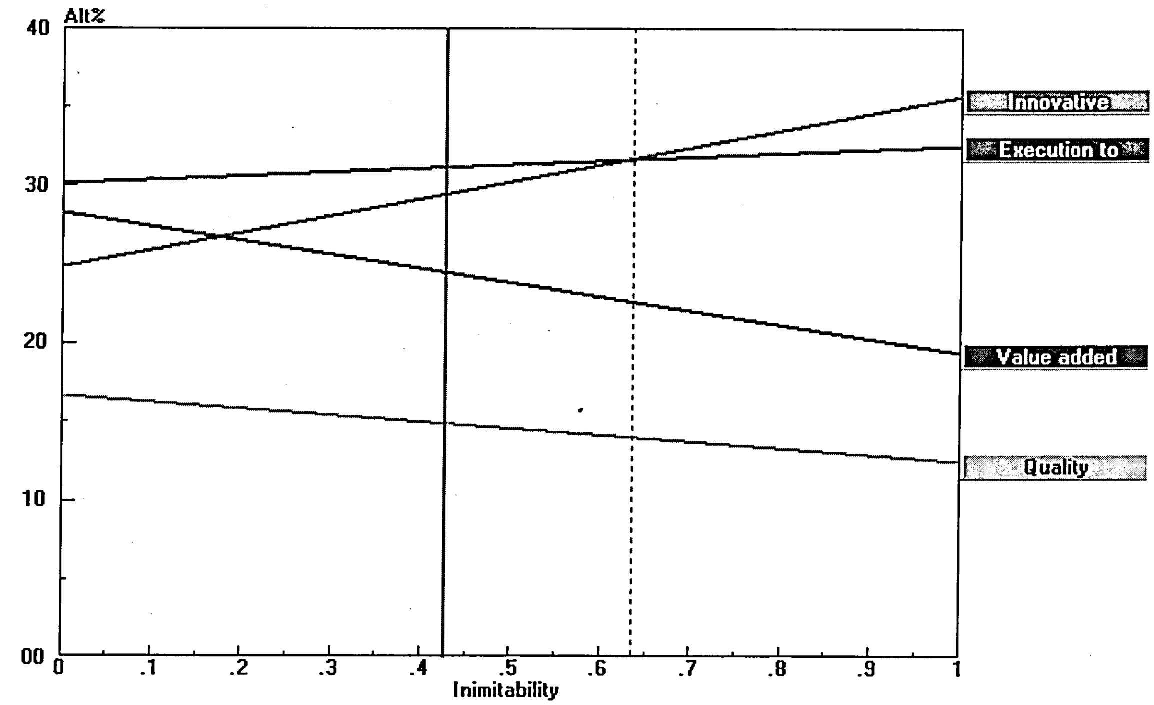

Fig. 23: The sensitivity with respect to changing the priority of Inimitability attribute by +50%.

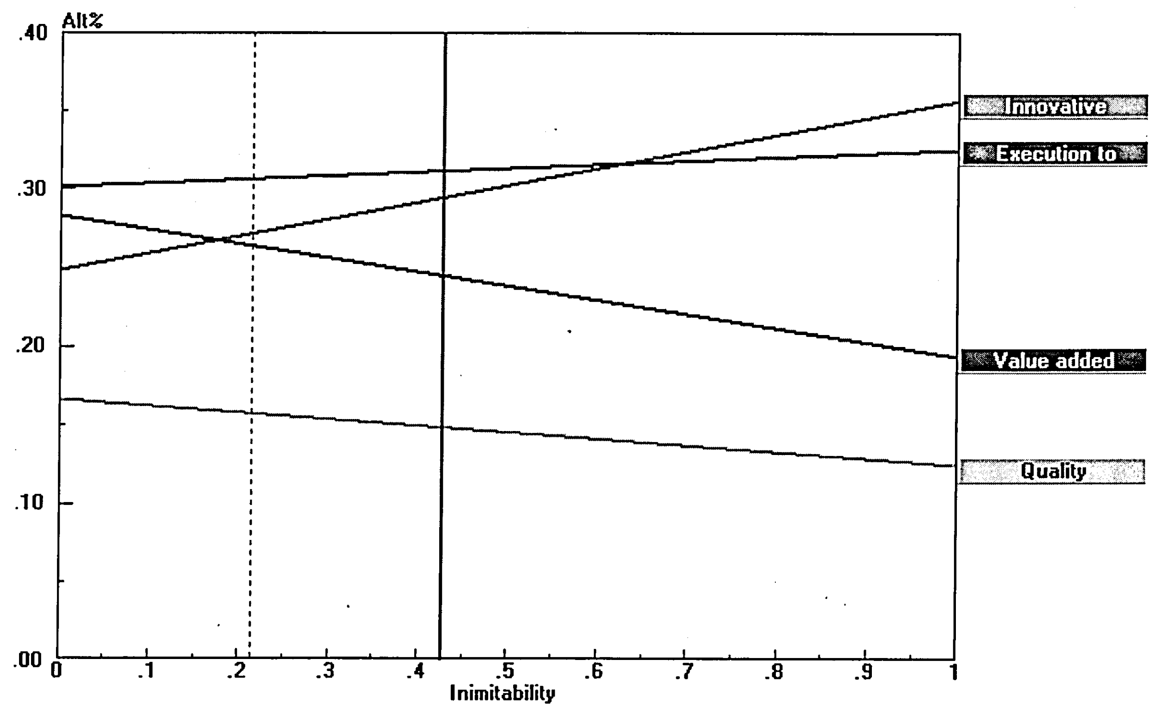

Fig. 24: The sensitivity with respect to changing the priority of Inimitability attribute by −50%.

- **Sensitivity analysis of Resource Re-deployment**

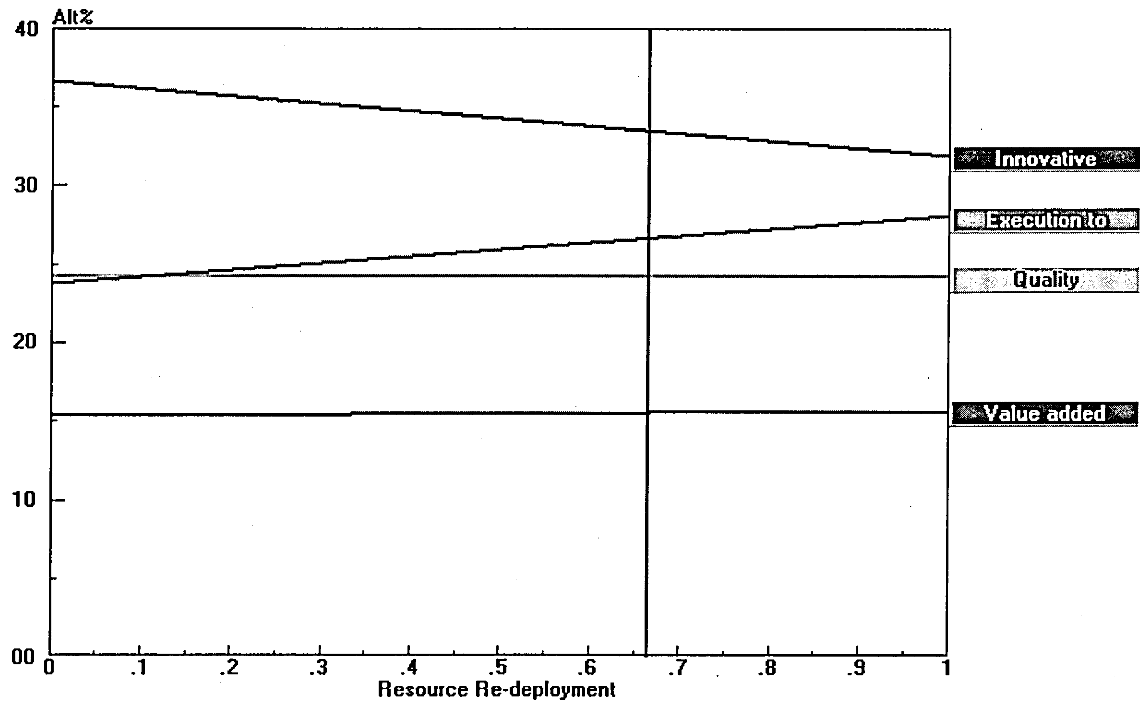

Fig. 25: The sensitivity graph with respect to the actual value (0.667) of Resource re-deployment attribute priority.

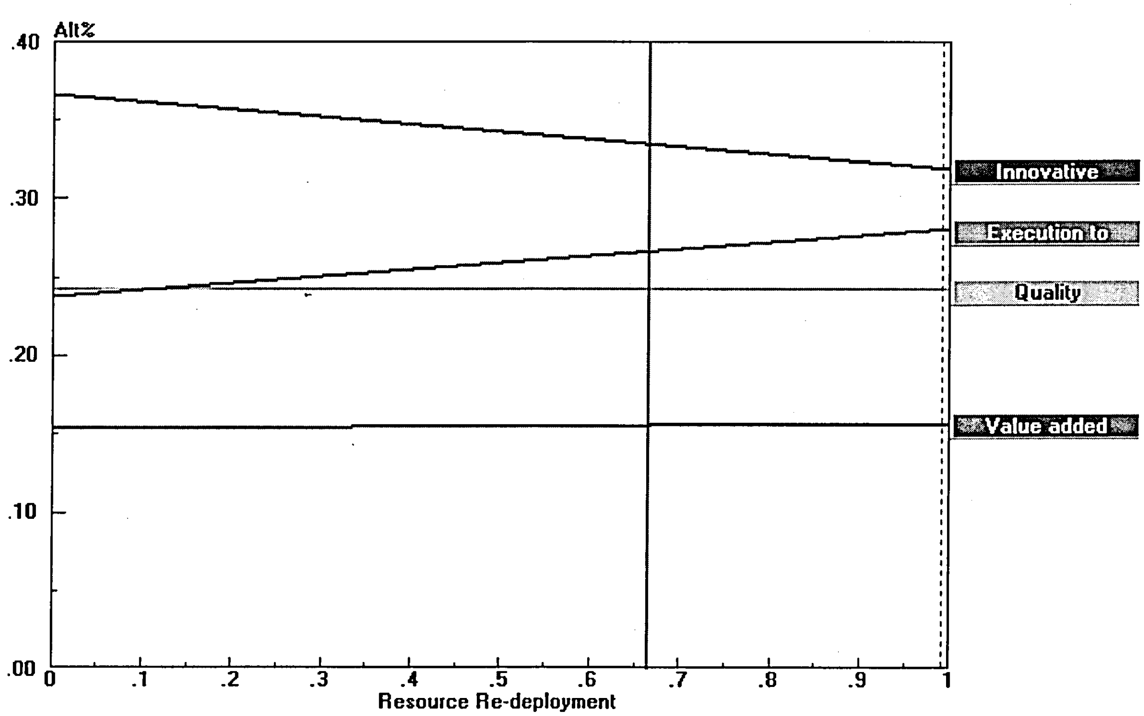

Fig. 26: The sensitivity with respect to changing the priority of Resource re-deployment attribute by +50%.

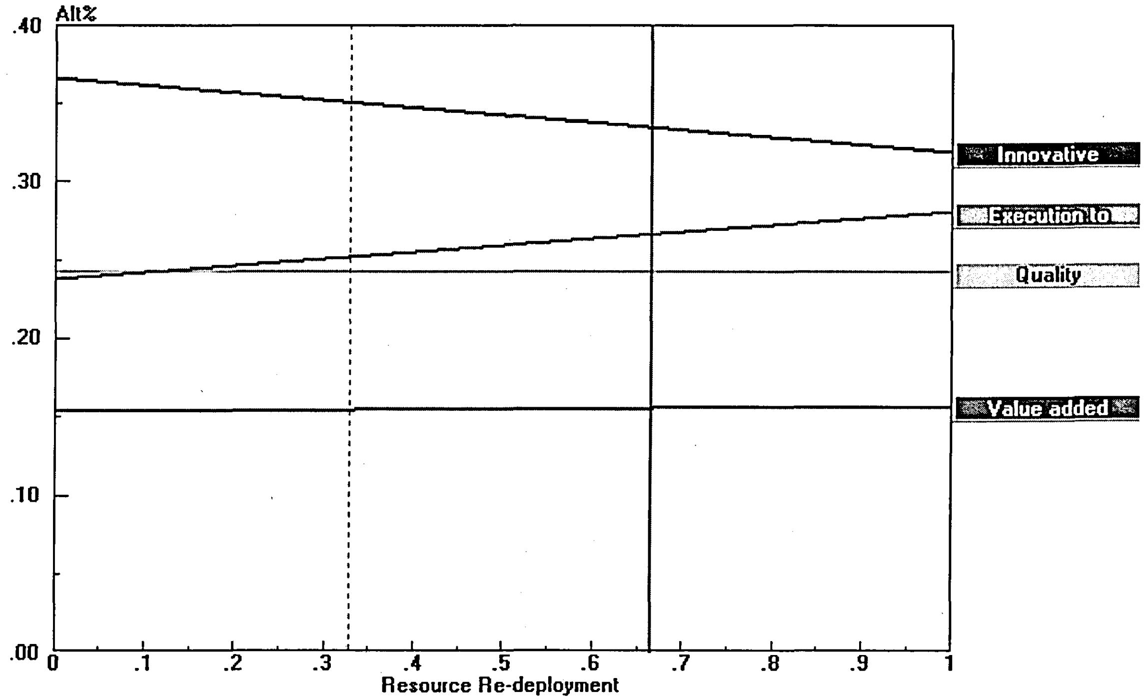

Fig. 27: The sensitivity with respect to changing the priority of Resource re-deployment attribute by −50%.

- **Sensitivity analysis of Routines Re-organisation**

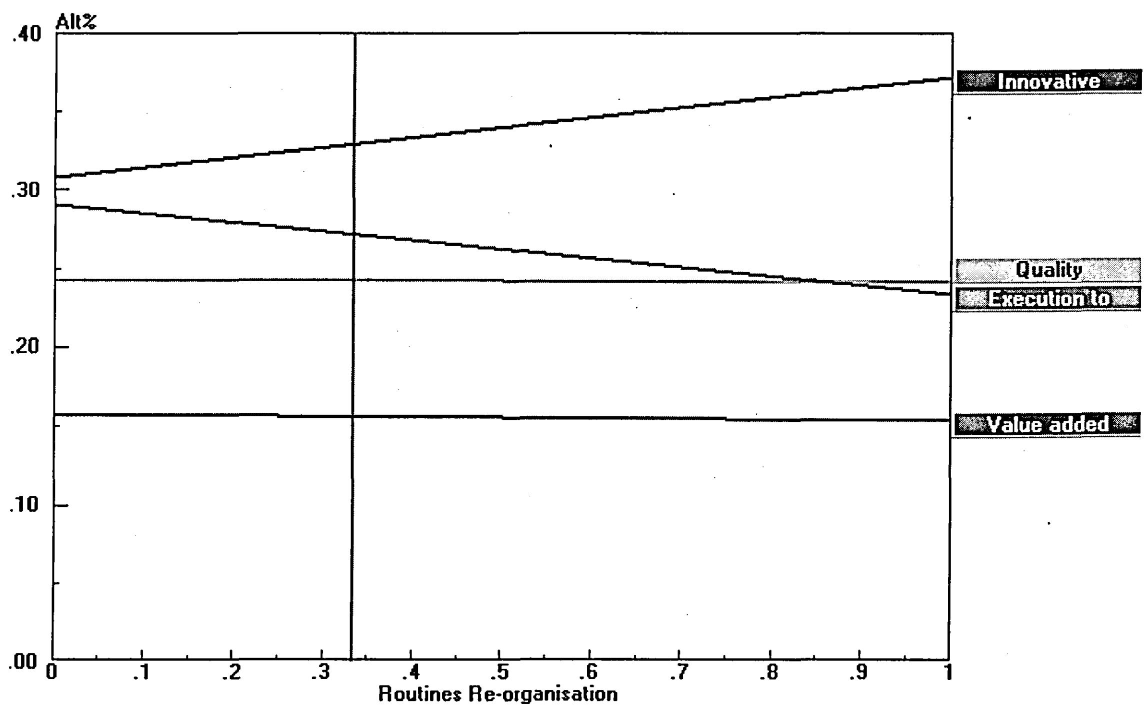

Fig. 28: The sensitivity graph with respect to the actual value (0.333) of Routines re-organisation attribute priority.

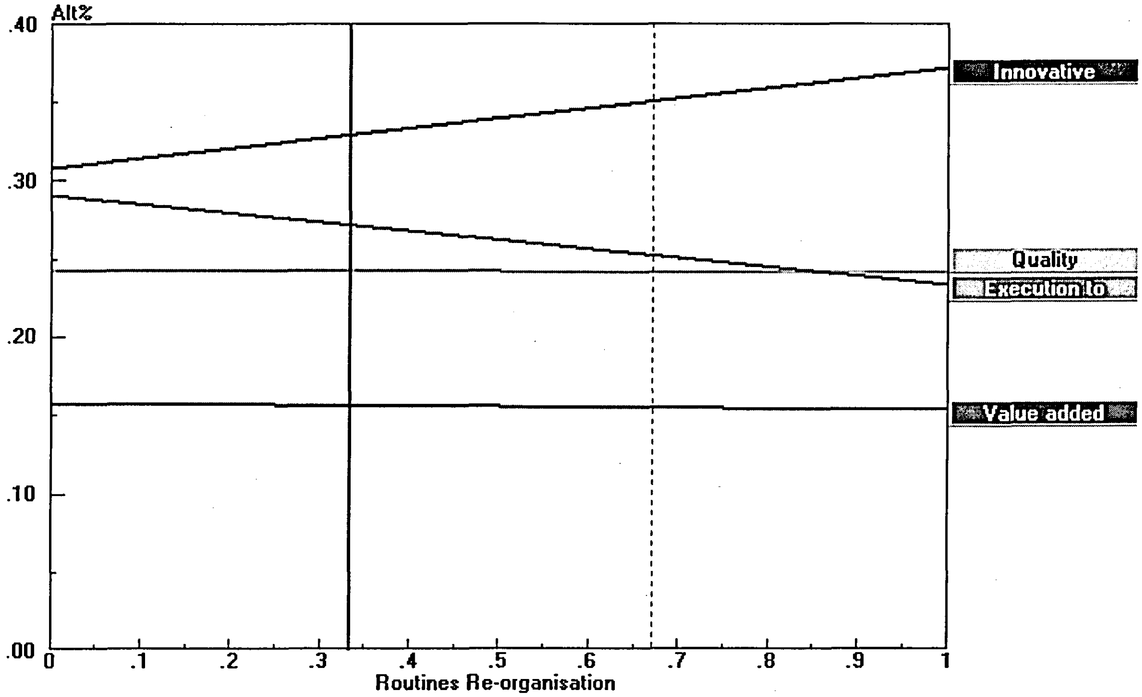

Fig. 29: The sensitivity with respect to changing the priority of Resource re-deployment attribute by +50%.

Appendix J

Construction Company D

- **Company Background**
  - Industry: Construction
  - Business: Construction and development
  - Employees: 140
  - Turnover: £40 million

- **Capabilities**
  - Modern methods of construction
  - Value added design
  - Modern style design
  - Innovative solutions
  - Cost effective construction
  - Quality management
  - Completion on time
  - Execution to specifications
  - Safety, environment applications

- **Key Capabilities**
  - Value added design
  - Innovative solutions
  - Quality management
  - Execution to specifications

- **Competences**
  - Innovative solutions
  - Execution to specifications

- **Core Competences**
  - Innovative solutions
  - Execution to specifications

Sensitivity Analysis

- **Sensitivity Analysis of Operating Profit Measure**

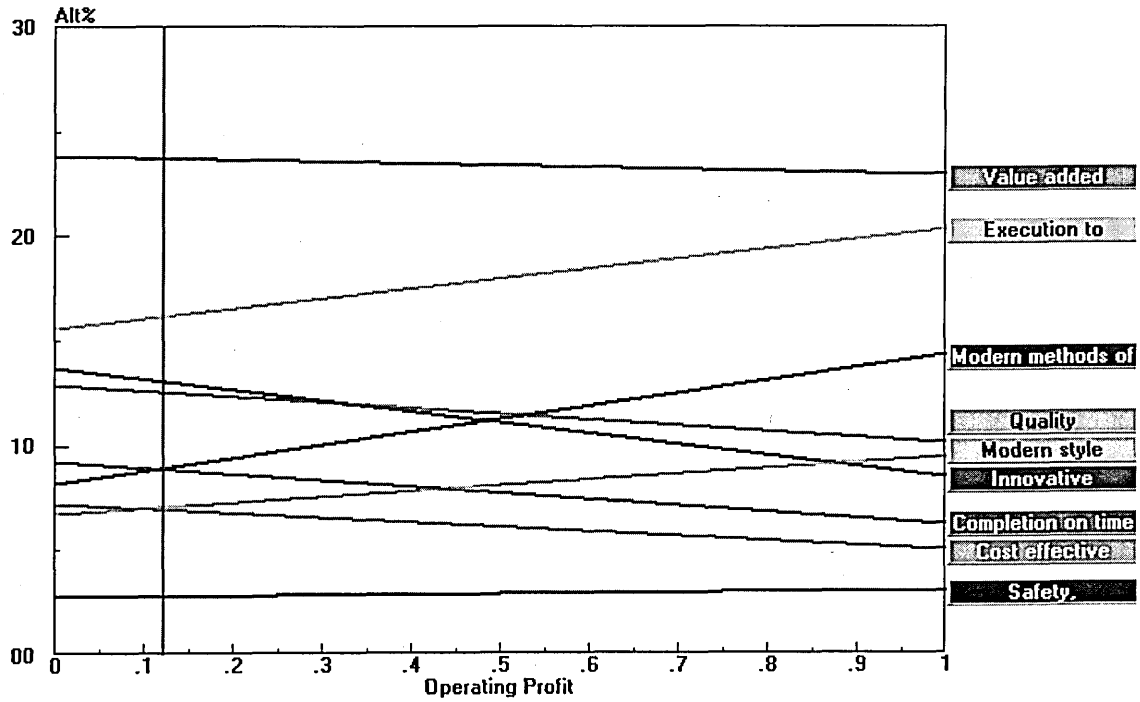

Fig. 1: The sensitivity graph with respect to the actual value (0.122) of Operating profit priority.

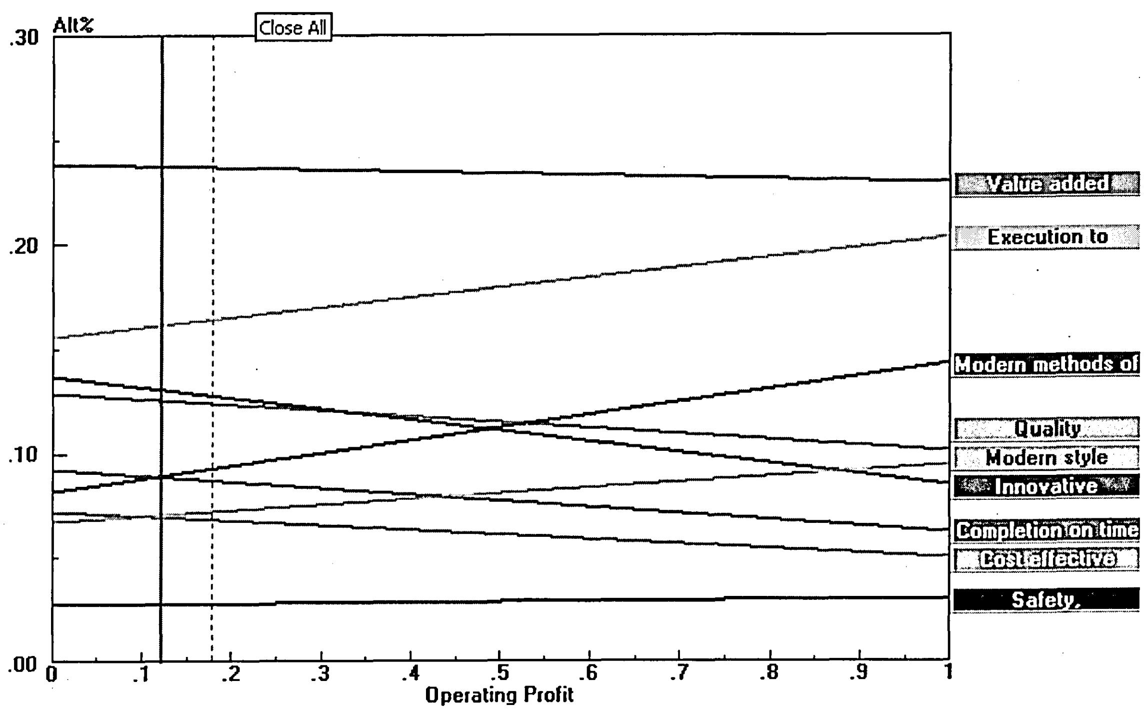

Fig. 2: The sensitivity graph with respect to changing the priority of Operating profit by +50%.

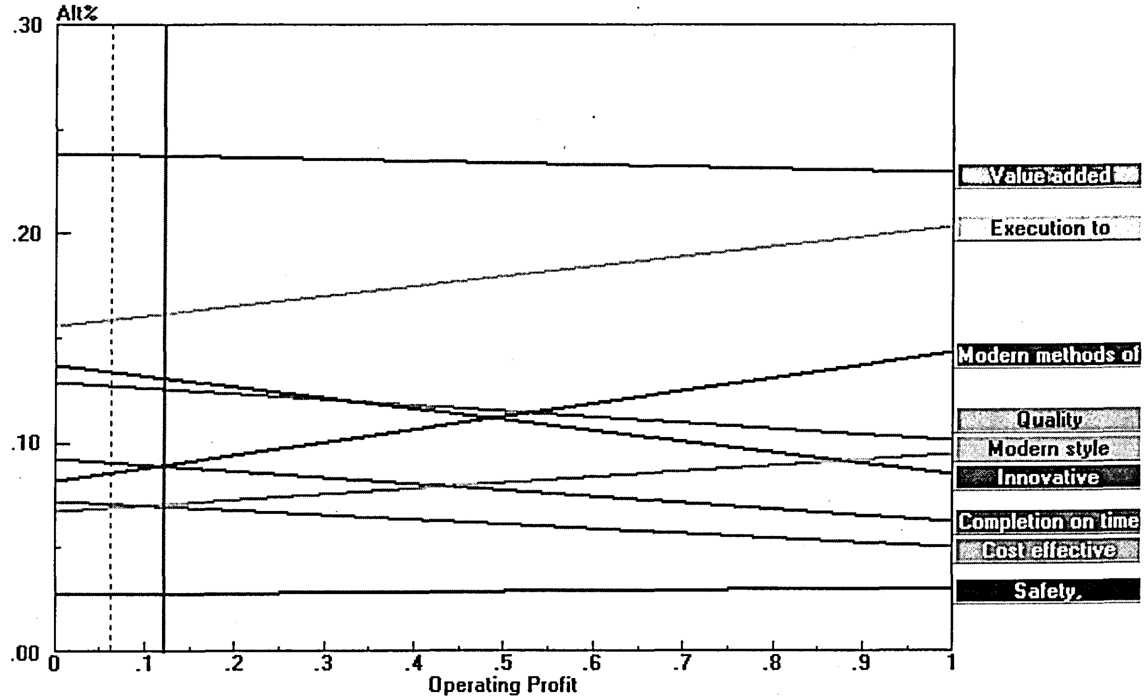

Fig. 3: The sensitivity graph with respect to changing the priority of Operating profit by −50%.

- **Sensitivity Analysis of Return on Capital Employed Measure**

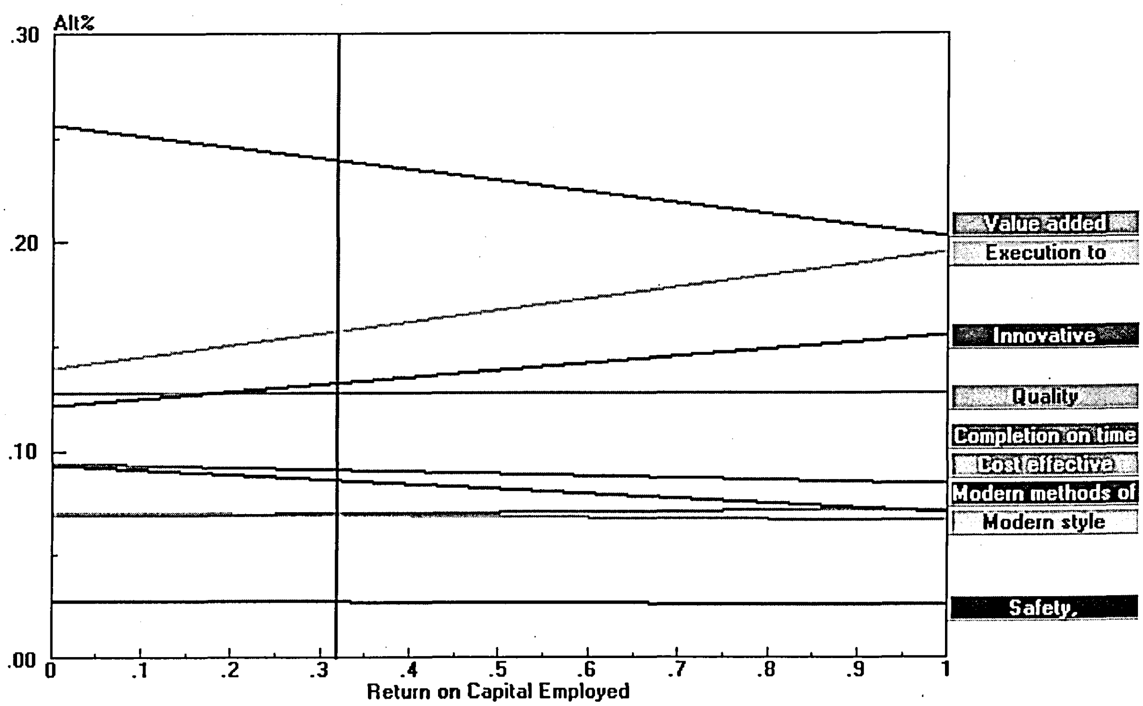

Fig. 4: The sensitivity graph with respect to the actual value (0.320) of Return on capital employed priority.

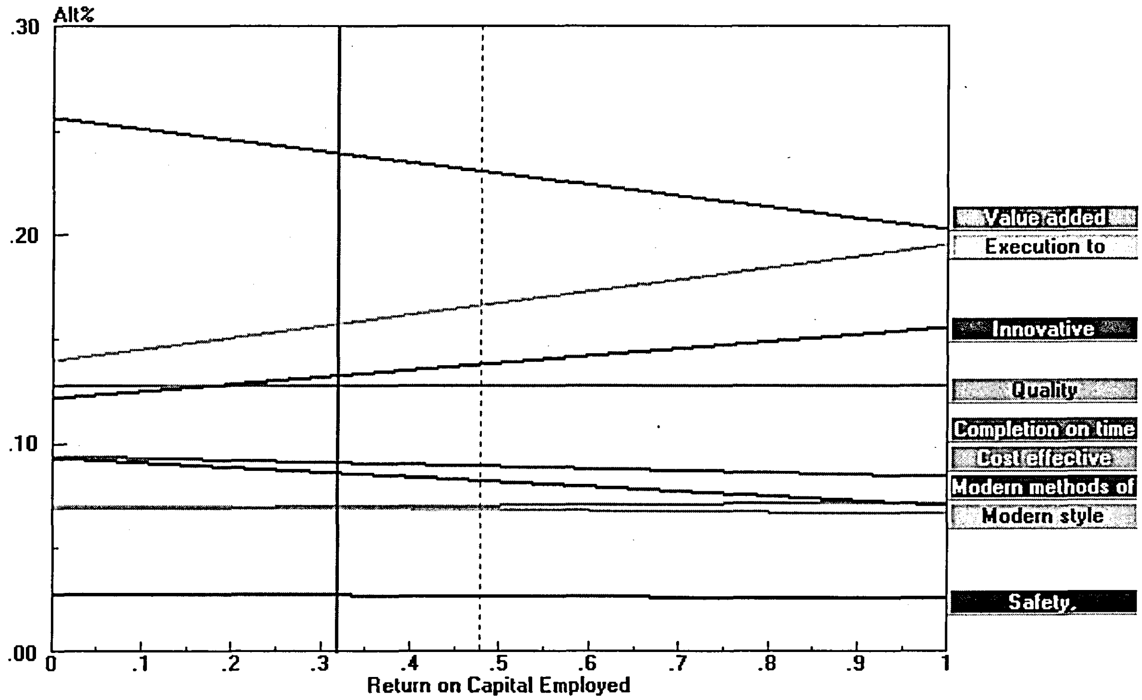

Fig. 5: The sensitivity graph with respect to changing the priority of Return on capital employed by +50%.

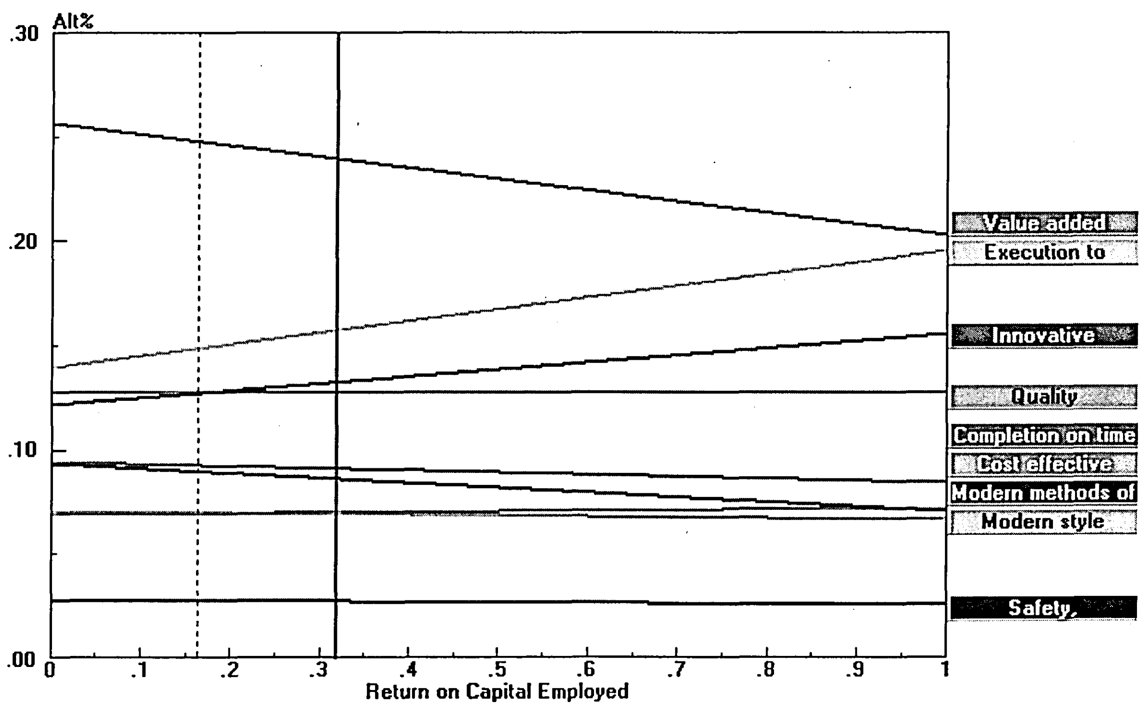

Fig. 6: The sensitivity graph with respect to changing the priority of Return on capital employed by −50%.

- **Sensitivity Analysis of Customer Satisfaction Measure**

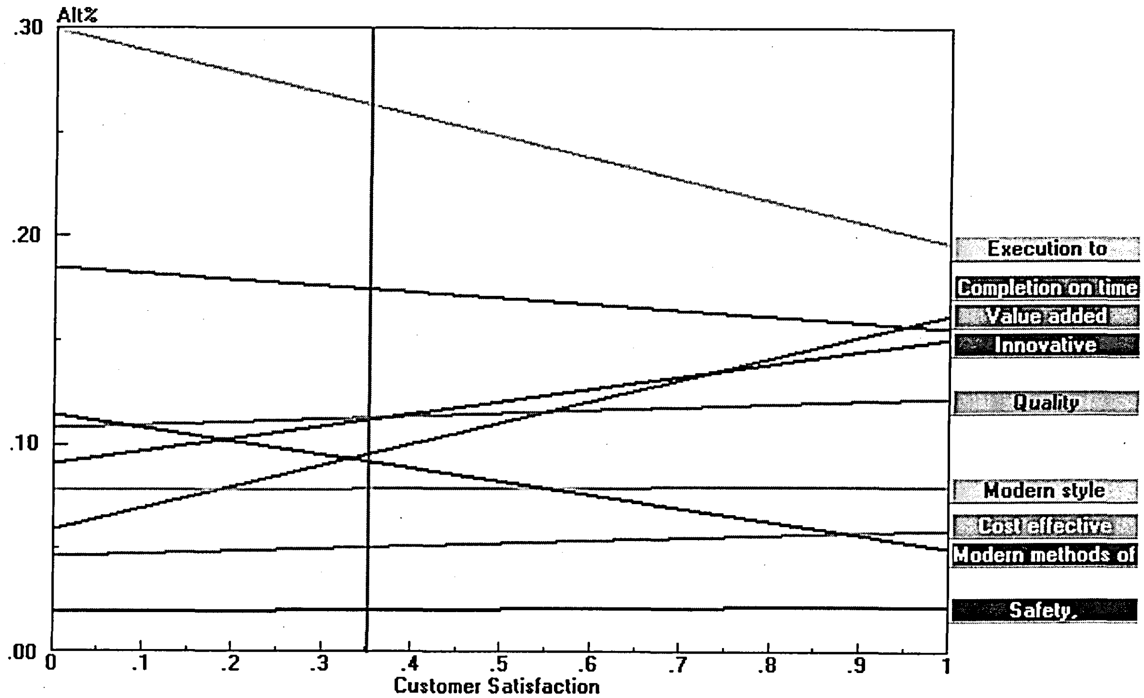

Fig.7: The sensitivity graph with respect to the actual value (0.352) of Customer satisfaction priority.

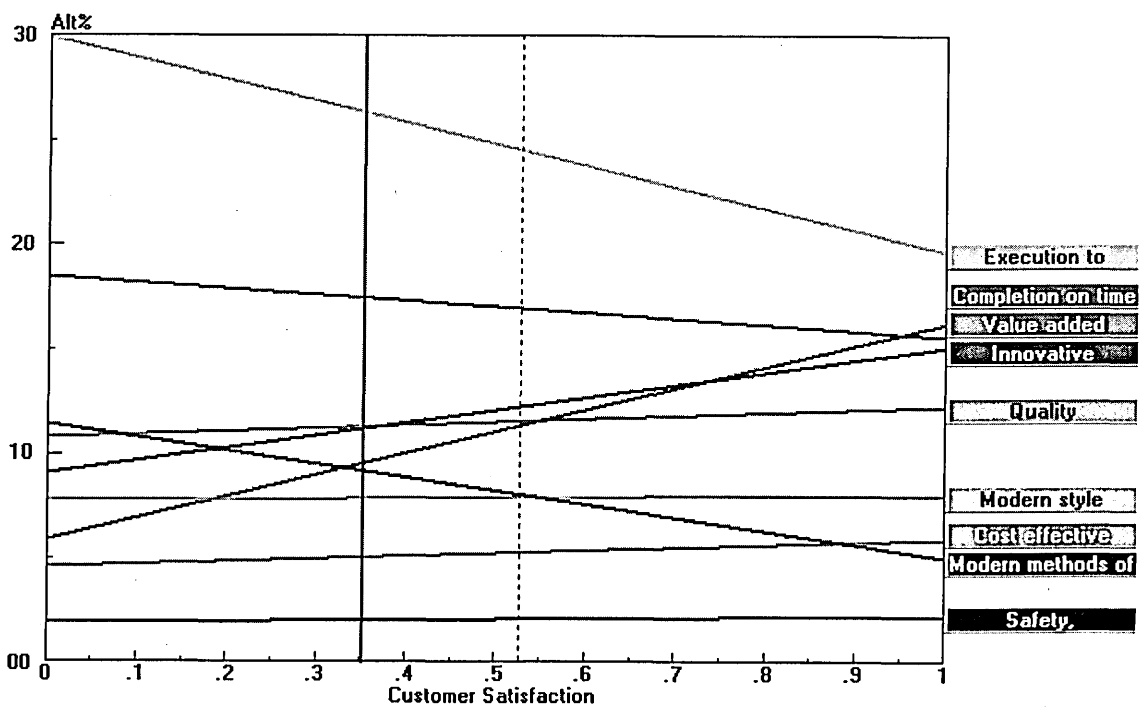

Fig.8: The sensitivity graph with respect to changing the priority of Customer satisfaction by +50%.

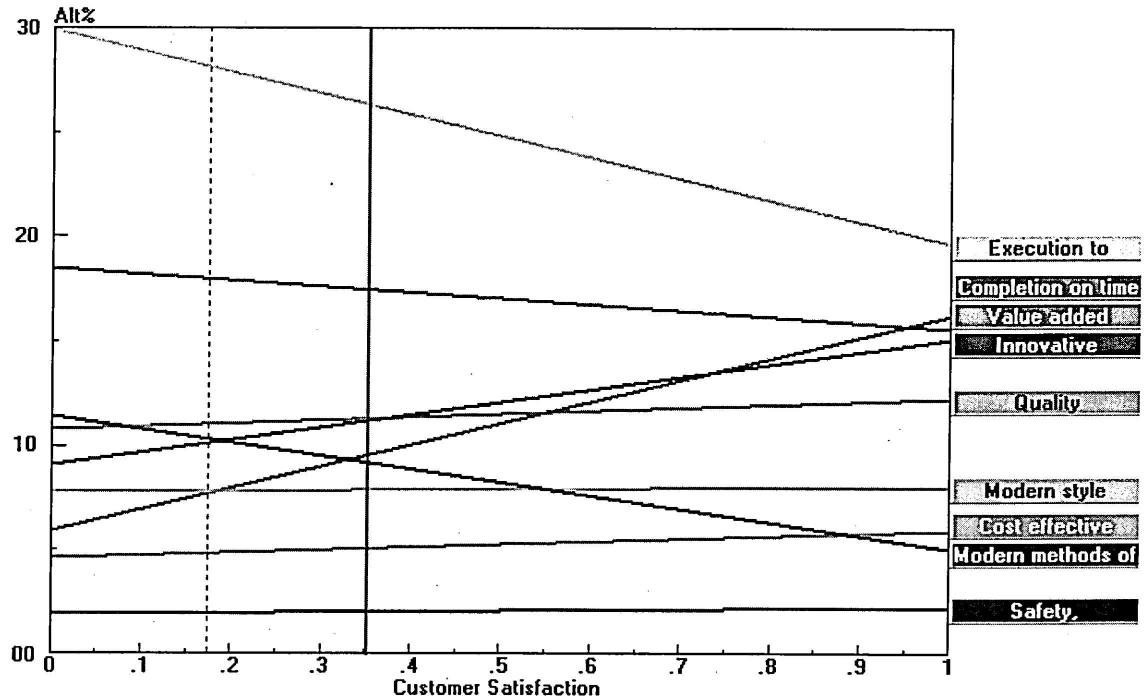

Fig.9: The sensitivity graph with respect to changing the priority of Customer satisfaction by −50%.

- **Sensitivity Analysis of Market Share Measure**

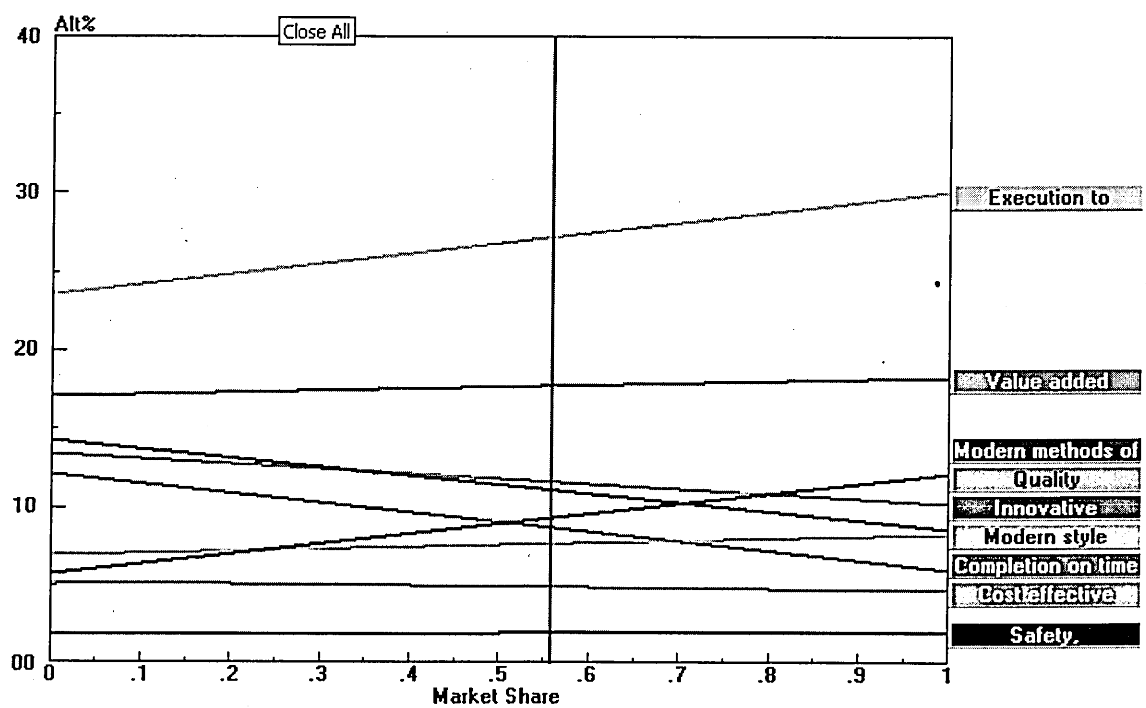

Fig.10: The sensitivity graph with respect to the actual value (0.559) of Market share priority.

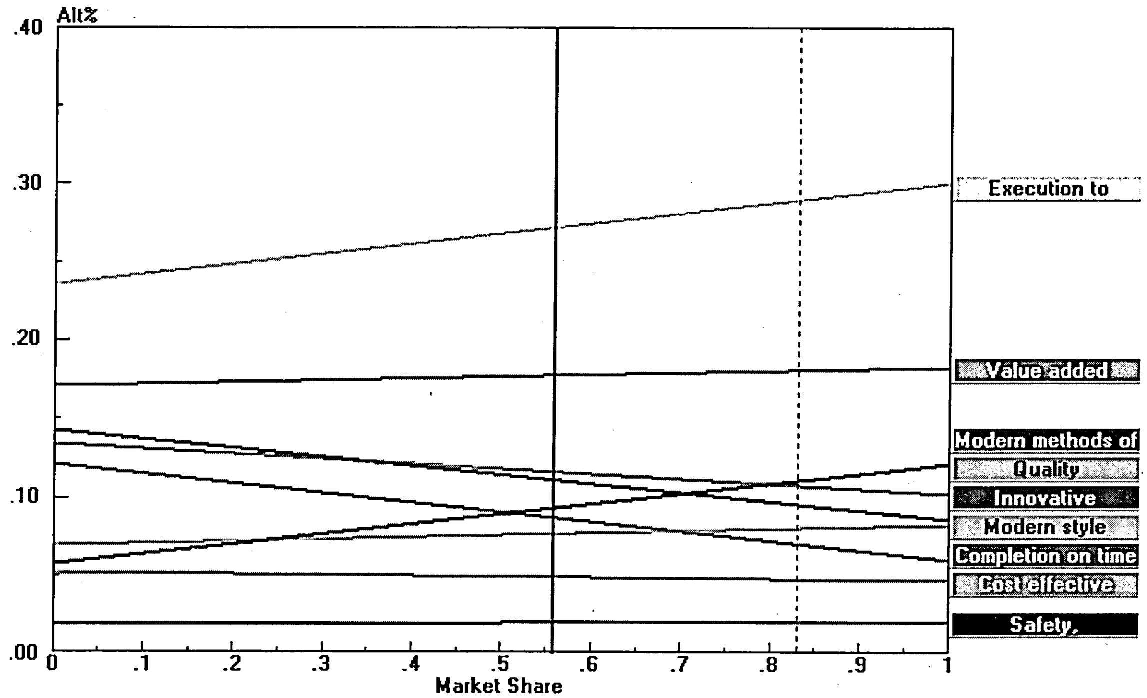

Fig.11: The sensitivity graph with respect to changing the priority of Market share by +50%.

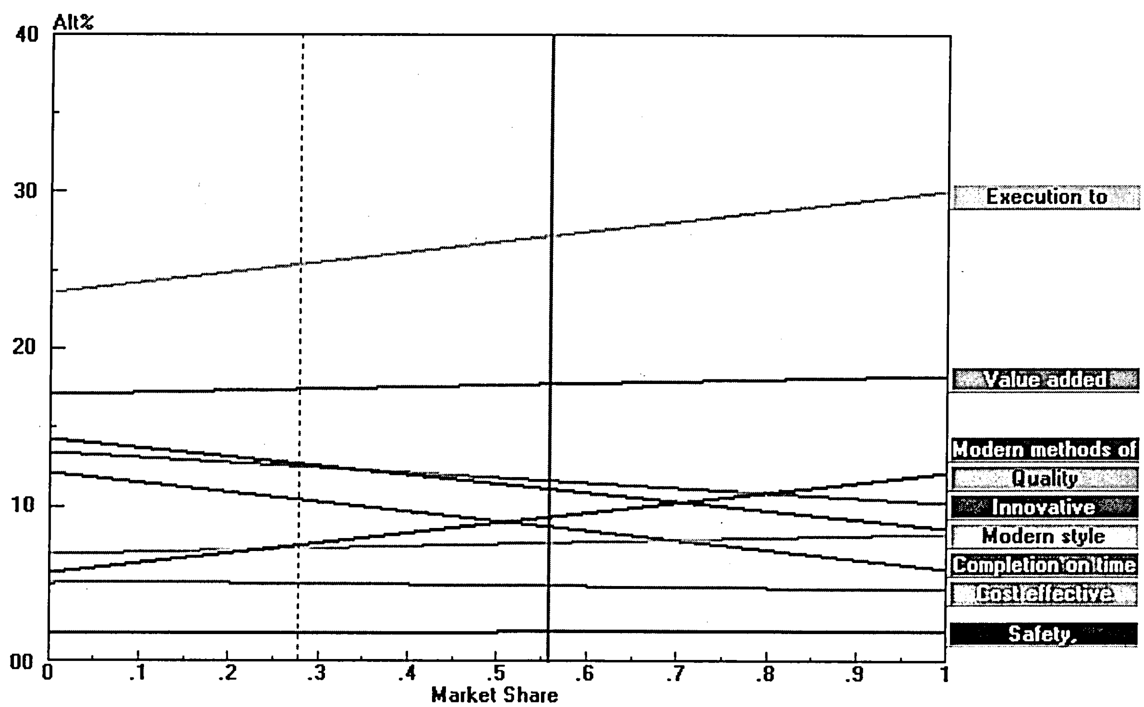

Fig. 12: The sensitivity graph with respect to changing the priority of Market share by −50%.

- **Sensitivity Analysis of New Product Introduction Measure**

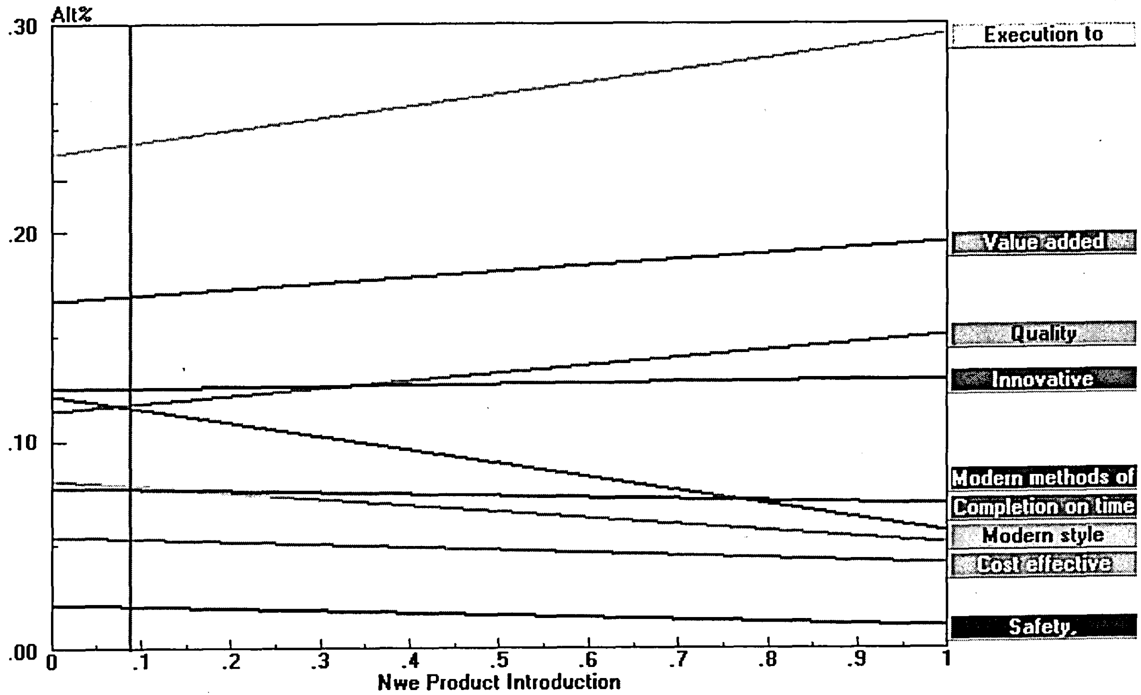

Fig. 13: The sensitivity graph with respect to the actual value of (0.089)New product introduction priority.

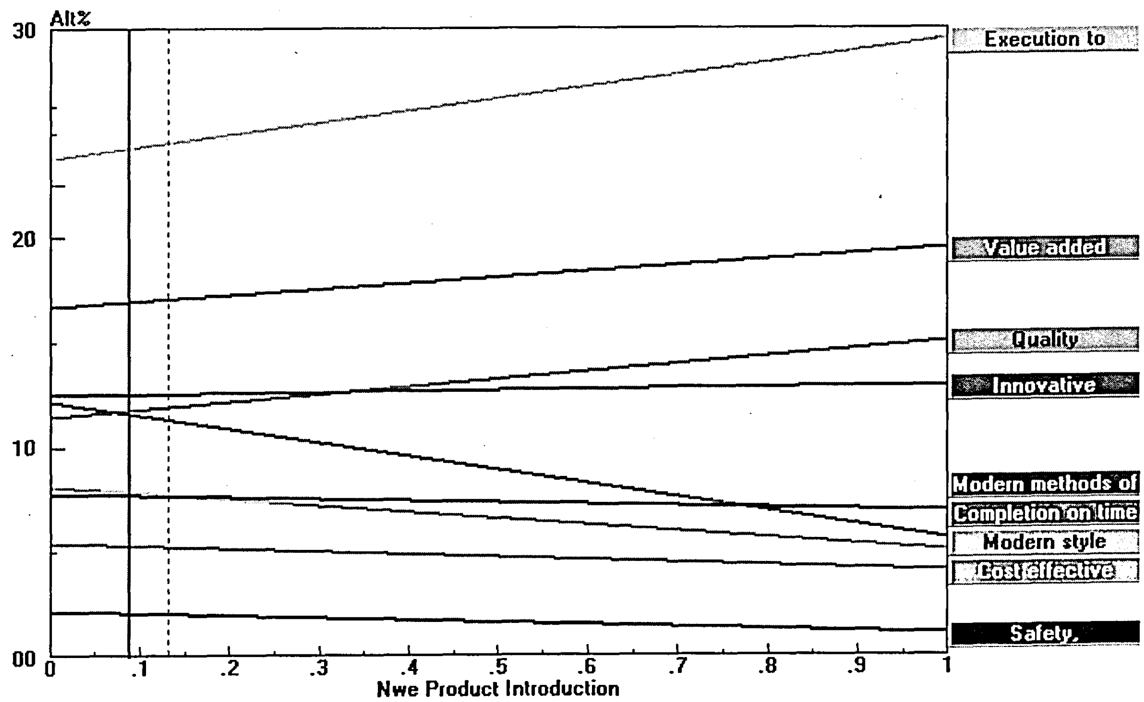

Fig. 14: The sensitivity graph with respect to changing the priority of New product introduction by +50%.

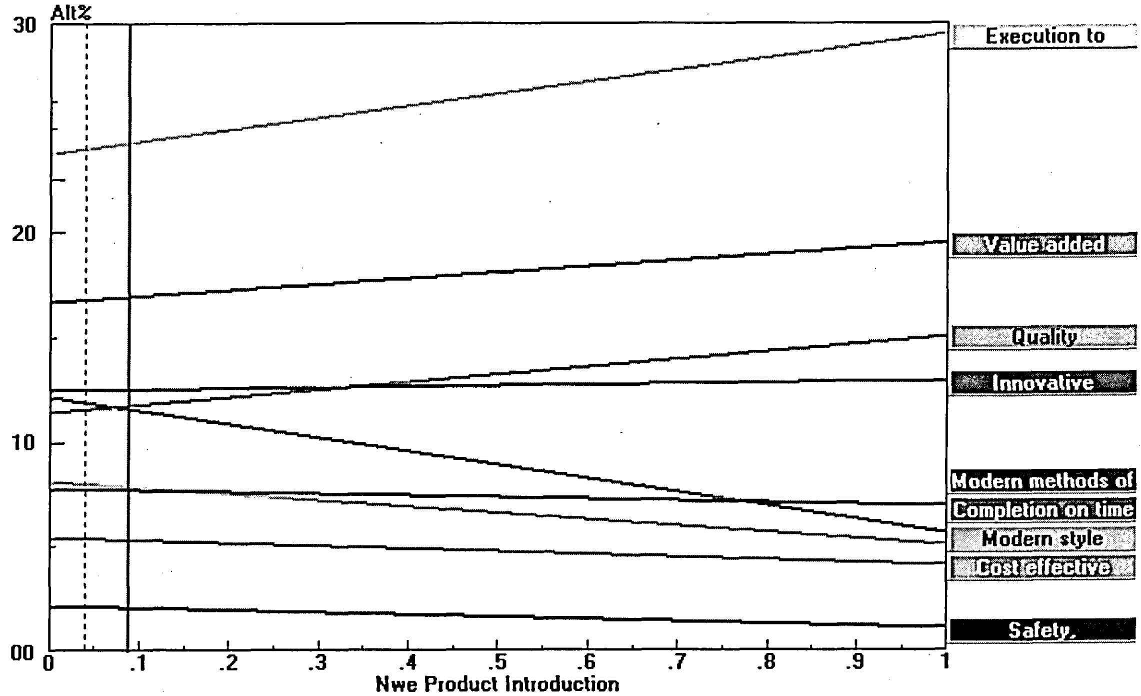

Fig. 15: The sensitivity graph with respect to changing the priority of New product introduction by −50%.

- **Sensitivity Analysis of Collectiveness (Across-business)**

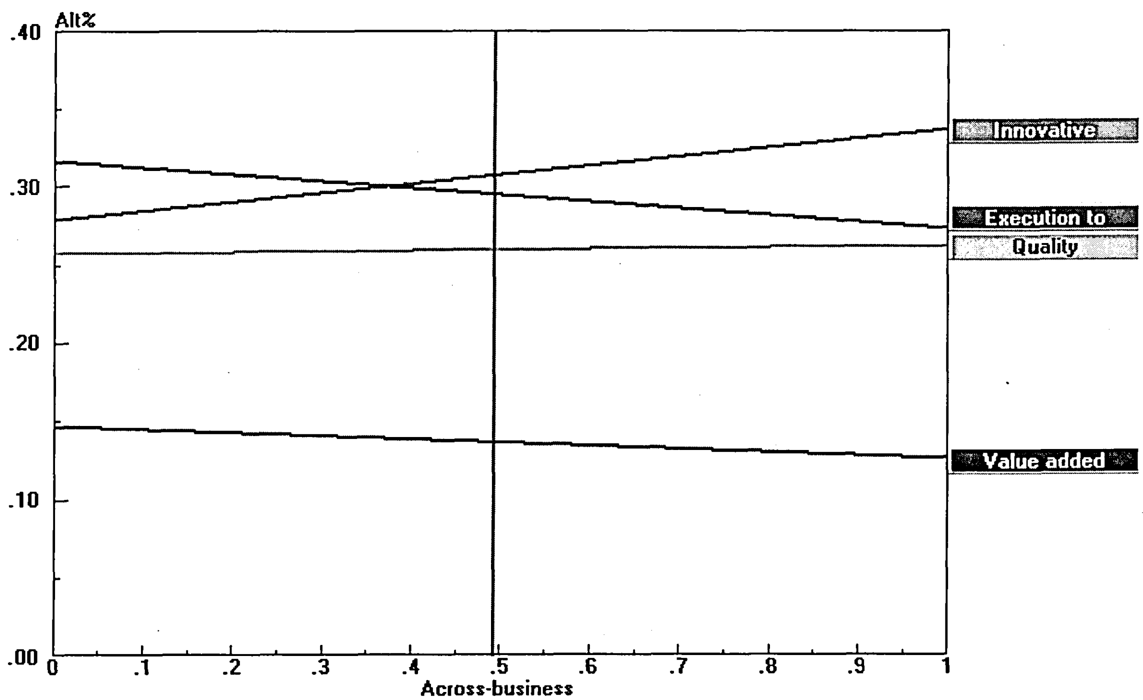

Fig. 16: The sensitivity graph with respect to the actual value (0.311) of Across-business attribute priority.

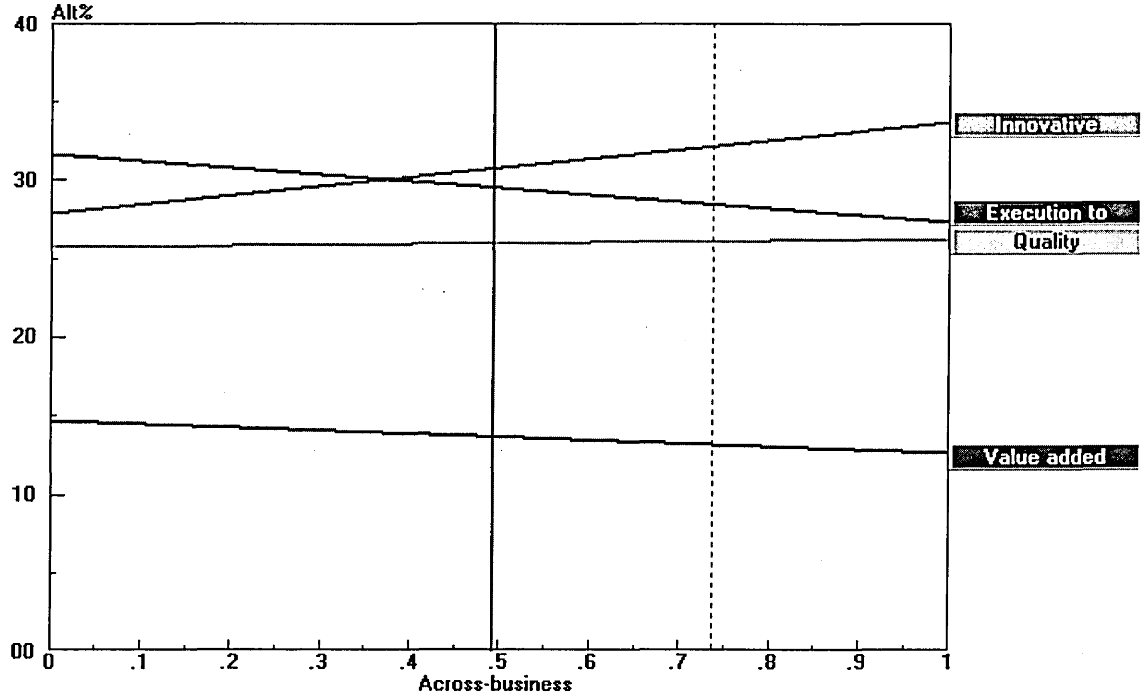

Fig. 17: The sensitivity with respect to changing the priority of Across-business attribute by +50%.

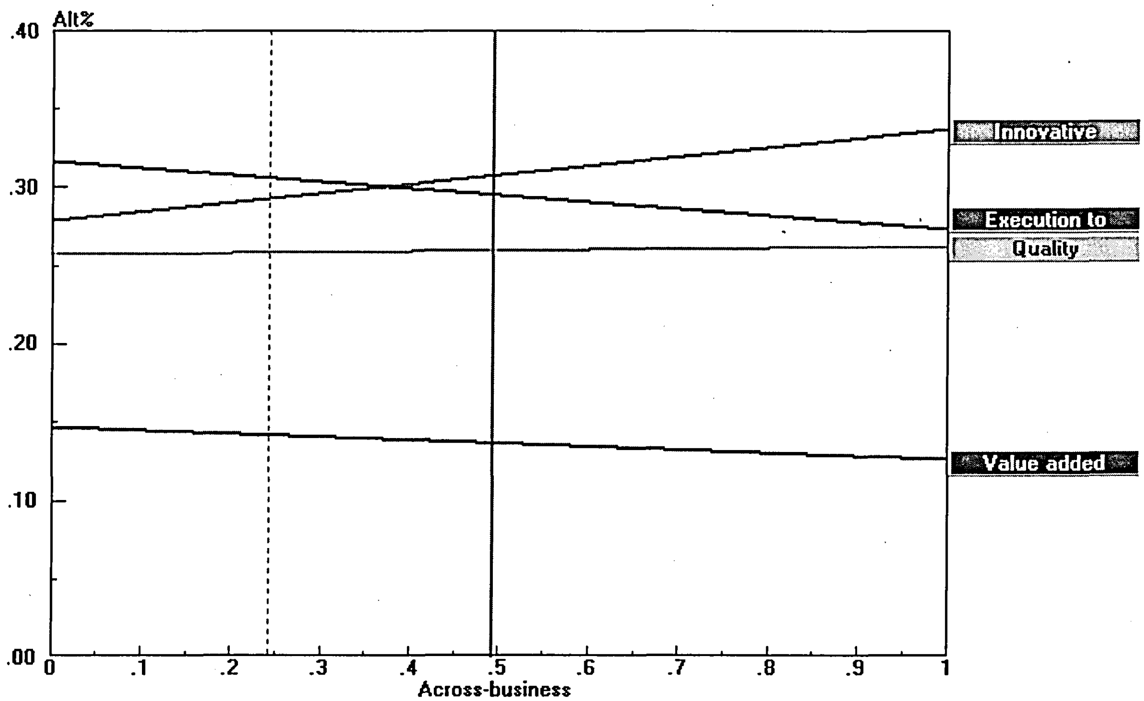

Fig. 18: The sensitivity with respect to changing the priority of Across-business attribute by −50%.

- **Sensitivity Analysis of (Rareness)**

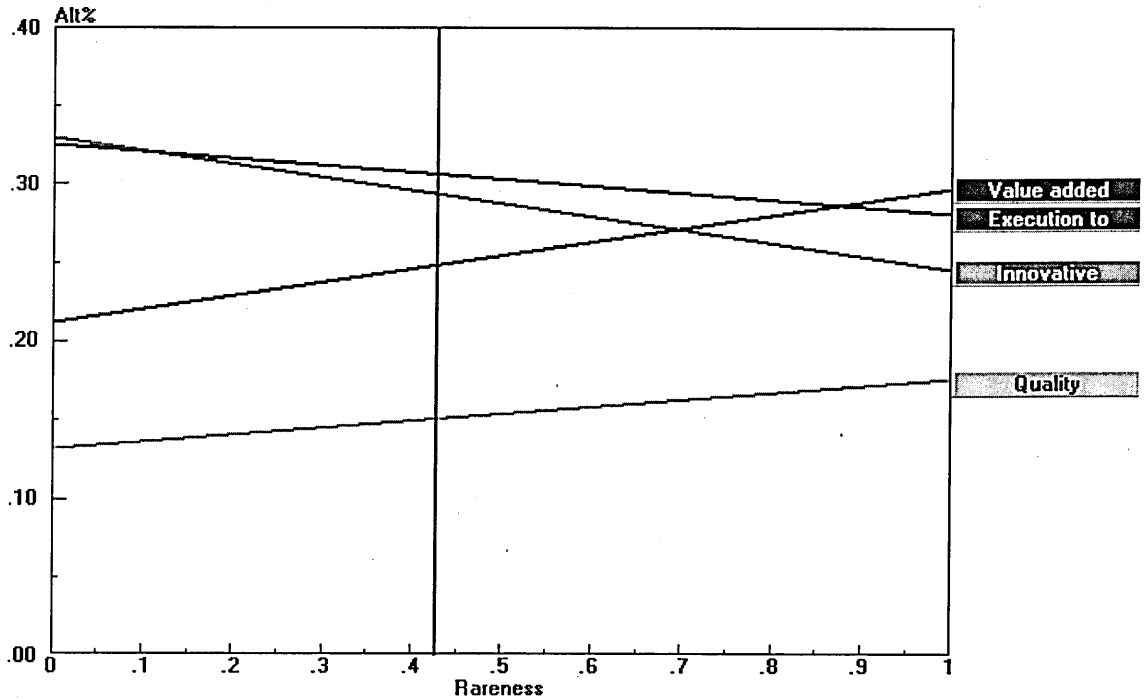

Fig. 19: The sensitivity graph with respect to the actual value (0.429)of Rareness attribute priority.

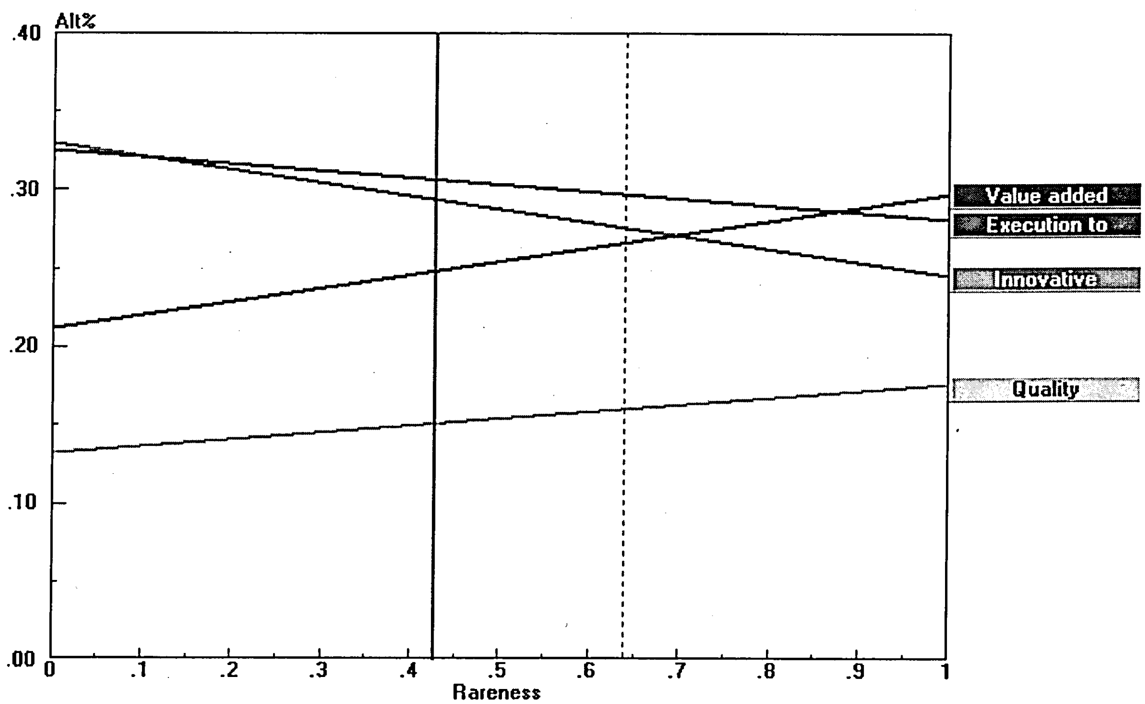

Fig. 20: The sensitivity with respect to changing the priority of Rareness attribute by +50%.

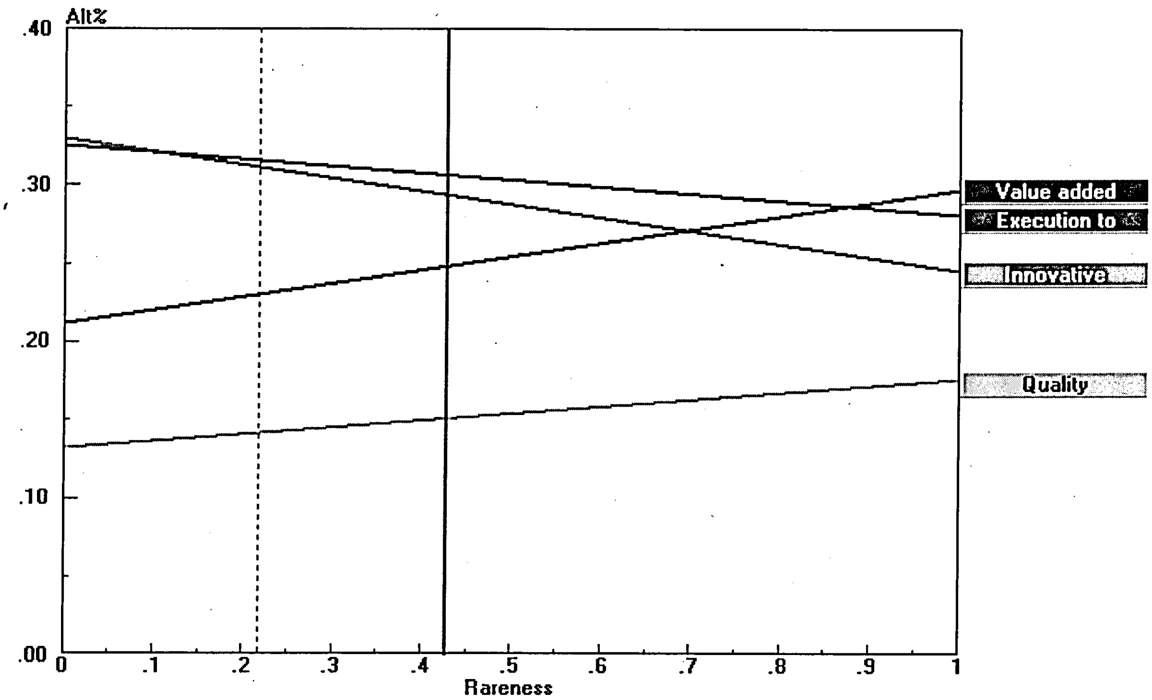

Fig. 21: The sensitivity with respect to changing the priority of Rareness attribute by −50%.

- **Sensitivity Analysis of Inimitability**

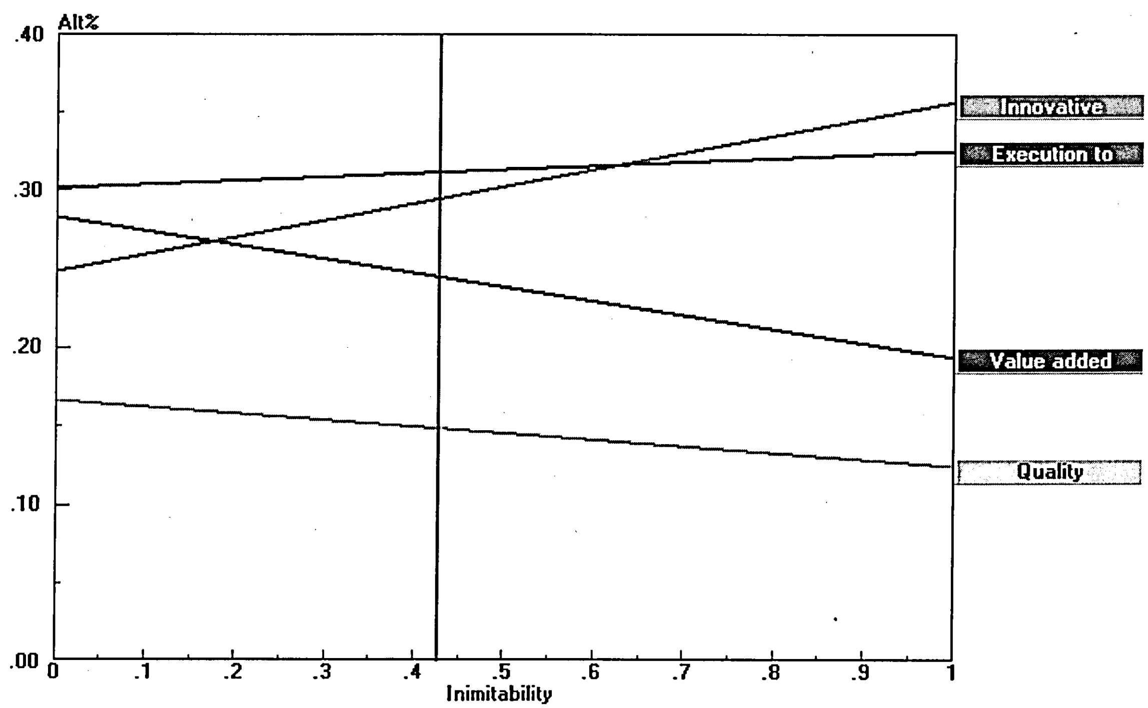

Fig. 22: The sensitivity graph with respect to the actual value of (0.429) Inimitability attribute priority.

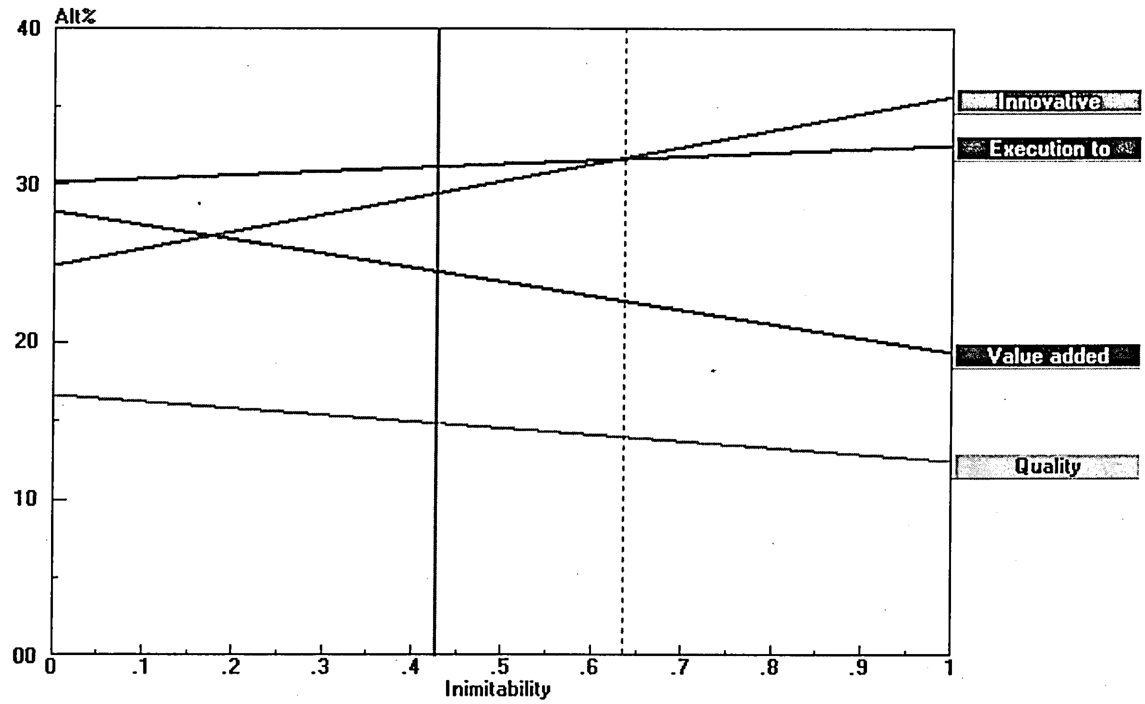

Fig. 23: The sensitivity with respect to changing the priority of Inimitability attribute by +50%.

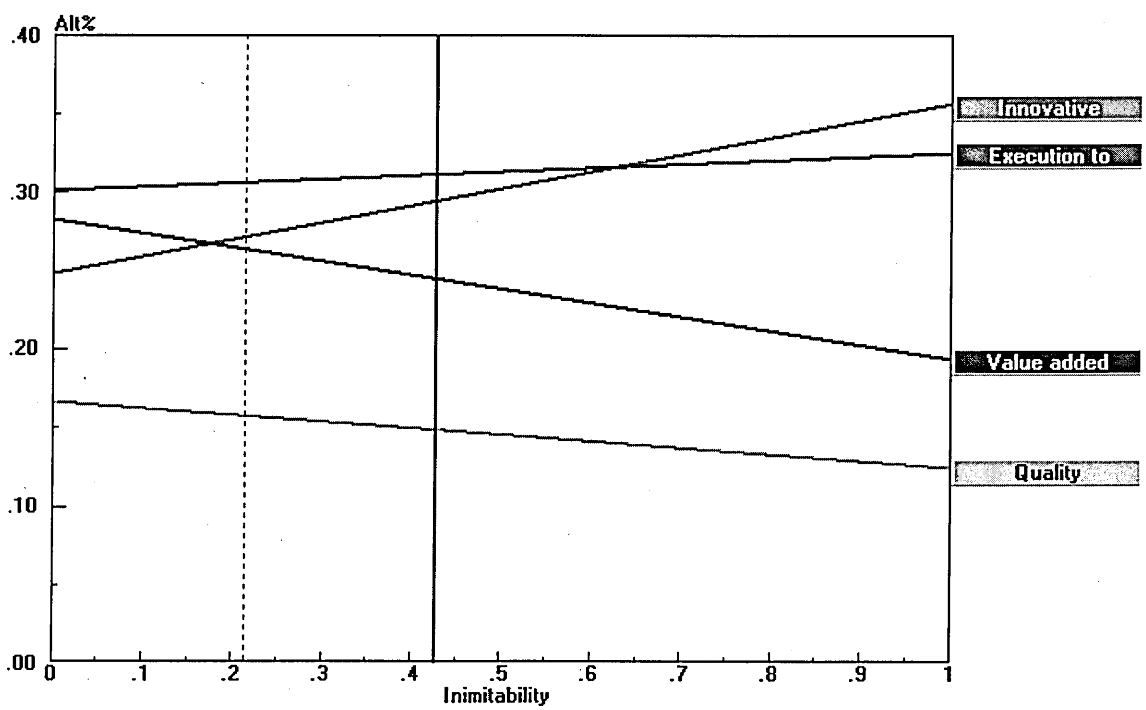

Fig. 24: The sensitivity with respect to changing the priority of Inimitability attribute by −50%.

- **Sensitivity analysis of Resource Re-deployment**

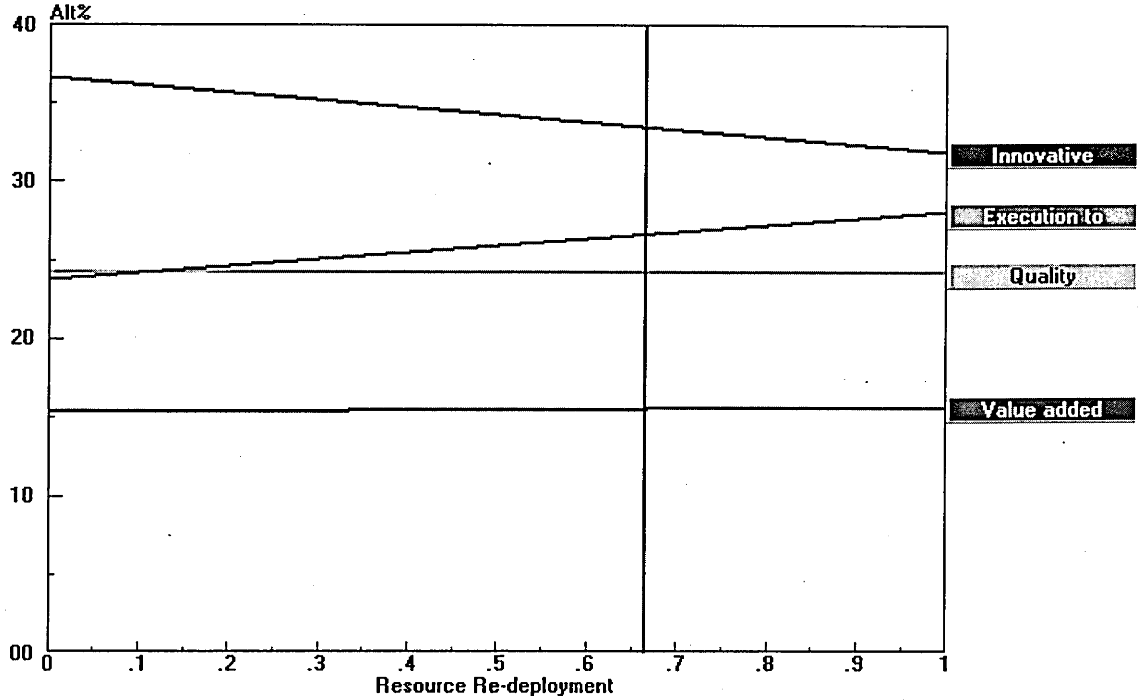

Fig. 25: The sensitivity graph with respect to the actual value (0.667) of Resource re-deployment attribute priority.

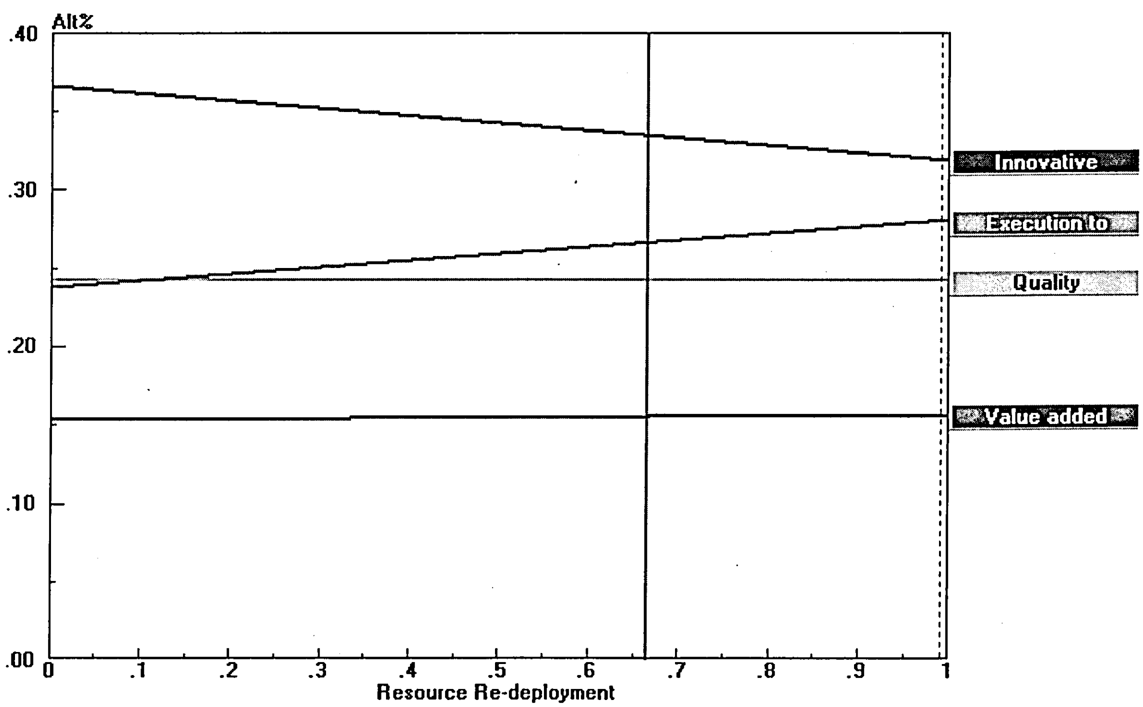

Fig. 26: The sensitivity with respect to changing the priority of Resource re-deployment attribute by +50%.

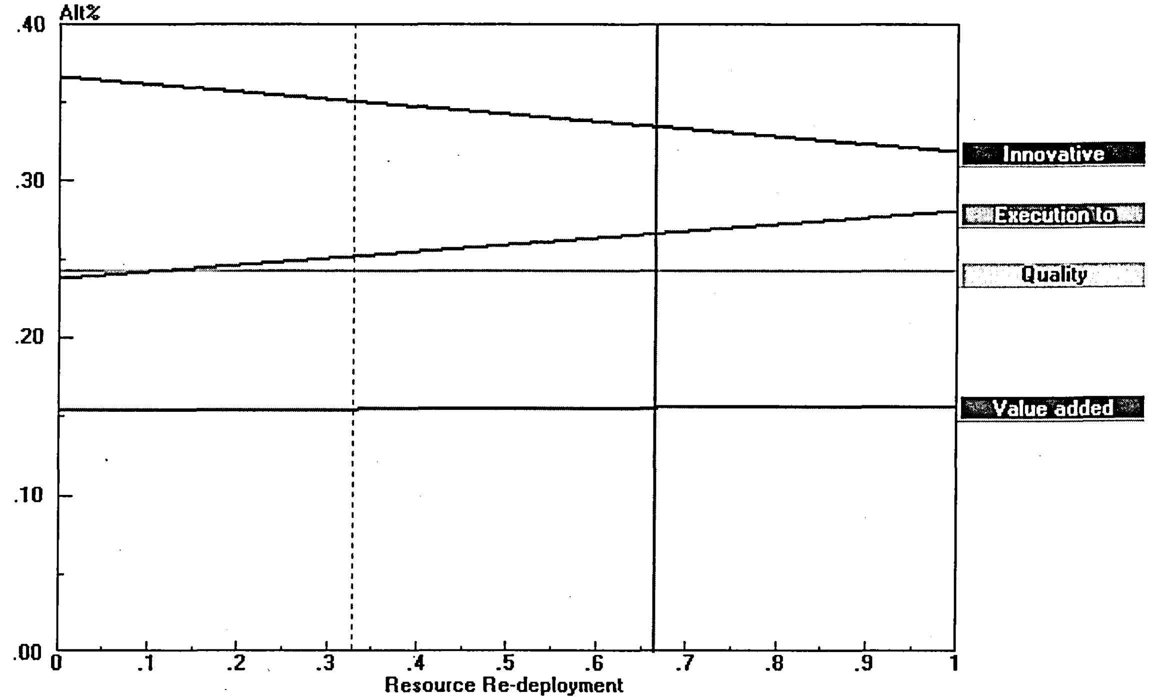

Fig. 27: The sensitivity with respect to changing the priority of Resource re-deployment attribute by −50%.

- **Sensitivity analysis of Routines Re-organisation**

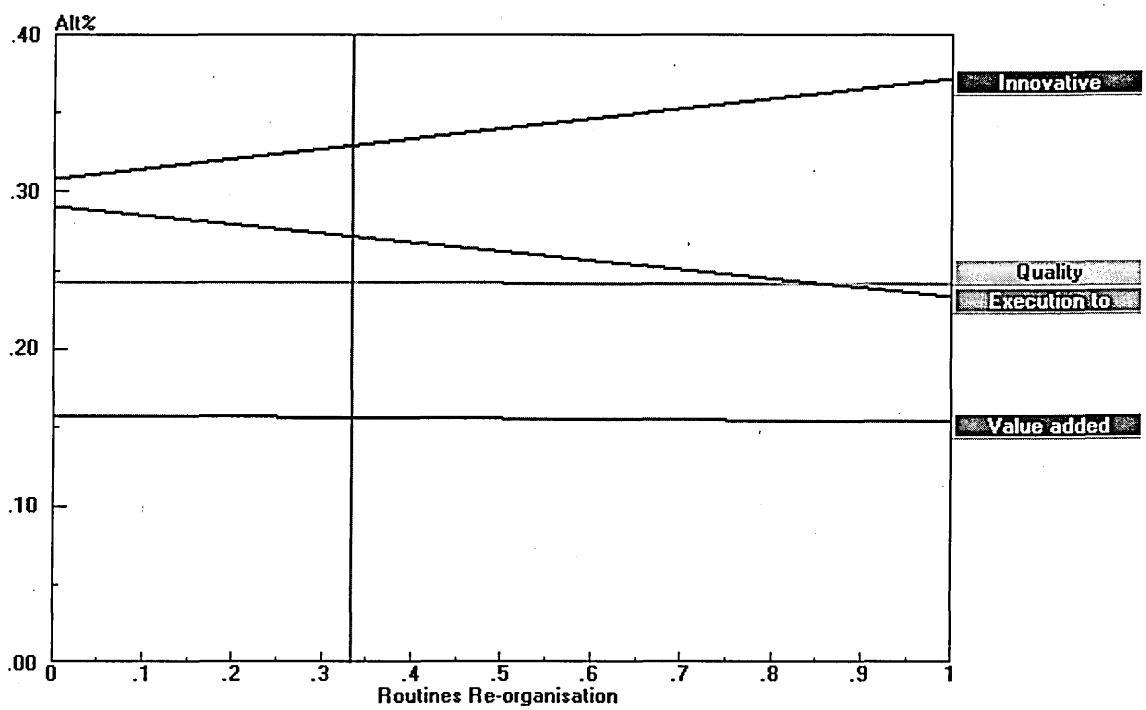

Fig. 28: The sensitivity graph with respect to the actual value (0.333) of Routines re-organisation attribute priority.

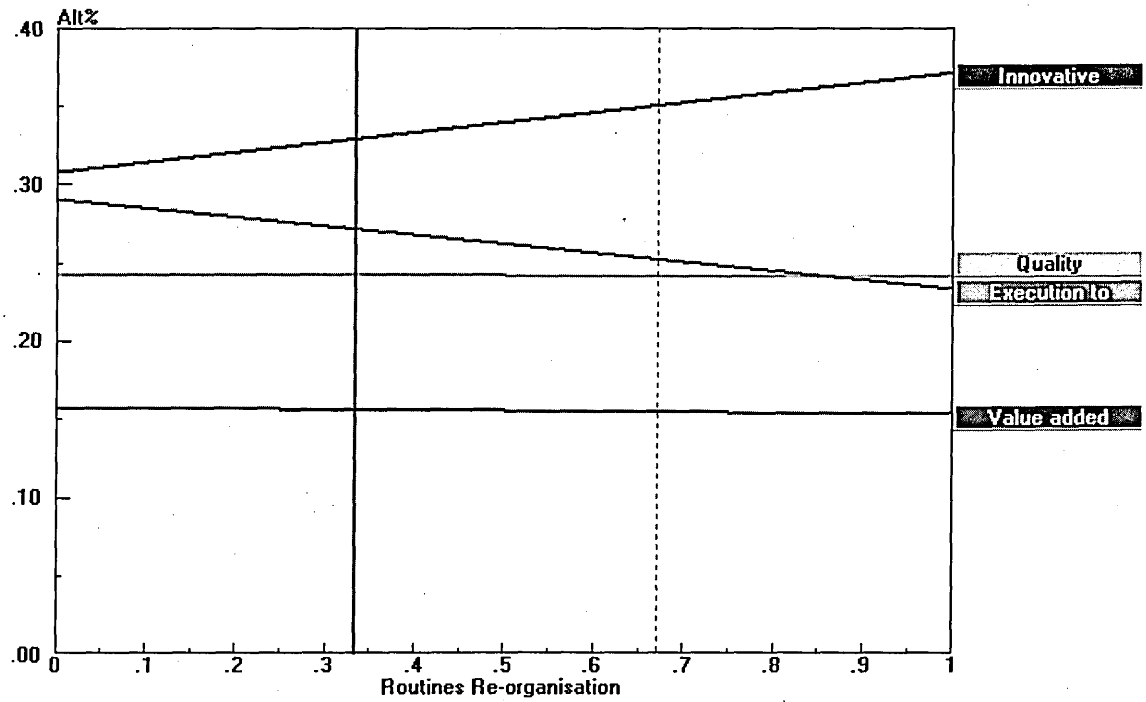

Fig. 29: The sensitivity with respect to changing the priority of Resource re-deployment attribute by +50%.

Appendix K

Construction Company B (CCB)

- **Company Background**

  - Industry: Construction
  - Business: Housing building and development
  - Employees: 40 - 50 employees
  - Turnover: ≈ £2 million

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Contract Management	25	75	100
Financial & Managerial Affairs	60	40	100
Construction Management	50	50	100
Studies & Development	20	80	100
Procurement management	50	50	100
Performance management	30	70	100

Table 1: The composition of capabilities of CCB.

Key Capabilities	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Contract Management	4	3	4	**11**
Financial & Managerial Affairs	3	3	3	**9**
Construction Management	4	4	4	**12**
Studies & Development	3	3	3	**9**

Table 2: Collectiveness analysis of CCB.

Key Capabilities	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Contract Management	3	2	3	**8**
Financial & Managerial Affairs	2	2	3	**7**
Construction Management	3	3	3	**9**
Studies & Development	2	2	3	**7**

Table 3: Uniqueness assessment of CCB.

Key Capabilities	Collectiveness Overall Score	Uniqueness Overall Score
Contract Management	**11**	**8**
Financial & Managerial Affairs	**9**	**7**
Construction Management	**12**	**9**
Studies & Development	**9**	**7**
Mean Value	**10.25**	**7.75**

Table 4: Determining competences of CCB.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Contract Management	4	3	**7**
Construction Management	4	3	**7**
Mean Value			***7.00***

Table 5: Strategic flexibility analysis of CCB.

Analysis of Contract Management

Operational Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Contract	35	65	100
Relationships & co-operation	40	60	100
Promotion	50	50	100

Table 6: The composition of operational capabilities of contract management.

Key Operational Capability	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Contract	3	3	4	**10**
Relationships & co-operation	3	4	4	**11**
Promotion	4	4	3	**11**

Table 7: Collectiveness analysis of contract management.

Key Operational Capability	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Contract	2	2	3	**7**
Relationships & co-operation	3	2	3	**8**
Promotion	2	2	3	**7**

Table 8: Uniqueness assessment of contract management.

Key Operational Capability	Collectiveness Overall Score	Uniqueness Overall Score
Contract	**10**	**7**
Relationships & co-operation	**11**	**8**
Promotion	**11**	**7**
Mean Value	**10.66**	**7.33**

Table 9: Determining competences of contract management.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Relationships & co-operation	4	3	**7**

Table 10: Strategic flexibility analysis of contract management.

Analysis of Construction Management

Operational Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Projects Schedulling	35	65	100
Concrete Works	80	20	100
Outsourcing	30	70	100
MRP	45	55	100

Table 11: The composition of capabilities of construction management.

Key Operational Capability	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Projects Schedulling	4	4	3	**11**
Concrete Works	3	4	3	**10**
Outsourcing	3	3	2	**8**
MRP	3	2	2	**7**

Table 12: Collectiveness analysis of construction management.

Key Operational Capability	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Projects Schedulling	3	2	3	**8**
Concrete Works	2	3	3	**8**
Outsourcing	2	3	2	**7**
MRP	2	2	2	**6**

Table 13: Uniqueness assessment of construction management.

Key Capabilities	Collectiveness Overall Score	Uniqueness Overall Score
Projects Schedulling	**11**	**8**
Concrete Works	**10**	**8**
Outsourcing	**8**	**7**
MRP	**7**	**6**
Mean Value	**9.00**	**7.25**

Table 14: Determining competences of construction management.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Projects Schedulling	3	3	**6**
Concrete Works	3	3	**6**

Table 15: Strategic flexibility analysis of construction management.

Competence	Human contribution	Organisational contribution	Technological contribution	Total %
Relationships & Co-operation	65	15	20	100
Projects Schedulling	40	20	40	100
Concrete Works	40	15	45	100

Table 16: The composition of organisational competences of CCB.

On which of these competences, do individuals' competencies have the most influence and contribution?			
	Relationships & Co-operation	Projects Schedulling	Concrete Works
Relationships & Co-operation		1	0
Projects Schedulling	1		0
Concrete Works	2	2	
Overall Score	**3**	**3**	**0**

Table 17: The influence and contribution of individuals' competencies on organisational competences of CCB.

Core Competence: Relationships & Co-operation							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation		1	2	1	0	0	1
Communication skills	1		1	1	2	1	1
People management	0	1		1	0	0	1
Customer focus	1	1	1		0	1	1
Results orientation	2	0	2	2		2	1
Problem solving	2	1	2	1	0		1
Planning and organising	1	1	1	1	1	1	
Overall Score	**7**	**5**	**9**	**7**	**3**	**5**	**6**

Table 18: Determining the most related individuals' competencies with Relationships and co-operation core competence.

Core Competence: Projects Schedulling							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation		1	0	0	1	2	1
Communication skills	1		0	1	2	2	1
People management	2	2		0	0	1	1
Customer focus	2	1	2		1	1	1
Results orientation	1	0	2	1		0	1
Problem solving	0	0	1	1	2		2
Planning and organising	1	1	1	1	1	0	
Overall Score	**7**	**5**	**6**	**4**	**7**	**6**	**7**

Table 19: Determining the most related individuals' competencies with Projects Schedulling core competence.

Appendix L

Construction Company C (CCC)

- **Company Background**

  - Industry: Construction
  - Business: Estates investment and development
  - Employees: ≈ 50 employees
  - Turnover: ≈ £4 million

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Quality Management	50	50	100
Performance Management	40	60	100
Construction Management	65	35	100
Properties Management	75	25	100
R & D	30	70	100

Table 1: The composition of capabilities of CCC.

Key Capabilities	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Quality Management	4	3	3	**10**
Performance Management	3	4	4	**11**
Construction Management	4	4	3	**11**
Properties Management	2	4	3	**9**
R & D	3	3	3	**9**

Table 2: Collectiveness analysis of CCC.

Key Capabilities	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Quality Management	2	2	3	**7**
Performance Management	2	3	4	**9**
Construction Management	2	2	4	**8**
Properties Management	2	2	2	**6**
R & D	3	3	2	**8**

Table 3: Uniqueness assessment of CCC.

Key Capabilities	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Quality Management	**10**	**7**
Performance Management	**11**	**9**
Construction Management	**11**	**8**
Properties Management	**9**	**6**
R & D	**9**	**8**
Mean Value	**10.00**	**7.60**

Table 4: Determining competences of CCC.

Organisational Competences	**Strategic Flexibility**		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Performance Management	4	3	7
Construction Management	3	4	7

Table 5: Strategic flexibility analysis of CCC.

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Engineering Planning	20	80	100
Projects Management	75	25	100
Engineering Consultation	10	90	100
Facilities Management	90	10	100
Supply Chain Management	70	30	100
Workforce Management	35	65	100

Table 6: The composition of operational capabilities of Construction management.

Functional Operational Capabilities	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Engineering Planning	4	4	4	**12**
Projects Management	4	4	4	**12**
Engineering Consultation	3	3	3	**9**
Facilities Management	3	4	4	**11**

Table 7: Collectiveness analysis of Construction management.

Functional Operational Capabilities	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Engineering Planning	4	3	3	**10**
Projects Management	3	2	2	**7**
Engineering Consultation	4	3	3	**10**
Facilities Management	2	2	2	**6**

Table 8: Uniqueness assessment of Construction management.

Key Capabilities	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Engineering Planning	**12**	**10**
Projects Management	**12**	**7**
Engineering Consultation	**9**	**10**
Facilities Management	**11**	**6**
Mean Value	**11**	**8.25**

Table 9: Determining competences of Construction management.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Engineering Planning	4	4	**8**

Table 10: Strategic flexibility analysis of Construction management.

Analysis of Performance Management

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Personnel Management	80	20	100
Information Processing	90	10	100
Product Development	40	60	100
Cost & Budget Control	85	15	100
Purchasing & Inventory	80	20	100
Review	85	15	100
Feasibility Studies	30	70	100

Table 11: The composition of operational capabilities of Performance management.

Functional Areas (Key Capabilities)	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Personnel Management	3	2	2	**7**
Information Processing	3	1	2	**6**
Cost & Budget Control	3	4	4	**11**
Purchasing & Inventory	2	4	4	**10**
Review	2	1	2	**5**

Table 12: Collectiveness analysis of Performance management.

Functional Areas (Key Capabilities)	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Personnel Management	2	2	2	**6**
Information Processing	4	3	3	**10**
Cost & Budget Control	4	3	3	**10**
Purchasing & Inventory	2	1	2	**5**
Review	1	1	1	**3**

Table 13: Uniqueness assessment of Performance management.

Key Capabilities	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Personnel Management	**7**	**6**
Information Processing	**6**	**10**
Cost & Budget Control	**11**	**10**
Purchasing & Inventory	**10**	**5**
Review	**5**	**3**
Mean Value	**7.80**	**6.80**

Table 14: Determining competences of Performance management.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Cost & Budget Control	4	4	**8**

Table 15: Strategic flexibility analysis of Performance management.

Appendix M

Construction Company A (CCA)

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Contract Management	50	50	100
Financial & Managerial Affairs	75	25	100
Construction & Installation	90	10	100
Estates Investment	40	60	100
Information & Development	30	70	100
Engineering and design	25	75	100
Supply chain management	60	40	100
Safety & environmental affairs	65	35	100

Table 1: The composition of capabilities of CCA.

Key Capabilities	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Contract Management	3	4	4	**11**
Financial &Managerial Affairs	3	2	4	**9**
Construction & Installation	4	4	4	**12**
Estates Investment	2	3	3	**8**
Information & Development	3	3	3	**9**

Table 2: Collectiveness analysis of CCA.

Key Capabilities	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Contract Management	2	3	2	**7**
Financial &Managerial Affairs	2	2	2	**6**
Construction & Installation	4	3	3	**10**
Estates Investment	3	2	2	**7**
Information & Development	3	3	3	**9**

Table 3: Uniqueness assessment of CCA.

Key Capabilities	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Contract Management	**11**	**7**
Financial & Managerial Affairs	**9**	**6**
Construction & Installation	**12**	**10**
Estates Investment	**8**	**7**
Information & Development	**9**	**9**
Mean Value	***9.80***	***7.80***

Table 4: Determining competences of CCA.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Construction &Installation	4	4	**4**

Table 5: Strategic flexibility analysis of CCA.

Analysis of Construction & Installation Management

Capability	% Contribution of Tangible Assets	% Contribution of Intangible Assets	Total %
Architecture Design	30	70	100
Marble Works	70	30	100
Cooling/ Heating Works	25	75	100
Electricity Works	15	85	100
Low Cost Estates	40	60	100

Table 6: The composition of operational capabilities of Construction management.

Functional Areas (Key Capabilities)	Collectiveness			
	Across-function Score (1-4)	Across-product Score (1-4)	Across-business Score (1-4)	Overall Score
Architecture Design	3	4	3	**10**
Marble Works	2	4	2	**8**
Cooling/ Heating Works	2	4	2	**8**
Electricity Works	2	4	2	**8**
Low Cost Estates	4	4	4	**12**

Table 7: Collectiveness analysis of Construction and installation management.

Functional Areas (Key Capabilities)	Uniqueness			
	Rareness Score (1-4)	Inimitability Score (1-4)	Non-Substitutability Score (1-4)	Overall Score
Architecture Design	3	2	3	**8**
Marble Works	3	2	1	**6**
Cooling/ Heating Works	3	2	1	**6**
Electricity Works	3	2	1	**6**
Low Cost Estates	3	3	4	**10**

Table 8: Uniqueness assessment of Construction management.

Key Capabilities	**Collectiveness** Overall Score	**Uniqueness** Overall Score
Architecture Design	**10**	**8**
Marble Works	**8**	**6**
Cooling/ Heating Works	**8**	**6**
Electricity Works	**8**	**6**
Low Cost Estates	**12**	**10**
Mean Value	***9.20***	*7.20*

Table 9: Determining competences of Construction management.

Organisational Competences	Strategic Flexibility		
	Resource Re-deployment Score (1-4)	Resource Re-organisation Score (1-4)	Overall Score
Architecture Design	2	4	6
Low Cost Estates	3	4	7

Table 10: Strategic flexibility analysis of Construction management.

Competence	Human contribution	Organisational contribution	Technological contribution	Total 100%
New Architecture Designs	70	10	20	100
Marble Works	30	30	40	100
Cooling / Heating Works	75	15	10	100
Electricity Works	80	10	10	100
Low Cost Estates	35	30	35	100

Table 11: Assessing the composition of organisational competences for CCA.

On which of these competences, do individuals' competencies have the most influence and contribution?					
	New Architect. Designs	Marble Works	Ventilation Systems Works	Electricity Works	Low Cost Estates
New Architecture Designs		0	0	0	2
Marble Works	2		0	2	2
Cooling / Heating Systems Works	2	2		2	2
Electricity Works	2	0	0		2
Low Cost Estates	0	0	0	0	
Overall Score	**6**	**2**	**0**	**4**	**8**

Table 12: The contribution individuals' competencies on of organisational competences.

Core Competence: New Architecture Design							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation		0	2	1	2	2	1
Communication skills	2		2	2	2	2	1
People management	0	0		2	2	2	0
Customer focus	1	0	0		1	1	1
Results orientation	0	0	0	1		1	1
Problem solving	0	0	0	1	1		1
Planning and organising	1	1	2	1	1	1	
Overall Score	**4**	**1**	**6**	**8**	**9**	**9**	**5**

Table 13: Determining the most relevant individuals' competencies to New architecture design core competence.

Core Competence: Low Cost Building							
Individuals' Competencies	T O	C S	P M	C F	R O	P S	P & O
Team orientation		1	1	1	1	1	1
Communication skills	1		1	0	2	0	1
People management	1	1		1	1	0	1
Customer focus	1	2	1		2	0	0
Results orientation	1	0	1	0		0	0
Problem solving	1	2	2	2	2		2
Planning and organising	1	1	1	2	2	0	
Overall Score	**6**	**7**	**7**	**6**	**10**	**1**	**5**

Table 14: Determining the most relevant individuals' competencies to **Low Cost Building** core competence.

Appendix N

The Main Outcomes of Six Case Studies

Construction Company: CCE

Capabilities

- Project & Facilities Management
- Property and Estate Management
- Business Development & Interim Management
- Contract & Commercial Engineering
- Health, Safety & Environment
- Surveying Services

Core Competence

- Project & Facilities Management

Construction and Estates Investment Company: CCF

Capabilities

- Property and Estate Management
- Design Management
- Engineering Services
- Performance Management
- Project Management
- Quality Management
- Regeneration Business
- Marketing

Core Competences

- Regeneration Business
- Engineering Services

Oil Services Company: SOC

Capabilities

- Communications
- Engineering and Design
- Corrosion Protection
- Process Engineering
- Using Information Systems
- Project Evaluation
- Construction Management

Core Competence

- Engineering and Design

Electricity and Water Company (Electricity Division): QEWC

Capabilities

- Safety Systems and Policies
- Network Control
- Technology Applications
- Performance Management
- Electricity Supply Development
- Electricity Load and Loss Control

Core Competences

- Technology Applications

Water and Sewerage Works Company: WSWC

Capabilities

- Water Management
- Sewerage Management
- Engineering Services
- Performance Management
- Project Management

- Quality Management
- Health Standards Exercise

Core Competence

- Health Standards Exercise

Textile and Clothing Company: TCC

Capabilities

- Product Development
- Design Management
- Marketing
- Performance Management
- Manufacturing Management
- Quality Management

Core Competence

- Product Development
- Marketing

Engines Services Company: AESC

Capabilities

- Technology Deployment
- Engineering Management
- Performance Management
- Supply Chain Management
- Quality Management
- Outsourcing
- R & D
- Financial Management

Core Competence

- Engineering Management

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Appendix O

Overview about Construction Case Companies

Company	Ownership	Size	Level of Analysis	Number of Participants
CCA	Ltd	SME	Organisational and Individuals	3
CCB	Ltd	SME	Organisational and Individuals	2
CCC	Plc	Small	Organisational	1
CCD	Plc	Large	Organisational and Individuals	1
CCE	Ltd	SME	Organisational	2
CCF	Ltd	Small	Organisational	1

Table 1: Overview about the construction case studies.