The Application of Integrated Management Systems (IMS) by Contracting Organisations

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ABSTRACT

Construction industry is a key player in the UK economy. It contributes 10% of the GDP and employs more than 1.5 million people. Contractor organisations are the public face of the industry. Their policies, processes, and performance directly impact all stakeholders in the industry. However, the performance of contractor organisations on Quality, Health and Safety and Environment issues is far from satisfactory. Organisations of all type, including contractors are increasingly implementing management systems for Quality (ISO 9000), Health and Safety (BS 8800/OHSAS 18001) and Environment (ISO 14000) for many reasons including the fulfilment of legal obligations, creating a better organisational image and the wider demonstration of concern for the society. The standard based management systems have developed individually, independently and at different times fulfilling unique demands. However, the structural similarities in the standards have led to the evolution of integrated management systems (IMS). Chemical, nuclear and manufacturing industries are at the forefront of the emerging initiative of IMS. Contractor organisations in the UK have also shown a keen interest in the IMS development, however, there is a clear lack of guidance on the implementation of integrated management systems. This research develops a unique best practice framework for the implementation of integrated management systems (IMS) in construction contractor organisations. A comprehensive literature review, case studies in some major UK contactor organisations and a questionnaire survey were conducted to encompass the management systems, developments and issues related to the implementation of integrated management systems (IMS) in construction and other industries. The research finds contractor organisations at varying levels of development from very basic to advance in integrating their management systems. Various different approaches and methods are being applied to develop the integrated management systems in absence of any industry specific guidelines. The industry validated framework, developed in this research project will help contractor organisations as a best practice guide, in the implementation of integrated Quality, Health and Safety and Environment management systems. The integrated framework will make systems more streamlined, productive and easier to comply with.

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ABBREVIATIONS

BSI:	British Standards Institution
EBEM:	European Business Excellence Model
EFQM:	European Foundation for Quality Management
EMS:	Environmental Management Systems
HSE:	Health, Safety and Environment
IMS:	Integrated Management Systems
IMSA:	Integrated Management Systems Assessment
IPMP:	Integrated Project Management Plan
IQA:	Institute of Quality Assurance
ISO:	International Organisation for Standardisation
OH&SMS:	Occupational Health and Safety Management Systems
OHSAS:	Occupational Health and Safety Assurance Systems
OH&S:	Occupational Health and Safety
PMP:	Project Management Plan
QMS:	Quality Management Systems
QUENSH:	Quality, Environment, Safety and Health
TQM:	Total Quality Management
SHE:	Safety, Health and Environment

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Chapter 1

Project Introduction

1.1. AIMS OF THE CHAPTER

This chapter aims to familiarise the reader with the purpose and the subject area of the research study. It also outlines the structure of the research thesis. The chapter takes an overview of the construction industry. It then focuses on the research topic and introduces the subject and its importance to the construction industry. Aims and objectives of the project are also outlined together with the overview of research methodology. It concludes with the chapter guide of the thesis.

1.2. RESEARCH FOCUS

The construction industry contributes hugely to quality of life. It is one of the main industrial sectors supporting any economy. Worldwide, construction industry output was estimated at over $3000 (£2000) billion in 1998. In Europe, it was approximately $1000 (£666) billion for the same year (ILO, 2001). In the UK, construction industry output was about £69 billion in year 2000 [£74 billion in year 2002] (Construction Statistics Annual, 2001, 2002) accounting for some 10% of GDP (DETR, 2000) and about half of the UK's total investment (CITB, 2002). The industry employs, in the UK alone, 1.5 million people (DETR, 2000) with current figures assessing it to be 1.65 million people, i.e. 8% of total work force (1 in 14 of the total UK's work force) (CITB, 2002), with an estimated 21 million employed Europe wide in 1998 (ILO, 2001). Globally, it provides work to an estimated 112 million people as per 1998 statistics (ILO, 2001). However, where this size of industry has positive impacts over the economy as a whole it also has a greater influence over other aspects of daily life.

Buildings and structures change the nature, functions and appearance of towns and countryside. If not planned and managed properly, they can have serious effects to the social and natural environment. Construction also provides the delivery mechanism for many aspects of government policy aimed at the provision and modernization of the nation's built environment for example, transport, housing, schools, hospitals and flood defences (DETR, 2000).

Conversely, the construction industry is also one of the main contributors to the depletion of natural resources and a major cause of unwanted side effects. Air and water pollution, solid waste, deforestation, toxic waste, health hazards, global warming a number among many. Buildings account for one -sixth of the world's fresh water withdrawals, one-quarter of its wood harvest and two-fifths of its materials and energy flows. Nearly one-quarter of all ozone-depleting chloroflorocarbons (CFCs) are emitted by building air conditioners and the processes used to manufacture building materials (Augenbroe and Pearce, 1998). Over 90% of non-energy minerals (260 million tonnes) extracted in UK alone are used to supply the construction industry with materials. Yet every year some 70 million tonnes of construction and demolition materials and soil ends up as waste. Some 13 million tonnes of that comprises material delivered to sites and thrown away unused (DETR, 2000). Construction industry produced an estimated 150 million tonnes of solid waste in 1998, nearly 3 tonnes for each man woman and child in the UK. For the same year, the industry emissions to the air were estimated to be 30 million tonnes (Smith *et al.*, 2002).

From a Health and Safety perspective, the construction industry has the highest rate of fatal accidents in UK and across Europe. In terms of major accidents, the industry is among the high-risk industries (Eurostat, 2001, 2002 and HSS, 2001, 2003).

Despite the huge volume of business, the construction sector is sometimes viewed as a poor investment. In the UK, according to Egan Report (1998) more than a third of major clients are dissatisfied with construction contractors' performance in keeping to quoted price and to time, resolving defects and delivering a final product to the required Quality.

These facts point to the need for further improvements in the construction process. Most of the aspects identified come within the categories of Quality, Health and Safety and Environmental management and internationally recognised standards exist to assist in the effective and efficient management of these areas. Improved Environment and Health and Safety management also directly impinges the sustainable construction issue. The economic, social and environmental benefits that can flow from a more efficient and a sustainable construction industry are potentially immense. With growing awareness and concern for sustainability, construction like other industrial sectors is under considerable pressure from various directions to improve its performance. In UK, it is partly driven by government's use of policy instrument (tax and regulations), i.e. landfill tax, proposed aggregate and business use of Energy Levy and review of building regulation etc (DETR, 2000).

It is within this contextual background that this research project concentrates on the concepts and principles of Quality, Health and Safety and Environment and the management systems employed in their implementation. The project endeavours to develop a more efficient and effective framework within which to manage these areas by the construction contractor through the application of integrated management systems (IMS). However, it must be emphasised that the IMS is not the ultimate solution to all the problems related to Quality, Health and Safety and Environmental management in the industry. It is an approach to streamline the systems with business objectives, to make them more productive, efficient and effective for the implementing organisations. Moreover, organisations are different in their objectives, focus, structure and functionality. Successful management system solutions are bespoke among each, depending on many factors including the business objectives, top management support, purpose of the systems implementation.

1.3. INTRODUCTION TO THE RESEARCH

Business organisations implement a number of management systems for various applications in addition to their core business systems. Quality systems e.g. ISO 9000:1994 (BSI, 2000) and latest version 9000:2000 (BSI, 2000) are foremost, accompanied and followed by Health and Safety systems e.g. BS 8800:1996, (BSI, 1996b) and OHSAS 18001:1999 (BSI, 1999), Environmental systems e.g. ISO 14001:1996, (BSI, 1996a) and others like Investors in People (IIP, 2001) etc.

As recognised by Griffith (1999a), the list of management initiatives and standards is set to increase. Hence, dealing with separate systems and ensuring their alignment with an organisation's business strategy can be problematic (Wilkinson and Dale, 1999a). This has led to search for a better way of managing the systems to tackle the potential problems and integrated management systems or IMS is one approach that is gathering growing support. The reasons are discussed in chapter three in detail.

Clearly, the need for IMS has risen as a result of organisations' decisions to implement more than one management system (Wilkinson and Dale, 1999b). Standard organisations have also recognised such a need for compatibility by suggesting links between the systems (BSI, 1996a, 1996b, 2000). The chemicals industry took the first initiative in IMS development with manufacturing and others following suit (Wilkinson and Dale (1996b). It is increasingly becoming part of organisations' management portfolios. Many management systems certification/registration bodies are offering services for IMS implementation.

In the construction industry also, contractors are implementing IMS (Moore, 1998, CIRIA, 2000, Griffith, 2000). Construction industry research has shown that the separate systems can be combined successfully into one integrated management system with thoughtful application (CIRIA, 2000).

Many authors on the subject agree that integration promotes more efficient and effective working by removing duplication of paper work and procedures, reducing audit and administration costs, better staff communication and ease in management (Karapetrovic and Wilborn, 1998, Douglas and Glen 2000, Stanger, 2000). IMS is seen as a way in which all the factors that affect an organisation's profitability and survival can be addressed in a practical and efficient manner. Hall (1998) maintains that simplified integrated management systems reduce risk and provide opportunity for increased profitability.

In construction, Quality, Health and Safety and Environment systems also correspond to triple bottom line objectives of sustainability (Griffith, 1999b) and the integrated approach brings improved organisational efficiency (Griffith, 2000).

Maintaining separate systems for certification purposes and to oblige the client in isolation serves no genuine purpose. Systems need to be integrated in line with the business objectives of organisation. IMS is set to gain momentum, and developments and products that make it easier for companies to introduce an integrated approach should receive a good response (Integrate, 1998).

However, literature suggests that integration is taking place in a number of different ways and at different levels. Integration needs a clear definition as, terms; compatibility, alignment and integration are frequently substituted (Wilkinson and Dale, 1999a). There are no national or international standards for IMS at this time (IQA, 2000). Different approaches adopted for IMS include; integration through links between standards or merging systems (Moore, 1998, CIRIA, 2000 and IQA, 2000), TQM approach or systems engineering approach (Wilkinson and Dale, 1999a, IQA, 2000 and Wilkinson and Dale, 2000) and risk assessment based or QUENSH approach (Griffith, 2000 and Renfrew and Muir, 1998).

Integration, especially in construction is a new area calling for further research. This project is intended to develop an innovative IMS framework for construction contracting organisations. It focuses on the greater efficiency and sustainability in contractor organisations. The framework is targeted to benefit industry by:

- Bringing systems in line with the business objectives;
- Making effective implementation of Environment management systems possible alongside Quality and Safety management systems;
- Identifying workable and effective site management procedures commensurate with rendering corporate objectives;

- Easing business automation efforts and
- Opening IMS for further links with other key sections like Finance, HR and Training.

1.4. RESEARCH AIM AND OBJECTIVES

The principal aim of the research is to develop a framework for integrated management systems (IMS) for application by construction contracting organisations.

In line with the aim of the research, the objectives of the project are to:

- Study, analyse and evaluate the existing management systems in contracting organisations;
- Examine and understand the developments in the field of IMS in construction and other industries;
- Identify, interpret and evaluate the issues involved with the implementation of IMS in construction;
- Develop a novel knowledge based framework for IMS;
- Review and validate the framework for its application in an industrial context.

The next section briefly outlines the research methodology adopted to achieve the project aim and objectives.

1.5. OVERVIEW OF THE RESEARCH METHODOLOGY

Given the nature of the research aim and objectives, an inductive research approach has been adopted in this research. A qualitative research technique dominates the research methodology. Following the analysis of the literature review, pilot case studies were carried out. Based on the literature review and the pilot studies, case studies were conducted in five major UK contractor organisations. In-depth interviews at six different organisational levels, from top management to the site supervisors were arranged along with the analysis of relevant organisational documents and reports. To triangulate the case studies findings, a questionnaire survey was run in 90 UK contractor organisations. The aim of the research has been achieved by developing a framework for the integrated management systems based on the analysis of the literature review, case studies and the questionnaire survey. Details of the research methodology are covered in the Chapter 6.

The following section briefly outlines the thesis structure that has been used to report the research work carried out to achieve the research aim and objectives.

1.6. GUIDE TO THE THESIS

This thesis is organised into nine further chapters. Brief guide to each chapter is as follows:

Chapter 2 presents the basic underlying study of the management and management systems. It covers in detail the Quality, Health & Safety and Environment management systems. Each system is covered from many aspects including importance, background, different methods and standards available, related laws and regulations, implementation in the construction industry. It also touches on the selection of management of systems by businesses organisations.

Chapter 3, focusing on the main theme of the thesis, introduces the integrated management systems (IMS). Building on management systems for Quality, Health and Safety and Environment covered in the chapter 2, a thorough understanding, explanation and analysis of integration of these systems is presented. Right from the definitions of integration, it includes the scope, logic, business case, different approaches, issues, and problems of the integrated system and its application in different industrial sectors and different other aspects of IMS.

Chapter 4 covers the integrated management systems from the construction industry perspective. Particular focus of the research on the contracting organisation is explained and justified first. The chapter includes among various topics, the advantages and disadvantages, problems, issues and current state of IMS implementation in construction. Brief analysis of the topics covered in the first four chapters based on the literature review is also included. The chapter concludes with the identification of the issues to be covered in the next stage of the preliminary case studies.

Chapter 5 gives the details of the information generated from preliminary interviews conducted as pilot studies. Starting from the need and justification of such studies, it provides a preliminary perspective on the topic from construction contractors. This chapter identifies the broad inquiry areas to be followed in the detailed case study phase. This chapter critically evaluates the issues identified from the literature review and weighs them against the initial findings from the field. The chapter in fact sets the direction for thorough primary data collection.

Chapter 6 outlines the research methodology adopted for the project. Selected methodology is based on the research objectives and issues identified from the literature review and pilot studies. It covers in detail the research process, different methodological concepts and approaches for research, strength and weakness of different methods. Based on the comprehensive introduction, the chapter then outlines the methodological framework for this project and justifies the methods selected. It also explains in detail the selected options. Research design section of the chapter presents the structure of the data collection and analysis phase of the project and covers in detail the procedures and the criteria for various choices made.

Chapter 7 reports on the data gathered from the principal primary exploratory research i.e. the case studies and its analysis. It begins with the selection criteria of cases. The profile of case organisations, methods employed for data collection and management positions approached for data collection in each organisation subsequently follow. Then the description of the techniques and tools used for the analysis of case studies data is provided. The major part of the chapter contains the analysis of case studies data.

Chapter 8 contents the data collection and analysis of the second phase of primary research i.e. the questionnaire survey. It begins with the introduction to the questionnaire. The average rate of response and the detailed break down of responses from different management positions is given. The chapter outlines the method employed for analysing the questionnaire survey. The analysis of the survey constitutes a major part of the chapter.

Chapter 9 is one of the principal chapters in the thesis. Based on the analysis of the secondary research (literature review) and the primary research (case studies and the questionnaire survey) findings, the chapter presents a framework for integrated management systems for the application by contractor organisations. The concept, structure and management of the framework have been elaborated in details. The different implementation phases and the success factors for the framework are also included.

Chapter 10 reports the validation of the framework for integrated management systems. It outlines the details of the process used to validate the framework and the justification for the chosen route. The response received from the industry is then presented. Analysis of the feedback and any follow up actions, if taken are also reported. Subsequently, the summary of the validation process is included in the sum up section. It covers the main suggestions/comments received from the industry. In addition, the sum up section outlines the other alternative routes discussed for the validation of the framework.

Chapter 11 is the final chapter of the thesis. It presents the conclusions drawn from the research work, covering all the phases including the literature review, case studies and questionnaire survey. The conclusions are followed by a summary of the conclusions. The limitations to this research work are explained. In continuation to the limitations, the chapter also identifies the areas in the integration of management systems, where future research is recommended.

1.7. CHAPTER SUMMARY

This chapter presented a brief introduction to the research project. In the beginning, construction industry was evaluated for its significance and contribution in the world, European and particularly UK economy. The overview also covered the state of the industry for Quality, Health and Safety performance and Environmental impact. It pointed to the disappointing performance in Quality. In terms of Health and Safety, construction stands-out with highest number of fatal and a major contributor in non-fatal injuries. The massive harmful effects the industry have over the Environment were also identified in that section. The facts in the overview emphasised the need for improvements in Quality, Health and Safety and Environmental management. Linked with the shortcomings, main issues and the focus of this research work were identified. The chapter then followed with a broader introduction and explanation of the research focus i.e. the integrated management systems (IMS). The current position of the IMS from a broader industrial perspective in general and from a construction industry perspective in particular was included in this chapter. Derived from the necessity and importance of the Quality, Health and Safety and Environment, the state of the industry, current research on the IMS and the resources availability and limitation of the project, the chapter outlined the aims and objectives of the research. The chapter concludes with a brief guide to the structure of the thesis. The next chapter introduces the management and management systems and covers in detail the management systems for Quality, Health and Safety and Environment.

Chapter 2

Management Systems

2.1. AIMS OF THE CHAPTER

This chapter builds the foundation for the research area through extensive literature review. It introduces management, defining it from different perspectives and explains the concept of management systems. Building towards the main research focus i.e. integrated management systems (IMS), the management systems for Quality, Health and Safety and Environment are covered in detail. The chapter concludes with the identification of trends in business organisations for selecting the best mix of management systems.

2.2. MANAGEMENT

Understandably, the main purpose of the IMS is to achieve the efficient and effective management of an organisation's business activities. Hence, before embarking on the practical details of the integrated management systems, it would be helpful to expand more upon the term management. It is also important to understand the different models, concepts and practices of organisational management. These fundamentals are the foundation for the structure of IMS.

Management is a general term and it is difficult to have a generally accepted definition as an activity.

The Oxford Dictionary defines management as:

> *"The act or art of managing; the manner of treating, directing, carrying on, or using, for a purpose; conduct; administration; guidance; control.'.*

This is the common understanding of the word management. However, it is rather a narrower administrative perspective. Management is more than administration and the two words must be differentiated. Administration is more related to developing and maintaining procedures. Management by comparison, is concerned with broader facets that include administration as a part.

Henry Fayol (1949), one of the pioneers of the scientific management, explains that:

> *"To manage is to forecast and plan, to organise, to command, to co-ordinate and to control."*

The definition is in line with concepts of Taylorism (F. W. Taylor, 1865-1915) in the era of scientific management in early part of nineteenth century. This is the form of management which was first to adopt the measurement of activity through work-study and work measurement and separated management from production.

A second school of thought appeared after the early decades of the scientific management known as "social and behavioural school of management". The concepts take account of the human component of management. The classical representation of this concept is the management definition by Brech (1965):

> *"Management is a social process ....the process consists of ....planning, control, co-ordinate and motivation."*

In a recent attempt Koontz and Weihrich (1988) maintain that:

> *"Management is a process of designing and maintaining an environment in which individuals, working together in groups, accomplish efficiently selected aims...........the five essential managerial functions (are): planning, organising, staffing, leading, and controlling."*

It is interesting to note that major concepts in the scientific definition are still prevalent today. Cole (1996) agrees that in essence all the definitions regard management as a process which enables organisations to set and achieve their objectives by planning, organising and controlling their resources, including gaining the commitment of their employees.

The definitions above views management from an activity-perspective, now from a broader process perspective it may be explained as follows.

> *"Management is concerned with the systematic organisation of economic resources and its task is to make these resources productive."*
>
> Drucker (1989)

Bennett (1997) elaborates the same approach further, in his view:

> *"Management is concerned with the deployment of materials, human and financial resources, with the design of organisation, their structure and development, the specification of objectives and the choice of criteria for evaluating organisational efficiency. Management sets standards, imposes budgets, plans controls, co-ordinates, leads and motivates staff, and takes decisions. It monitors performance and initiates remedial action when plans are not achieved."*

From a practitioner perspective, management may not be an activity that exists in its own right. It is rather a description of a variety of activities carried out by those members of organisation whose role is that of a manager i.e. someone who either has formal responsibility for the work of one or more persons in the organisation, or who is accountable for specialist advisory duties in support of key management activities. These can be grouped in terms of planning, organising, motivating and controlling activities (Cole, 1996).

The difference in definitions suggests the broadness of the subject. One can find a unique definition of management, each time looking at it from a different perspective. Changes in focus and terminology in definitions reflect the evolution of management concepts in the last century. In very simplistic terms "management is to achieve the objectives of any activity in an efficient, effective and organised manner." The term activity here refers to any type of organisational activity i.e. business, public service, government, etc.

2.3. MANAGEMENT SYSTEMS

Organisations of any type are complex systems in concept and in practice. Each combines different sub-systems to deal with the multiple aspects of current business, social and environmental issues. A typical business organisation may have sub-systems for Production, Accounting and Finance, Marketing, Quality, Safety and Environment among many. Where an organisation has its corporate management system, every sub-system in turn may maintain its own management system. In the context of IMS, it will be helpful to understand the concept of systems and the management systems.

The Oxford Dictionary defines a system as:

> *"A complex whole; a set of connected things or parts, an organised body of materials and immaterial things."*

In management terms (Lamming and Bessant, 1988), it is:

> *"A group or series of independent functions, which are designed to combine towards one, or more common objectives and which may be treated as one entity."*

In technical terms:

> *"A system is series of activities that transform input into output through process (es)."*

In comparison, a management system is the necessary infrastructure for operating any system. The infrastructure comprises the organisation, resources and processes, which enable the organisation to achieve its objectives, as Hoyle (1998) propounds. BSI (1996a) further elaborates the essence of a management system as as:

> *"A composite, at any level of complexity, of personal resources, policies and procedures, the components of which interact in an organised way to ensure a given task is performed, or to achieve or maintain a specified outcome."*

As discussed earlier, organisations adopt and operate a number of different management systems. They can be categorised in core systems and support systems. Core Systems are those which generate direct revenue for the business for example a production system in a manufacturing company. Alternatively, support systems, although they do not directly contribute in revenue, ensure the smooth management of the organisation, its stability and the sustained business. The list for support systems extends from Marketing, Finance and Accounting to IIP (investors in people), Quality, Safety and Environmental management systems etc. In addition to their core business systems, organisations generally implement a number of support management systems.

Quality and Environment systems are different and special in the list of support systems in a way that both have recognised, formal, standard and certifiable management systems. Although, at present there is no accredited occupational Health and Safety management system, yet, in one form or another it is employed in organisations. For some industrial sectors, it is a legal requirement, particularly in high hazard business activities to have a Health and Safety management mechanism in place. Environment management systems are the latest in the series of management systems. They have come as a result of growing concern for Environmental issues in communities.

Management systems essentially establish a structure (Holdsworth, 2003), uniformity and a consistent approach for Quality, Health and Safety and Environmental management. For full understanding of IMS, it will be useful that a further examination of these management systems is carried out separately. Therefore, Quality is covered in detail followed by Health and Safety and Environment.

2.4. QUALITY MANAGEMENT

Quality is such an important and critical aspect of businesses today that it seems unfair and might be misleading to regard Quality management as a support system. Especially with the introduction of Total Quality Management (TQM) and the growing emphasis on customers, Quality concepts have attained an unprecedented importance. Hence, it is worth tracing back the history of Quality in order to develop an understanding of the concepts involved.

2.4.1. Background

Quality, usually associated with some form of measurement and inspection activity, has been an important aspect of production operations throughout history. Evans and Lindsay (1999) point to Egyptian wall paintings from around 1450 BC showing evidence of measurement and inspection. Pyramids are a living illustration where stones were cut so precisely that even today it is impossible to put a knife blade between the blocks.

The development of Quality concepts continued in the middle ages in Europe. Craft guilds, consisting of masters, journeymen, and apprentices, emerged to ensure that craftspeople were adequately trained. Quality assurance was informal; however, every effort was made to ensure that Quality was built into the final product by the people who produced it. It is suggested that these themes, which were lost with the advent of the industrial revolution, are important foundations of modern Quality assurance efforts (Evans and Lindsay, 1999).

For modern business organisations, Quality is not a new concept. The emerging industrial economy enabled machines to produce at a scale that far exceeded the demand. The resulting market economy and competition culture made it necessary for companies to differentiate their products. Obviously, Quality was the chosen option, concept and tool to win over in the market place.

The current drive for Quality can be traced back to 19th century. Evans and Lindsay (1999) quote W. C. Procter, grandson of the founder of Proctor & Gambel, advising his employees in 1887:

> *"The first job we have is to turn out quality merchandise that consumers will buy and keep on buying. If we produce it efficiently and economically, we will earn a profit, in which you will share."*

The Bell System, the centre for the famous Mayo Studies (Evans and Lindsay, 1999) is regarded as the pioneer organisation in the early modern history of industrial Quality assurance. It created an inspection wing in its Western Electric Company in the early 1900s to support the Bell operating companies. The Western Electric group, led by Walter Shewhart, ushered in the era of Statistical Quality Control (SQC). SQC is the application of statistical methods for controlling the problems that cause defects. In World War II, the US military began using statistical sampling procedures and imposing stringent standards on suppliers.

Major contributions to the Quality movement came from two US consultants, Juran (1988) and Deming (1986). They introduced statistical quality control techniques to the Japanese to aid them in their rebuilding efforts. They insisted on the support from top management for Quality improvements. With that support, the Japanese integrated Quality throughout their organisations and developed a culture of continuous improvement. This resulted in a new initiative known as Total quality management (TQM). Today quality management and control is recognised as the foundation of business competitiveness and is proactively integrated with all business practices (Evans and Lindsay, 1999).

Another major step in the history of Quality is the introduction of the ISO 9000 series (formerly BS 5750) in the UK as formal Quality management systems in the late twentieth century. The standard has had a great impact over the Quality movement as it gave a formal procedural structure to Quality and created a general awareness for Quality. As an internationally accepted standard of Quality, it ensures that certified organisations have uniform infrastructures and procedures in place for delivering Quality management.

Quality appears as a fundamental requirement for competitiveness and this has been accompanied by the evolution of the concept of Quality from simple Quality Control to current Total quality management (Matias and Coelho, 2002).

2.4.2. Quality: Definition

Like management, Quality is also a subjective and confusing term and there can be a number of definitions from different perspectives. It is difficult to agree on a definition, owing to differences in the criteria individuals apply to their requirements. Even practitioners and consultants have struggled to reach an agreement as Quality definitions have evolved over the time with the development of new Quality concepts and initiatives. A study reported by Evans and Lindsay (1999) asking managers to define Quality, produced several dozen different responses, including:

- Perfection;
- Consistency;
- Eliminating waste;
- Speed of delivery;
- Compliance with policies and procedures;
- Providing a good, usable product;
- Doing it right the first time;
- Delighting or pleasing customers, and
- Total customer service and satisfaction.

Even different parts of an organisation may regard Quality in different ways. Hence, it is important to appreciate the Quality from different aspects (Evans and Lindsay, 1999).

a) Judgmental Criteria: Quality, as often used by consumers, is regarded as synonymous with superiority of excellence. In this sense, Quality is "absolute and universally recognisable mark of uncompromising standards and high achievement".

b) Product Based Criteria: Quality is a function of a specific measurable variable and that difference in Quality reflects differences in quantity of some product attribute. This implies that higher levels or amounts of product characteristics are equivalent to higher Quality.

c) User-Based Criteria: Quality is based on the presumption that Quality is determined by what a customer wants. Individuals have different wants and needs and, hence, different Quality standards. This leads to a user-based definition where Quality is defined as fitness for intended use.

d) Value Based Criteria: Quality is based on value. From this perspective, a Quality product is as useful as other competing products and is sold at a lower price or one that offers greater usefulness or satisfaction at a comparable price.

e) Manufacturing-Based Criteria: Quality is defined as the desirable outcome of engineering and manufacturing practice, or conformance to specifications. Specifications are targets and tolerances determined by designers of products and services.

The International Standards Organisation (ISO) in the previous version of Quality management systems ISO 9001:1994 and the American Society for Quality adopt the following definition for Quality:

> *"It is the totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs."*
>
> (BSI, 1995 and ASQ, 2001)

The definition is based heavily on the product and user based approaches and is driven by the need to contribute value to customers and thus to influence satisfaction and preference. As a recent development, many companies had begun using Quality "as meeting or exceeding customer expectations" though a simpler, yet powerful, customer-driven definition of Quality. Presently, the customer driven concept of Quality is further extended, rapidly embracing the nature or degree of impact an organisation has on its stakeholders, environment and society (IQA, 2001). Working on the same lines, the latest version of ISO 9000:2000 Quality management systems define Quality as a:

> *"Degree to which a set of inherent characteristics fulfils requirements."*
>
> (BSI, 2000)

As true for every management initiative, businesses and consultants also sometimes take Quality as flavour of any particular time. Jonker and Klaver (1998) agree that Quality has becomes a throw away term and consequently its meaning in any particular situation has to be redefined repeatedly.

2.4.3. Different Methods and Standards

For Quality, a variety of standards, philosophies, methodologies, tools, techniques, and measures have been developed to help organisations meet the goals. Some of these are categorised here to appreciate the confusion in adopting an appropriate mix for any organisation.

a) Management Systems

- ISO 9000, Quality Management System (ISO, 2001) [UK Equivalent BS5750]
  (Variants such as QS 9000 for the automotive industry)
  First published ISO: 9000:1987, revised ISO: 9000:1994
  Latest Version ISO: 9000:2000

b) Philosophies

Some most famous among the various management philosophies available now include:

- Deming's 14 points (Deming, 1986 and Deming Institute, 2002);
- Juran's (Juran, 1988 and Juran Institute, 2002) and Crosby's (2002) philosophies;
- Total Quality Management.

c) Methodologies

The Quality methodologies available in the market are numerous. Selection of a right method can be some times problematic for an organisation. Just to recognise the choice available, some of the methodologies available are as follows.

- Business Process Management;
- Continual Improvement (Kaizen);
- Stretch Goals and Breakthrough Improvements;
- Process Reengineering;

- Quality cost management Best Practices and Bench marking;
- Zero Defects;
- Right First Time;
- Six Sigma Quality;
- Statistical Experimentation;
- The Taguchi Loss function, and
- Quality Function Deployment.

d) Tools and Techniques

The same is the case of tool and technologies as with the methodologies. Only for illustration purpose, few are listed as follows.

- Process Charts;
- Failure Mode And Effects Analysis;
- Statistical Process Control;
- Quality Function Deployment;
- Critical Paths;
- Affinity Diagrams;
- Interrelationship diagrams;
- Tree Diagrams;
- Matrix Diagrams;
- Matrix Data Analyses;
- Process Decision Programme Charts;
- Arrow Diagrams;
- The Deming cycle;
- Juran's improvement plan, and
- The Crosby programme.

e) Measures

- Malcolm Baldrige Quality Award (NIST, 2001);
- UK Quality Award (BQF, 2001);
- European Quality Award: Established in October 1991, by European Foundation for Quality Management (EFQM, 2001) in partnership with the European Commission and the European Organisations for Quality, it is now know as Business Excellence Model;
- Australian Business Excellence Award (AQC, 2001);
- Canadian Award for Business Excellence (NQI, 2001);
- The Deming Applications Prize, instituted in 1951 by Union of Japanese Scientists and Engineers (JUSE, 2001);
- Best Value (IDEA, 2001), and
- Investors in People (IIP, 2001).

2.4.4. ISO 9000 Quality Management Systems

ISO 9000 is the internationally recognised standard for Quality. Notably, it does not guarantee the Quality product, but ensures the certified organisation has all preventive and corrective measure and procedures in place to check a defective product entering in to market. It is widely accepted as a mark of Quality. ISO 9000 Quality standards first published in 1987. It is not easy to trace back the concepts behind ISO 9000. Quality concepts have been around for a considerable time; however, a formal system did not appear until early 1950s. Hoyle (1998) explains that Quality control, an element of Quality management, emerged as a function within the industry after World War Two (W.W.II) and the principles were codified by Juran (1988) in 1951. As mentioned earlier, Quality control measures were used by the military in W.W.II. In 1959, the American Defence Department issued first national standard, "Mil Q 9858A". This was followed in 1968 by NATO's Allied Quality Assurance Publication (AQAP). The UK Ministry of Defence issued "Def Stan 05-08" in 1970, a UK version of AQAP-1. British Standard Institution (BSI) published BS 4891 in 1972, A Guide to Quality Assurance. BSI then issued BS 5179 in 1974 to complement the UK MoD standards. It was heavily based on the Defence Standards but was aimed at the non-military market, although it was only a guide. In 1979, BSI published BS 5750 in three parts for contractual purposes, matching the three UK Defence standards and the three AQAP standards. BS 5750 was revised in 1987 and the world-wide interest in the subject encouraged the International Organisation for Standardisation (ISO 2001) to adopt it as a Quality System Standard. Involving over 26 countries in its development, the first draft was published in 1987. Since then, it has gained recognition as an internationally accepted standard and a Quality mark. Huge numbers of companies around the globe are ISO 9000 certified. However, as viewed by Millidge and Smith (1999) this popularity is not surprising, as government in the 1980's heavily backed it. Although for small firms, who accepted the standard under customer demand found it difficult to embark upon, the idea of a third party registration soon presented benefits. Now it has become an established part of the commercial life. Lack of a certified Quality management system can be a trade barrier (Labodova, 2003). Magd and Curry (2003) also stress that the strategic implication of Quality cannot be ignored. In terms of numbers, some 510616 organisations were certified to ISO 9000 Quality management systems world-wide at the end of 2001 (ISO, 2004).

2.4.5. Quality Systems Implementation

Quality management and improvement has become a subject of tremendous importance to any type of organisation. Most organisations have some type of Quality management system (QMS) in place. The ISO 9000 standard has provided a uniform and consistent procedure and formal management framework to support Quality. In addition to ISO 9000 number of other initiatives are also available, designed specifically to improve Quality. Total quality management (TQM) is also one of them, which is far reaching and more philosophical than the procedural and formal approach of ISO 9000.

In contrast to achievable benefits, third party certification and strict procedural approach have reduced the Quality to a function rather than a comprehensive and detailed thought process. Thompson (1999) argues that standards have turned Quality into a formality, which has to be complied with for the sake of certification. It is therefore difficult to see how the other concepts like TQM can flourish. The industry as a whole is far from satisfied with the results achieved from using ISO 9000 and in wider perspective Quality initiatives generally. The less tangible ideals of Total quality management (TQM) present even greater challenge to organisations particularly because they involve cultural and people issues. Too many companies embark on TQM initiatives, even when they do not have the fundamentals in place. For many it is merely a case of award chasing. It is also believed that there are many gaps in the ISO 9000 standards. The objectives and boundaries of the Quality system, interrelationships between the system elements are left unclear and subject to various interpretations. However, as Hoyle (1998) explains, it is not surprising that they are not the state of the art but rather minimally accepted systems. Karapetrovic and Wilborn (1998) also agree that with the confusing structure of the ISO 9000 standards describing models for Quality systems, it comes as no surprise that a number of organisations focus on the documentation resources, rather than improving the effectiveness and efficiency of the Quality system practice and as whole. Thus paradoxically, the "system" itself becomes a barrier to improved performance rather than a catalyst.

Thompson (1999) points out that, Quality manuals, which form the central pillar of Quality management systems, often slavishly followed the 20 section headings of previous ISO 9000:1994. Indeed some companies and consultants adopt an almost reprographic approach to create an ISO 9000 system, which involves merely inserting the company name and specifies in an off the shelf system. There is generally a little attempt to design a Quality management system around business processes so that it is aligned to business need. In other words, a systems approach is lacking. Interestingly, as Moore (1998) agrees, businesses end up being asked by consultants about how to conduct the business instead of moulding standards on their business needs and activities.

Nevertheless, ISO 9000 has contributed immensely providing a formal management structure for Quality and creating an overall awareness and understanding. The majority of organisations have benefited in one way or other. The standard has provided a homogenous structure for Quality across all types of businesses that are separated by the functional, sectoral, industrial or national boundaries.

2.4.6. Quality Management in Construction Industry

Construction companies have implemented Quality management systems like organisations in other industrial sectors. However, the reasons for such implementation may be, different in the construction. Al-Nakeeb (1993) suggests that the main reasons seem to be the client pressure followed by perceived competitive advantage, potential reduction in costs and the elimination of long standing Quality problems. Much debate has centred on the effectiveness of ISO 9000 within the construction industry (Al-Nakeeb et al., 1998). It has been criticised as bureaucratic, unwieldy, wasteful and based on an approach which does not add real value to the organisation (CIRIA, 2001). Moatazed-Keivani *et al.* (1999) however believe that the Quality standards (ISO, 9000) series can and has formed the basis for efficient and advantageous Quality management systems in the construction industry. They point out to the need for correct interpretation of the standards. Greatest potential failure of ISO 9000 is its broad nature that leaves it open to misinterpretation and which can have severe negative results for the firm concerned and leads to backlash against ISO 9000 itself. There seems to be a continuing need for further education and wider dissemination of information on the application of ISO 9000 to the construction industry, with particular attention to the dangers of over bureaucratic and unnecessary checking and documenting procedures, in order to overcome this potential weakness. Overall, the benefits of a formal Quality system, which is correctly understood, appropriately designed and well implemented far outweigh any negative side effects.

2.4.7. Shift in Focus

Quality is an ever-evolving subject. After a procedural and formal era of standards development, the scope of application is extending further. From Quality control departments to cover the whole enterprise within the idea of a Total quality management (Thompson, 1999). Jonker and Klaver (1998) see Quality expanding from products, through processes and systems, to the whole organisation and even beyond. This extension has far reaching consequences, changing Quality from an object (product) oriented focus towards a subject (perception and relation) oriented focus. The most important change agent is the advent of TQM. Deming (1986) is regarded as a founding contributor of TQM. His views are based on the concepts of continuous improvement, involvement, and customer focus. Among many attempts and initiatives to systemize TQM the most ambitious to date has been made by the European Foundation for Quality. They introduced the European Foundation for Quality Model (EFQM) now renamed the European Businesses Excellence Model (EBEM) (Thompson, 1999).

The focus on Quality is set to change and it will be seen increasingly as a management philosophy instead of an organisational function or specialism. Jonker and Klaver (1998) maintain that these trends indicate a shift in focus and direction for Quality in near future. A shift in emphasis will also occur towards people as the major vehicles for Quality. For the immediate future, this requires increasing effort to integrate already existing and emerging Quality systems.

2.5. HEALTH AND SAFETY MANAGEMENT

The following sections cover the Health and Safety management in detail.

2.5.1. Background

In the modern business environment, Occupational Health and Safety occupies an important place. This is rightfully so, as nearly 300 people are reported to have been killed in UK alone during work in year 2000/01 and some 27000 major injuries were suffered at work (HSS, 2001). Workplace Health and Safety issues are subject to stringent legal requirements and any negligence and breach can result in prosecution leading to serious consequences for any business. The Health and Safety management is explained from different perspectives in the following sub sections.

2.5.2. Laws and Regulations

The legal requirements related to Health and Safety are covered in two sets. General laws and regulations application to every workplace and the second set specifically for construction industry.

a) General

In the UK, the principal legal requirements relating to Occupational Health and Safety are stipulated in the Health and Safety at Work etc Act 1974 (Croner, 2001) and Management of Health and Safety at Work Regulations 1999. There are number of statutes and regulations emanating from the law covering various aspects.

Stranks (1992) explains that the law on Health and Safety at work has, like much protective legislation, developed in a fragmented way over the last two centuries. The first statute, the Health and Morals of Apprentices Act 1802 was passed to combat this state of affairs in the textile industry. The Factory Act 1833 resulted in the appointment of four-factory inspectors with specific powers of entry to factories. The means of enforcement was extended to other industries with the Factory and Workshop Act 1878. A final consolidating Act, the Factory and Workshop Act 1901, formed the basis for much of the current protective Health and Safety legislation. However, as Fink (1997) maintains, that preventive statutory regime centred on a detailed and prescriptive approach, which has continued virtually unabated until the 1960s with the creation of statues like the Factories Act 1961 and the Offices, Shops and Railway Premises Act 1963. Despite the existence of such laws, accident rates have risen continuously. This fact alone led the Government to commission the first comprehensive review of Health and Safety law in the UK, which was embodied in the report of the Committee on Safety and Health at Work the "Robens Report" published in July 1972. Stranks (1992) regards that report as instrumental in the passing of the Health and Safety Act 1974.

Much of the recent UK legislation on the subject is influenced as a direct result of EC Directives. The most important is the Council of European Communities Directive 89/391/EEC entitled, "measures to encourage improvements in the Safety and Health of workers at work". This is commonly referred to as The Framework Directive (EC, 2002). This directive requires compliance of member states and it covers (Griffith and Howarth, 2000):

- prevention of occupational risks;
- protection of Safety and Health;
- informing, consultation and training of workers and their representatives, and principles concerning the management of above measures.

b) Related to Construction Industry

The construction industry has a significant part to play in Health and Safety matters, as explained in the subsequent sections. The general industrial Health and Safety laws and regulations are equally applicable in construction. However, in order to comply with the Temporary or Mobile Construction Sites Directive, which was adopted by the European Council in

1992, the Construction Design and Management Regulations were developed in UK.

Fink (1997) suggests that it is fair to say that the Construction Design and Management Regulations 1994 (the CDM Regulations) represent one of the most fundamental revisions to construction safety law since the 1960's.

The regulations reflect a fundamental shift in the Health and Safety Commission's policy for construction safety in the UK, moving it away from the traditional systems whereby each employer is obliged to determine the proper course of conduct for his own employees only, towards a system that obliges every employer on a construction site is to become part of Health and Safety management system for the project as a whole (Fink, 1997). The Construction (Health, Safety and Welfare) Regulations 1996 are also part of the Health and Safety law of construction industry.

2.5.3. Cost of Health and Safety Failure

Apart from the tragic human lives lost and suffering of persons injured, it is estimated that Health and Safety failures due to workplace accidents and work related ill Health in 1995-1996 cost the UK £18 billion. Work related accidents and illness cost 2.1%-2.6% of Gross Domestic Product each year, equivalent to between £14.5 billion to £18.1 billion. The cost to employers is estimated to be between £3.5 billion and £7.3 billion a year, 4% to 8% of all gross company trading profits. Over £180 million a year could be saved in work related illness costs in the construction industry alone (DETR, 2000a).

2.5.4. Latest Statistics

This section reports the latest statistics on workplace Health and Safety in the UK with particular focus on the construction industry.

a) Overall Figures

According to Health and Safety Executive's report, the rate of reported fatal injury in the UK in 2002/03 was 0.8 per 100000 workers, nearly 226 in total. The rate of reported non-fatal injuries in 2002/03 was 614.1 per 100000 workers. The number of fatal injuries in fact has risen from 220 in year 1999/2000 (HSS, 2001, HSS, 2003). The report identifies the high-risk industries, which account for 78% of all fatal injuries to workers. Over the three years period 1998-2001, 764 fatal injuries to workers (employees and the self-employed) were reported to HSE (Health and Safety Executive) and local authorities from these industries. A breakdown of industries with the highest rates of fatal injury is given in Table 2.1.

b) Construction Industry Figures

As table 2.1 and 2.2 show, the construction industry is one of the high-risk industries in the UK. Over the past ten years there have been 150,417 injuries in the construction industry reported to HSE. Of these 131,949 were to employees, 15,969 were to the self-employed and 2,499 to members of the public. Of which 921 were fatal injuries and 149496 were non-fatal injuries (HSS, 2001).

Table 2.1, Industries with the highest rated of fatal injuries to workers, 1998/99 to 2000/01 combined.

	Standard Industrial Classification	Number of fatal injuries	Number of workers (a)	Fatal rate per 100,000 workers
1	Quarrying of stone, ore and clay	9	87	10.4
2	Agriculture, hunting, forestry and fishing	128	1,423	9.0
3	Extraction of coal, oil and gas	12	135	8.9
4	Construction	252	5,225	4.8
5	Manufacturing of basic metals and fabricated metal products	58	1,682	3.4
6	Manufacturing of wood and wood products	9	284	3.2
7	Manufacturing of other non-metallic mineral products	12	447	2.7
8	Manufacturing not elsewhere classified	17	737	2.3
9	Transport, storage and communication (b)	80	4,017	2.0
10	Electricity, gas and water supply	6	386	1.6
11	Manufacturing of rubber and plastic products	12	728	1.6
	Total	595	15,151	-
	All industries (c)	764	82,657	0.9

(a) Expressed in thousands of workers
(b) Injuries arising from shore-based services only. Excludes incidents reported under merchant shipping legislation.
(c) Numbers and percentages do not sum to the total.

Source: Health and Safety Statistics 2000/01, Part 1: Statistics of workplace injury, gas Safety, dangerous occurrences and enforcement action, Health and Safety Commission, National Statistics, 2001.

Table 2.2, Industries with the highest rates of major injuries to employees, 1998/99-2000/01 combined

	Standard Industrial Classification	Number of major injuries	Number of workers (a)	Major rate per 100000 workers
1	Quarrying of stone, ore and clay	363	81	449.7
2	Manufacturing of wood and wood products	1,023	243	420.5
3	Extraction of coal, oil and gas	511	130	392.6
4	Construction	12,943	3,301	392.1
5	Manufacturing of food products, beverage and tobacco	4,353	1,418	3,06.9
6	Manufacturing of other non-metallic mineral products	1247	412	302.8
7	Manufacturing of basic metals and fabricated metal products	4,690	1576	297.7
8	Manufacturing of rubber and plastic products	1,898	692	274.4
9	Transport, storage and communication (b)	8,710	3,365	258.9
10	Agriculture, hunting, forestry and fishing	1,850	872	212.2
	Total	37,588	12,090	-
	All industries (c)	83,567	72,642	112.8

(a) Expressed in thousands of employees.
(b) Injuries arising from shore-based services only. Excludes incidents reported under merchant shipping legislation.
(c) Numbers and percentages do not sum to the total.

Source: Health and Safety Statistics 2000/01, Part 1: Statistics of workplace injury, gas Safety, dangerous occurrences and enforcement action, Health and Safety Commission, National Statistics, 2001.

Table 2.3, Industries with the highest rates of reported major injuries per 100000 employees, 2002/2003 (p)

	Standard Industrial Classification (SIC 92)	Number of major injuries
1	Mining of Coal, lignite and peat extraction	685.1
2	Recycling of scrap and waste	539.6
3	Manufacturing of wood and wood products	441.5
4	Forestry	421.9
5	Other mining and quarrying	395.9
6	Manufacture of basic metals	378.7
7	Construction	374.8
8	Manufacture of other non-metallic mineral products	309.3
9	Sewage and refuse disposal	298.6
10	Manufacture of food products	295.6
11	Supporting and auxiliary transport activities	283.2
12	Agriculture and hunting	272.7

SIC 92: Standards Industrial Classification (1992)

Source: Adopted from Health and Safety Statistics Highlights 2002/03, Health and Safety Commission, National Statistics, 2003.

Construction Workers are six times more likely to have an accident at work than the average British worker (HSE, 2002). The picture is not different in the continental Europe. 1998/1999 statistics show that the industry has the highest number of fatal (1,330 accidents) and one of high-risk industries in terms of 3days or more absence due to injury rate (8,008 per 100,000 persons in employment) across European Union (Eurostat, 2001, 2002). In UK, in 1998/1999 (April to March) 68 people were killed on construction sites, 5,034 suffered major injuries and a further 9,576 suffered injuries which kept them away for work for more than three days. In 1999/2000, 85 people were killed on construction sites, 5,040 suffered major injuries and 10,292 over three day injuries (HSE, 2002). During the year 2000, the industry is responsible for more than 70 deaths and thousands of disabling accidents and thousands more people suffering ill Health (CBPP, 2001). From the league tables 2.1, 2.2, 2.3 of industries, construction industry has one of the highest rates of fatal injuries and major injuries. Table 2.4 gives the breakdown of last ten years statistics for the industry.

Table 2.4, Rates of fatal injury to workers, non-fatal reported injury to employees and rate of reportable injury from the LFS 1993/ 1994-2002/2003.

	93/94	94/95	95/96	96/97 (d)	97/98	98/99	99/00	00/01	01/02	02/03 p
Fatal	5.7	5.1	5.0	5.6	4.6	3.8	4.7	5.9	4.4	4.0
Non-fatal Major	214.4	221.2	224.0	403.0	382.3	402.7	395.9	38.0.9	356.1	374.8
Over-3-days	1,127.4	1,139.4	1,030.3	1,078.6	966.3	863.4	917.0	8829.2	799.1	791.9
LFS reportable (e)	n/a	2967	2549	2697	2431	2589	2534	2580	2510	n/a

(a) Fatal injury rates per 100000 workers
(b) Non-fatal major injury rate and over 3-day injury rate are per 100000 employees.
(c) Reported to all enforcing authorities.
(d) Rates of reportable injury from the LFS are per 100000 workers.
LFS: Annual questions on workplace injury in the Labour Force Survey (LFS), a survey of around 60000 private households.
p: Provisional injury numbers and rates for 2002/03.

Source: Adopted from Health and Safety Statistics Highlights 2002/03, Health and Safety Commission, National Statistics, 2003.

c) Targets

Health and Safety management is an important and sensitive issue for both public and private sector industries and for the economy and society as a whole. The UK government is also taking steps both in terms of tighter regulations and encouraging good business practices to bring down the number of accidents. In a strategy statement on revitalizing Health and Safety (DETR, 2000a), the government has set the following targets for all industrial sectors, taking 1999-2000 as base year:

- Reduce the number of working days lost per 100000 workers from work-related injuries and ill Health by 30% by 2010;
- Reduce the incident rate of cases of work related ill Health by 20% by 2010;
- Reduce the incident rate of fatalities and major injuries by 10% by 2010;
- Achieve half the improvements under each target by 2004.

2.5.5. Health and Safety Management Systems

Clearly one, if not the most important Health and Safety statutory instrument to come into force since the Health and Safety at Work Act 1974, is the Management of Health and Safety at Work Regulations 1992 (latest Management of Health and Safety at Work Regulation 1999, came into force from 3rd December 1999). Fink (1997) explains that those regulations were introduced to stem the tide of rising accidents in the 1980's which was thought to be a function of the fact that the Health and Safety at Work Act failed to explicitly require employers to develop effective Safety management systems. Hence, management systems play the key role in the implementation of an effective Health and Safety systems. It is evident also in the fact that Government's strategy on occupational health for England, Scotland and Wales has suggested that to achieve these targets outlined in the previous section; the strategy will be take forward five key programs of work relating to (HSE, 2000):

1. Compliance
2. Continuous Improvement
3. Knowledge
4. Skills and
5. Support Mechanism

It is recognised that sound management principles will be crucial to underpin the delivery of strategy. These include:

- Gaining commitment;
- Effective communication;
- Discussion, consultation and working in partnership;
- Identifying and agreeing priorities;
- Setting targets;
- Monitoring the effectiveness of the action taken, and
- Sharing success.

All the above points are essentially a part of a good Health and Safety management system. It is also identified that most Health and Safety failures are due to poor management and ignorance of good practice, rather than direct malicious intent (DETR, 2000a). Hence, what needed is a workable and effective management system for Health and Safety.

2.5.6. Health and Safety Management in Construction Industry

The construction industry covers a wide field of operations, from very large civil engineering projects such as motorway construction to, at the other end of the spectrum, self-employed tradesmen carrying out minor improvements and repairs to buildings. Stranks (1992) finds the extensive employment of casual labour, the relationship between the occupier of premises, contractors and sub contractors, and the very real problems that can arise when contractors are working on an existing site, contribute to the high incidence of accidents in this country. It is essential therefore to establish clearly the written procedures to regulate the activities of construction work. In view of Levitt and Samelson (1993), the reason why effective Safety management is a profit maker for construction companies is that accidents have high direct and indirect costs and management can control these costs. Joyce (1995) agrees and points to a study, published by the Health and Safety Executive in 1988, on accidents over five years (1981-85) in the building and civil engineering industries entitled "Blackspot Construction". The executive concluded that 70% of the deaths could have been prevented by positive actions by managers with in the industry. Hence, as put by Griffith and Howarth (2000), the management of Health and Safety is without a doubt the most important function of construction management. Construction management has a perpetual and unswerving challenge to ensure a safe and healthy working environment. Effective Health and Safety management demands a clear vision, a systematic approach and a sustained commitment to improvements. In addition, the main legal instrument on Health and Safety in construction i.e. the CDM Regulations 1995 seeks to ensure that Health and Safety is managed effectively throughout all stages of a construction project, from conception and design through to site work and subsequent maintenance and repair. It is enshrined in the principles of good management practice in which all those involved understand fully their own obligations and those of others, and work co-operatively to achieve a healthy, safe, cost efficient and highly productive project (DETR, 2000a). In that respect, Griffith and Howarth (2000) maintain that an appropriate way for the industry (principal contractor) to address the legislative requirement, corporate business needs and practical project demands of Health and Safety is to establish an effective a Health and Safety management system within the organisation.

2.5.7. Current Health and Safety Management Systems and Standards

At present, two standards exist for developing Health and Safety management systems, BS 8800: 1996 (BSI, 1996b) and OHSAS 18001:1999 (BSI, 1999). BS 8800:1996 is a non-mandatory guide based on the general principle of good management and designed to enable the integration of Occupational Health and Safety with in an overall management system. Whereas the OHSAS 18001 has been developed in response to urgent customer demand for a recognisable Health and Safety management standards against which their management system can be assessed and certified. It is more compatible with ISO 9000 and ISO 14000, facilitating the integration of the Quality, Health and Safety and Environment systems. However, both standards are at this time, non-accredited and non-certifiable.

2.5.8. The way forward

The UK government's strategy statement, "Revitalising Health and Safety" (DETR, 2000a), recognises that at present there is no Health and Safety management standard to which companies can seek accredited certification. This is at odds with the position on Environment and Quality management standards, and may mean that Health and Safety is given less attention. Agreeing to this, the Health and Safety Executive Guide HSG 65 (Successful Health and Safety Management) elaborates:

> *"The principles and approach to managing Health and Safety are those advocated for managing Quality and Environment. A well developed approach to Quality is increasingly seen as an essential activity for the successful organisation rather than optional extra. Organisations often fail to manage Health and Safety effectively because they see it as something distinct from other management tasks. They conclude that it is too difficult. They do not bring the same rigour to it as they do for Quality or the Environment."*

Although Health and Safety does feature in the most recent Investors in People standard (IIP, 2001), it is unlikely that this element, set within such a broad standard can realistically acquire sufficient prominence to achieve the impact that is sought by industry. A certifiable standard could provide a clear benchmark and help to promote supply chain initiative. It is for consideration whether any of the existing non-certifiable Health and Safety standards would provide a good starting point.

2.6. ENVIRONMENTAL MANAGEMENT

The Environment management is covered in detail in the following sections.

2.6.1. Background

Since the world has come to understand better the harmful, dangerous and potentially disastrous effects on the planet from man-made activities, people have become increasingly concerned about the Environment. Now, we no longer want to ruin the habitability of the planet. Industrial activities over the last two centuries are the major contributor to dangerous environmental impacts. Now, organisations in every sector are under enormous pressure to bear environmental liability. They are striving to achieve and demonstrate sound environmental performance (Matias and Coelho, 2002). In addition, as Walker (2000) identifies, the global economy is increasing in size to the extent that many trans-national corporations are far larger in economic terms than many nations. A number of these large global corporations have recognised that they must be proactive and clearly demonstrate their credentials as "good corporate citizens".

2.6.2. Importance of Environment Management

The Environment and its management are critical for very survival of humans on the planet. Some facts given below show stipulate the severity of the problem (Watson *et al.*, 1998):

- The Earth's global mean surface temperature has warmed by about half a degree centigrade over the last 100 years;
- The six warmest years in the last century occurred since 1990 and eight of the ten warmest have occurred since 1980;
- The amount and spatial and temporal patterns of precipitation are changing.
- Average sea level has increased by 15-25 centimetres during last 100 years;
- Glaciers are retreating world-wide.

2.6.2.1. Projected impact of human activities on the climate system

- The atmospheric concentration of carbon dioxides projected to increase from 360 parts per million by volume (ppmv) in 1998 to between 500 and 900 ppmv in 2100;
- Global mean surface temperature are projected to increase by between 1.0 and 3.5 degrees Centigrade by 2100, a rate faster than anything observed during last 10000 years;
- Sea levels are projected to rise by 15-95 centimetres by 2100, and
- Global warming caused by increase in the atmospheric concentrations of greenhouse gases can only be reversed very slowly because of the century scale atmospheric residence times in the gases and the large thermal inertia of the oceans.

2.6.2.2. Social, economic and ecological consequences of projected changes

- Projected changes in climate may result in: adverse effects on human health, in particular an increase in heat-stress mortality and vector-borne disease, with potentially tens of millions of additional cases of malaria each year, changes in the boundaries, structure, and functioning of ecological systems, especially forests where there could be near-term die back and a shift in boundaries of between 150 and 650 kilometres pole-wards, a decrease in agricultural production in the tropics and sub tropics even if total global food production does not drop, less predictable availability of freshwater, and the displacement of tens of millions of people from small island states and low lying deltaic areas, if sea level increase by one meter (Watson *et al.*, 1998);

- The cost of damage associated with a climate change caused by a doubling of atmospheric carbon dioxide has been estimated to lie between 1.5 and 2.0 percent of world GDP (Watson *et al.*, 1998);

- Nineteen countries around the world are already under stress for lack of water. This figure is expected to double by the year 2025 even if the climate does not change (Watson, 1997), and

- The present rate of extinction of birds, animals and plants is already between 50 and 100 times the natural rate. If the current rate of deforestation in the tropics continues this would go up, potentially, to 1,000 to 10,000 times the natural extinction rate within the next 30 years. This would, to say the least, be a major experiment on our ecological systems (Watson, 1997).

Cook (1997) regards the disruptive effects of climate change as dreadful. Europe could see more animal and plant species under threat; in Africa and Latin America, increased disease. Food production in Latin America will go down. North America could lose as much as 50 per cent of its coastal wetlands, and East Asia will likely suffer more acute water shortages. Walker (1997) rightly points out that meeting human needs, with present practices, is causing environmental degradation. A holistic approach is required, concentrating on meeting human needs while protecting the local, regional and global environment.

2.6.3. Environment Management Systems and Standards

The Environmental management field has seen a steady growth in the development of national and regional standards. The British Standards Institution has BS 7750 (now superseded), the Canadian Standards Association has Environmental management, auditing, eco-labelling and other standards, the European Union has all of these plus the Eco-management and Audit System (EMAS), and many other countries (e.g. USA, Germany and Japan) introduced eco-labelling programs. However, the majority of organisations across the world implementing Environmental management systems employs ISO 14001:1996 standard. The two most prominent are covered in the following sections.

2.6.3.1. ISO 14000

The ISO 14000 series emerged primarily as a result of the Uruguay round of the GATT negotiations and the Rio Summit on the Environment held in 1992. The Rio summit generated a commitment to protection of the Environment across the globe. ISO formed a committee, TC 207 in 1992, for international environmental management standards. The committee and its sub-committees include representatives from industry, standards organisations, government and environmental organisations from many countries (Quality Network, 2002). The ISO14000 standards are designed to cover:

- Environmental management systems;
- Environmental auditing;
- Environmental performance evaluation;
- Environmental labelling;
- Life-cycle assessment, and
- Environmental aspects in product standards.

The ISO 14001 outlines the basic elements and functions of an effective EMS including establishing an environmental policy, determining environmental aspects and impacts of products/activities/services, planning environmental objectives and measurable targets, implementation and operation of programmes to meet objectives and targets, checking and corrective action and management review (Zhang *et al.*, 2000). Walker (2000) believes that ISO 14000 also provides the incentive for companies to seriously pursue excellence in Environmental management. It has been developed to contribute to sustainable development to the extent that it helps organisations move towards the above objectives. It endeavours to bring environmental issues into the main stream of the corporate decision-making process (Zhang *et al.*, 2000). The ISO 14000 accreditation by companies is a sound first step towards achieving a broader more robust measure of achieving a Quality product (Walker, 2000). It is reported that worldwide 36765 organisations were certified to ISO 14000 by the end of 2001 (ISO, 2004).

2.6.3.2. European Eco-management and Audit System (EMAS)

EMAS is a site based registration system with due consideration provided to off-site activities that may have a bearing upon the products and services of the primary site. Within the UK an extension to the scheme has been agreed for local government operations, who may also register their Environmental management systems to the EMAS Regulations (Quality Network, 2002). The Eco-management and Audit System, EMAS, was adopted by the European Council on 29th of June 1993, allowing voluntary participation in an environmental management scheme, based on harmonised lines and principles throughout the European Union. The overall objective of the scheme is to promote continuous environmental performance improvements of economic activities by committing organisations to evaluate and improve their environmental performance and provide relevant information to the public. The scheme does not replace existing community or national environmental legislation or technical standards nor does it, in any way, removes a company's responsibility to fulfil all of its legal obligations under such legislation or standards. The EMAS Regulation has now been revised and the revision was adopted by the Council of the European Union and by the European Parliament in March 2001. The aim of the revision was to strengthen and improve the original EMAS scheme. The main elements of the revised EMAS Regulation are:

- The extension of the scope of EMAS to all sectors of economic activity including local authorities;
- The integration of ISO 14000 as the Environmental management system required by EMAS;
- The adoption of a visible and recognisable EMAS logo to allow registered organisations to publicise their participation in EMAS more effectively;
- The involvement of employees in the implementation of EMAS;
- The strengthening of the role of the environmental statement to improve the transparency of communication of environmental performance between registered organisations and their stakeholders and the public, and
- A more thorough consideration of indirect effects including capital investments, administrative and planning decisions, procurement procedures, choice and composition of services (e.g. catering).

Registration in the scheme requires the organisation to adopt an Environmental policy containing the following key commitments:

- Compliance with all relevant environmental legislation;
- Prevention of pollution, and
- Achieving continuous improvements in environmental performance.

2.6.4. Sustainable Development

The term Sustainable Development is usually associated with environmental issues, though its scope is much wider. Sustainable Development is about ensuring a better quality of life for everyone, now and for generations to come or as defined by Brundtland "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (DETR, 1998). The key drive for sustainable development comes from the growing concern for the negative environmental effects that have been caused by unchecked industrial and development activity over last century. Laws, regulations and change in cultural mindsets are needed to stop the situation growing worse. The UK government has taken the lead and prepared its first national sustainable development strategy in 1994. A revised strategy in 1999 has outlined the following aims, further widening its scope (DETR, 1999):

- Social progress which recognizes the needs of everyone;
- Effective protection of the environment, and
- Prudent use of natural resources; and maintenance of high and stable levels of economic growth and employment.

They are termed as "triple bottom line" objectives covering economic, environmental and social aspects.

2.6.5. Sustainable Construction

The construction industry is one of the main contributors to the depletion of natural resources and a major cause of unwanted side affects such as air and water pollution, solid waste, deforestation, toxic waste, health hazards, global warming and other negative consequences. Buildings account for one -sixth of the world's fresh water withdrawals, one-quarter of its wood harvest and two-fifths of its materials and energy flows. Nearly one-quarter of all ozone-depleting chloroflorocarbons (CFCs) are emitted by building air conditioners and the processes used to manufacture building materials (Augenbroe and Pearce, 1998). Buildings and structures change the landscape and their construction, use, repair, maintenance and demolition consume energy and resources and generate waste on a scale, which dwarfs most other industrial sectors. Over 90% of non-energy minerals (260 million tonnes) extracted in the UK each year are used to supply the construction industry with materials. Yet every year some 70 million tonnes of construction and demolition materials and soil ends up as waste. Some 13 million tonnes of that comprise material delivered to sites and thrown away unused (DETR, 2000). The industry accounts for 10% of Gross Domestic Product and provides employment for around 1.5 million people thus the industry has a huge contribution to make (DETR, 2000). Ofori and Chan (1998) suggest the impacts of construction activities on the Environment include:

- Competition for land with other activities such as agriculture;
- Adverse effects on the plots of land which are developed and their Environment, such as changing their ecological characteristics;
- Substantial consumption of both renewable and non-renewable resources;
- Production of substantial volumes of wastes;

- Consumption of large amounts of energy during the processing of materials, the construction process and in the use of constructed items;
- Contribution to air pollution from the dust and substances, including some toxic ones, which are released during the production and transportation of materials, and in some construction operations, and
- Disruption of the lives of the people living in the vicinity of the project through traffic diversions, noise pollution and others.

The UK government's Sustainable Construction Strategy (DETR, 2000), recognizing the above facts has set out following road map for the industry:

- To be more profitable and more competitive;
- Deliver buildings and structures that provide greater satisfaction, well being and value to customers and users;
- Respect and treat its stakeholders more fairly;
- Enhance and better protect the natural Environment, and
- Minimize its impact on the consumption of energy (especially carbon-based) and natural resources.

This push is partly driven by the UK government's use of policy instruments (tax and regulations) (landfill tax, proposed aggregate and business use of Energy Levy and review of Building Regulation etc.) Being the single biggest construction industry client, the UK government is also redirecting its procurement policies to achieve those targets (DETR, 2000).

2.6.6. Scope of Sustainable Construction

Sustainable Construction needs a paradigm shift in forcing participants to take a much broader look in time (full life cycle assessments), space (the object in its wider system settings) and costs (greener cost metrics than pure monetary), than one usually adopted in traditional engineering (Augenbroe and Pearce, 1998). The scope is wide and industry is seeing difficulties in coming to terms with sustainability. It is not easy and almost too big to grasp. Efforts need to start from concept and planning for a project through to demolition. It will be easy to persuade industry to adopt sustainable thinking if it makes business sense or simply clients are ready to pay for it. In turn, clients need to be pressurized by occupiers. However, simple actions can make a real difference. Research suggests some clear areas where the sustainability agenda overlaps with the drivers for efficiency set out in Rethinking Construction (Richard Hodkinson Consultancy, 2000). Sustainable construction strategy also regards the Egan agenda (Egan, 1998) as an instrument for radical change and improvement in performance, contributing in part to a wider sustainability issue (DETR, 2000). It only shows the broad scope of the sustainability issue. Sustainable Construction is much beyond good Environmental practices. As identified by Griffith (1999b) it requires changes in all aspects within all construction organisations.

2.6.7. Environmental Management Systems in Construction Industry

ISO 14000 standards provide a mechanism that links the concept of sustainable development with the construction procurement process. Although the standards are voluntary by design, they are relevant to any company as long as its business activities have environmental impacts. The implementation of the system does not incur extensive burdens. In fact, if properly implemented, the system may help win more business and reduce cost in production and operation through improving Environment performance. Zhang *et al.* (2000) recognise that as construction is an important industry in any economy, it has an obligation and the potential to make a significant contribution to sustainable development through implementing ISO 14001. Furthermore, a study by Clive Briffett and Ofori (2002) suggest that in the future Environment management will become a core requirement in the construction industry.

2.7. SELECTION OF MANAGEMENT SYSTEMS

Some of the common management systems implemented by organisations were discussed previously. Among them, QMS (Quality Management Systems) in the shape of a formal and certified (e.g. ISO 9000 series) or in any informal shape, are the most common types to be found in organisations. Government measures and emphasis, customer and competition pressures, use as a marketing tool and globalisation of a business are few among many factors to credit. Clearly, in the post modern-era social and environmental considerations are gaining growing importance. The shift in focus has resulted in emergence of management systems to deal with concerns in the respective areas.

Wilkinson and Dale (1999b) elaborate that responsible organisations are showing increasing concern about the well being of employees and their Environment and the impact of operations on their neighbours and local community (i.e. stakeholders' concept). Government regulations and laws are another factor that organisations cannot ignore. The Environmental Protection Act 1990, The Health and Safety at Work Act 1974 and the Control of Substances Hazardous to Health Regulations 1998 are a few to quote among many. Failure to comply may result in heavy fines, a prison sentence, loss of operating license or even closure of business. Globalisation and creation of regional economic areas are important too. Renfrew and Muir

(1998) point to European Community's (EC) efforts in setting harmonised standards for free market competition. Much of this is to do with product quality, safety, health and welfare of the populace and the protection of the environment. It is defining the minimum acceptable standards for organisations to have access to its markets. Hence, a common mix of management systems includes Quality systems (e.g. ISO 9000:1994/9001:2000 (BSI, 1994, 2000), Safety systems (e.g. BS 8800:1996/OHSAS 18001: 1999 Occupational Health and Safety management systems (BSI, 1996, 1999)), Environmental systems (e.g. ISO 14001:1996, Environmental management system (BSI, 1996)). The mix may contain other management initiatives such as IIP (Investors in People) etc. Where the tendency of having all these systems listed above shows the business concern for social and environmental issues, it also raises a management issue for an efficient and effective structure and performance of the management systems. This issue will be dealt with in detail in following chapters.

2.8. CHAPTER SUMMARY

This chapter has laid the foundation on which the further research will be based. Importantly, it started with the introduction to the management itself. Purposefully included, the introduction laid the groundwork for the deeper understanding of the management systems to follow. The management introduction revealed the broader nature of the subject, nevertheless, identifying the common threads in all the perspectives. Brief explanation of management systems helped in recognising the reasons for implementation and importance of the management systems for Quality, Health and Safety and Environment. The important sections of the chapter related to the comprehensive appreciation of Quality, Health and Safety and Environment management systems, the underpinning for the integrated management systems. The systems were covered thoroughly from a boarder perspective and in more detail from a construction industry focus. The facts and latest statistics presented confirmed the scale of essentiality; the management systems hold especially the Health and Safety management systems. The chapter explained the systems in more details by encompassing the scope, importance, related laws and regulations, different standards, methods and techniques available, latest trends, scale of implementation and other aspects. The importance of the management systems for Quality, Health and Safety and Environment were emphasised for businesses in general and for construction in particular. In the end, the selection of best mix of systems for organisations was included. The next chapter covers the integration of these management systems into single integrated management systems (IMS).

Chapter 3

Integration of Management Systems

3.1. AIMS OF THE CHAPTER

The chapter introduces the main research area. It starts with outlining the scope of integrated management systems, followed by the reasons for integration, benefits, uncertainty and contrasting views on different definitions, and various approaches adopted for implementation of integrated management systems. The chapter also looks at the criticism of integrated management systems and difficulties with their implementation. The integrated management systems are viewed from a broader perspective in this chapter. In the following chapter, integration will be discussed from a construction industry and specifically the contractor's outlook.

3.2. INTEGRATION OF MANAGEMENT SYSTEMS: INTRODUCTION

In the previous chapter, management systems for Quality, Health and Safety and Environment were encompassed. As it showed, each area has its own management system and standards. Effective and efficient management of these systems, in an organisation having all these systems together, can be a very complex and difficult process. This has given rise to the idea and concept of integrated management systems (IMS). The following sub-sections will introduce the subject, through extensive literature review.

3.2.1. Scope

The growing number of management systems in an organisation requires that a mechanism be put in place that ensures that desired objectives are achieved. It is therefore natural to consider potential reconfiguration of these systems. This area of research is broadly termed as integration of management systems and the resultant system as integrated management systems (IMS).

Wilkinson and Dale (1999b) and Beckmerhagen, *et al.* (2003b) state the need for an IMS has risen as a result of organisations' decisions to implement more than one management system i.e. Quality, Safety and Environment management systems. The case for integrated management systems (IMS) is now being made in the literature. Conventional approach for implementation of management systems is that of vertical structures within different parts of organisation, thereby adding to costs and reducing effectiveness. Griffith (2000) maintains that in the vertical approach each function is essentially separate and ostensibly operates in parallel. Each function has its own set of management boundaries and there is little, if any sharing of tasks or information. It is suggested that separate systems incurs considerable costs, increases the probability of mistakes and failures, duplicates efforts, creates unnecessary bureaucracy and documentation, and ultimately has a negative impact on most stakeholders (Beckmerhagen, *et al.*, 2003b). Moreover, Engelhardt and Fresner (2003) maintain that separate systems do not help employees who must work with these systems. The IMS presents an opportunity to establish a cross-functional management structure. However, one of the reasons to keep the management systems separate might be the perceived difficulties in achieving the integration (Smith, 2001). Nevertheless, IMS is now increasingly seen as part of the management portfolio of many organisations. The initial thrust for IMS came from the chemicals industry (Wilkinson and Dale, 1999b). Many organisations have now started to move down the integration path. The importance of IMS cannot be stressed any further than the Cullen Report (Renfrew and Muir, 1998) published after the Piper Alpha disaster. That Report highlighted the need for unifying Quality and Health and Safety.

Ideally, IMS are aimed at augmenting the corporate organisation in the management of multiple functions, accommodating multiple operating site (projects) organisations and meeting applicable legislation and standards (Griffith, 2000). Jonker and Klaver (1998) taking a broader look see the integration developing in three directions: integration of systems (e.g. Quality, Health and Safety, Environment) with an increase in aspects to be covered (e.g. managerial auditing, ethical auditing) integration and further development of management systems into new areas of business such as research and development, marketing and professional services.

Some specific example across the business include, British Nuclear Fuel's decision to make Environmental management system (EMS) a part of the total Quality system, the Azco Nobel Chemicals Group has integrated ISO 9002 and BS 7750 into its site management system and Sharp, the copier machine manufacturer, has developed an integrated quality standard for its dealers that covers ISO 9002, BS8800 and BS 7750 (Wilkinson and Dale, 1999a). The Piper Bravo offshore platform (build in 1993 replacing Piper Alpha platform that was referred to previously) merged Quality and Health and Safety and the facility now bears the BSI Safety kite mark and is ISO 9001 certified (Renfrew and Muir, 1998).

Many registration bodies are offering services for IMS. As the concept develops further, there will be need to benchmark IMS activity in all business sectors and in a wider international context. As stated, the main thrust behind IMS development is to achieve the efficient and effective performance of the growing number of management systems. In the following section, different reasons for IMS are covered in detail.

3.2.2. Different Reasons for Integration

There is no set uniform rationale for IMS implementation in organisations. Reasons for implementation vary from organisation to organisation depending on the size, business sector, current management structure of organisations etc. However, some trends are discernible as follows.

a) Similarities in management systems

The most common management system employed for Quality is the ISO 9000 series. For Environmental management, the ISO 14000 series is widely recognised. For Safety management however, no internationally recognised system is yet available. In the UK, Occupational Health and Safety systems are usually based on the BS 8800 requirements. Nevertheless, a consortium of national standard bodies and international certification bodies has produced a certifiable standard (OHSAS 18000) which follows BS 8800 very closely. Looking at systems, certain similarities between the Environment and Quality management systems are immediately apparent. As put by Millidge and Smith (1999), they are both formal management systems subject to third party certification, both demand a documented system, a statement of policy, document control, procedure of other means of operational control, demonstration of training, measuring output, control of records, internal audits to demonstrate conformance to the system, regular reviews by management, and so on. Within Occupational Health and Safety, the BS 8800 has an almost identical list of common elements. Nevertheless, Matias and Coelho (2002) explain that the structure of OHSAS 18001:1999 has been developed to foster compatibility with the standards of Quality and Environment. Hoyle (1998) and Labodova (2003) agree that whether the focus is on Quality, Health and Safety or Environment, the composition of a management system remains fairly similar. About 80% of the work is common to all these disciplines, Shaw (2003) maintains. In addition, Holdsworth (2003) finds significant number of duplicated procedures. His research also suggests conflicts in the similar procedures developed for different management systems.

It is true that composition and management elements have lot in common in the three systems (Engelhardt and Fresner, 2003) but it should not be forgotten that:

a) There are important differences in the scope of each of the management systems;
b) Unlike Quality and Environment, Safety management systems are not yet certifiable;
c) Different drivers for implementation of systems, for instance, it is legal obligation to have a management system to control OH & S, although honoured more in the breach than the observance, and
d) Safety standards i.e. BS8800 and OHSAS 18001 are the guides (a "should" document rather than a "shall" document).

b) Links in management systems

The issue of IMS is not limited to practitioners, consultants, researchers or academics but standard writing organisations (i.e. International Organisation for Standards: ISO, British Standards Institution: BSI) also see configuration of management systems as an important and viable option.

The need for compatibility between systems has been recognised by suggesting corresponding links. Annex A to ISO 9001:2000 (BSI, 2000) and annex B to ISO 14001:1996 (BSI, 1996a) list the links between ISO 14001 and ISO 9001:1994 (BSI, 1994). Similarly, Annex A to BS 8800:1996 (BSI, 1996b) suggests links with ISO 9001: 1994. In view of Renfrew and Muir (1998), the ISO TC176's (ISO, 2001) proposal to integrate ISO 9001, 9002 and 9003 into a single ISO 9001 is a move that could be extended to cover Health and Safety and Environmental issues. ISO 14001 was drawn from lessons learned from ISO 9001 and the draft of the new version seems to have drawn from lessons learned in ISO 14001 (Renfrew and Muir, 1998). Labodova (2003) agree that revised ISO 9000:2000 is even more compatible with ISO 14000:1996 requirements. One common standard for Quality and Environment management systems audits (ISO 19011:2002) shows the priority for integration.

Hall (1998) maintains that although the standards are separate and capable of standing alone, they are becoming increasingly compatible. It is understandable, as they have lot in common structurally and they are all basically specifications of good management practice. Conversely, Renfrew and Muir (1998) see the management systems intertwined in such a way that subtle changes in one area can have an impact across many other, Moore (1998) also agrees. This makes a strong case for configuration of systems. However, interesting is the use of word "compatibility". Clearly, it is far below the integration. If the purpose is to only merge documents and procedures then it may be misleading to use the term integration.

c) Good business sense

The majority of organisations fall into the category of commercial business concerns. Understandably, their main objective is to make a profit. Any initiative that is aimed at making profitability easier to achieve will be welcomed. Hall (1998) believes that simplified and integrated management systems reduce risks and increase profitability in both large and small organisations. Karapetrovic and Wilborn (1998) also agree that IMS assure effective attainment of set objectives and avoid costly sub-optimisation. Theoretically, people see the logic and potential for greater efficiency. A survey (Integrate, 1998) reports a generally positive response to the concept of an integrated approach. Any development that makes it easier for companies to introduce an integrated approach should receive a good response. The market appears to be open to the concept of the integration. However, the strongest selling point would relate to the likelihood of financial gain for the company from the integration process. This is also linked with timesaving and improved efficiency. The reasoning here is quite logical, however it misses the important aspect, that of the practical implications of IMS, which may not be that simple.

d) Dealing with different management systems

Organisations are under growing pressure to implement the standard systems for Quality, Health and Safety and Environment management. The list may not end here and the number of developing systems is expected to grow. It is logical to have some sort of configuration for the many management systems. Each management system addresses a different area of concern. The objectives and scope of each are different. As stated by Wilkinson and Dale (1999a), dealing with separate systems and ensuring their alignment with an organisation's business strategy is seen to be problematic. This has encouraged organisations to consider the solution in the shape of integrated management systems.

e) Finding a best mix

Organisations, even in the same business sector, are different from each other. Each may have a different structure, orientation, focus and business needs. On the other hand, standards for Quality, Health and Safety and Environment are quite generic in their structure to accommodate all types of organisations and specify minimum acceptable requirements. A difficulty with implementing ISO 9000 and adding other systems on, is the determination of which system if any ultimately satisfies the ongoing business requirements. Hall (1998) believes that the systems and initiatives have gaps in their management, and they could benefit from a procedure, which is being applied to another activity. It is possible and desirable to integrate the management of different activities. Jacobs (1998) maintains that IMS bring together the most appropriate parts of a variety of systems to suit a set of particular needs. It is not a definitive solution but simply offers a well-defined alternative. The strength of one system can be analysed and compared to another. Features can be integrated and the most appropriate set identified.

f) Growth of management systems

Globalisation of the economy inevitably entails the need for standardisation of products and processes. As the concern grows for social and environmental issues, the process of new local, national or global standards is also speeding up. Hall (1998) is of the same view that the global economy requires that one should be able to compare companies separated by national boundaries and international standards are one way of doing this. Griffith (1999) agrees and adds that the list of management initiatives may well increase. The International Organisation for Standardisation is currently considering a standard on business ethics and corporate social responsibility (Beckmerhagen *et al.*, 2003b). However, the development of new standards and management initiatives has its implications too. Jonker and Klaver (1998) consider that this process will impact on the organisation structures tremendously. It will reduce the need for functional specialists, leading to a search for configuration of standards. Karapetrovic and Wilborn (1998) believe that revised ISO 9000 standard and MNBQA (NIST, 2001) guidelines take account of modern developments and indicate towards a comprehensive management system.

g) Efficiency and effectiveness benefits

Implementation of various management systems and standards brings many advantages for organisations. However, over-emphasis on documentation and manuals create resentment in operational staff. Hall (1998) points that though excellent in themselves, the procedures for systems and standards are perhaps too much to assimilate and use on a daily basis. As identified in the Integrate Project (1998) staff should only be involved in one integrated plan and not many. Organisations too easily tend to create parallel tracks, one managing the core functions, which are essential for the profitable survival and other separate tracks managing Quality, Health and Safety or the Environment. Interestingly, there is often a lot of duplication in matters common to all the management systems and activities. Hence, integration of systems, in whatever form, should always lead to a more effective system (Karapetrovic and Wilborn, 1998). Hall (1998) also agrees that all the factors that affect a company's profitability and survival can be addressed in a practical and efficient way in an IMS. Integration promotes more efficient and effective working by removing duplication of paperwork and procedures, reducing audit and administration costs, better staff communication and ease in managing systems (Karapetrovic and Wilborn, 1998, Douglas and Glen 2000, Stanger, 2000, Wilkinson and Dale, 2000). Wilkinson and Dale (1999b) also recognise the potential contradictions in decisions taken for different management areas. Successful advance of an organisation can only be ensured when policies and targets conform to the overall business objectives and they do not conflict. Hall (1998) believes that functions that are not integrated, including Quality are likely to be put aside in times of stress and only those which are integrated can hope to influence an organisation's lasting success. It is also considered doubtful that customers will demand an IMS (IQA, 2000) but the pressure will be from within, for a greater efficiency and effective use of management systems.

h) Existing Quality management systems

The majority of organisations that now wish to implement Health and Safety and Environmental systems will already have experience of Quality systems (Millidge and Smith, 1999). It is much easier in this case to implement other management systems in line with the already established Quality management systems. Griffith (1999a) also agrees that the Quality management system is the best platform to be used for further integration of management systems. Moore (1998) concurs that Quality is an essential function of any effective business system and Health and Safety and Environment should certainly be integrated into it.

i) Total Quality Management (TQM)

The organisations already embracing the Total quality management concept find themselves in a much better position to take a holistic approach on other management systems. As the concept of Quality broadens from product and consumers to organisation and stakeholders, Quality standards such as ISO 9000 series become just an important first step in achieving excellence. The focal point of Quality management attention and responsibility broadens towards Environmental management, workplace Health and Safety and production and operations management (Karapetrovic and Wilborn, 1998). In that situation, integrating systems has emerged as a major task for practising managers.

j) Size of organisation

As discussed earlier, the benefits of IMS are applicable to both large and small size organisations (Hall, 1998). However, Millidge and Smith (1999) link the choice between the IMS and separate systems to the size and organisation of the business. Large organisations may find little appeal in having a totally unified system for Quality, Health and Safety and Environment compared to a small company, whereas all these responsibilities are in the same area. Douglas and Glen (2000) also agree that small and medium size organisations are simplifying their management systems as more and more systems are introduced. With growing management complexity, true integration will become more desirable.

k) Disappointment with current management standards

It is evident in the literature that organisations are far from satisfied with the current standards for Quality. Thompson (1999) considers that these standards have turned Quality to more of a formality, exercised through documents and manuals. A survey (Integrate 1998) report suggests that 50% or more people felt that the management systems (Quality, Health and Safety and Environment) were giving them little or no overall benefits. The discontentment is indicative of the need for a more holistic and comprehensive approach to management systems, where they are brought more in line with overall organisational business objectives. The integrated management systems provide a synergistic and beneficial alternative.

3.2.3. Benefits of Integration

Benefits from any management initiative, such as IMS, are not easily identified and precisely quantified. Most advantages are indirect, hidden (cultural based). However, some of apparent advantages are categorized as follows (Griffith 2000, IQA 2000, Engelhardt and Fresner, 2003, Beckmerhagen *et al.*, 2003b).

a) Efficiency related

- Avoiding duplication from multiple individual systems
- Eliminating the overlap of efforts
- Reducing the fuzzy management boundaries between individual systems
- Broadening the horizon beyond the functional level of any individual system
- Sharing information across traditional organisational boundaries
- Streamlining paperwork and communication
- Reducing risks and increase profitability
- Eliminating conflicting responsibilities and relationships
- Formalizing informal systems
- Harmonizing and optimising practices
- Facilitating training and development
- Reducing cost in standards interpretation and implementation
- Creating synergy effects when different systems are integrated

Cultural

- Diffusing the power system
- Creating consistency
- Improving communication

Strategic

- Balancing conflicting objectives
- Turning the focus onto business goals
- Meeting the requirement of one system certification
- Internal integration to meet external or project team integration (Egan, 1998) in a project based organisations i.e. construction
- Safeguarding other stakeholders interests
- Improving public relations

3.2.4. Definition of Integration

The integration of management systems (IMS) is a relatively new field. For establishing good communications on any topic, in particular when it is an emerging one, a clear definition is always useful. IMS has as yet, no clear agreed definition. Wilkinson and Dale (1999b) comment that a number of differences have been identified in the interpretation of what it means and how it should be accomplished. It is an urgent need to have a definition of integration. The term is used quite broadly and loosely for compatibility, alignment, co-ordination.

Different perspectives and meanings for the integration are explored further as follows.

a) Integration as alignment

Integration of management systems is most commonly confused with alignment of systems. However, two terms are different and the concepts of integration and alignment need to be clearly distinguished. A study by MacGregor Associates (1996) found that the integration was seen as:

> *"A single top-level management core standard with option modular supporting standards covering specific requirements".*

Where as alignment was considered as:

> *"Parallel management system standards specific to an individual discipline, but with a high degree of commonality of structure and content".*

In the first definition, the core elements cover the QMS, EMS and OH&SMS, plus future management systems, which may not be immediate objectives of the organisation. On the other hand the aligned approach is more flexible, with similar common elements allows adoption of "that part of the common elements appropriate to the standards under immediate consideration".

b) Integration as compatibility

The appreciation of the difference between the terms integration and compatibility becomes more important, especially in wake of the recent recommendations by the ISO technical advisory group, ISO/TAG 12 (ISO, 2001) that ISO 9000 and ISO 14000 series should not be merged, but made more compatible. The group defines compatibility as:

"Implementation of common elements of the standards in a shared manner, in whole or in part by organisations without necessary duplication or the imposition of conflicting requirements".

c) Integration as a deployment

Integration and deployments are sometimes used interchangeably. Garvin (1991) believes that integration is closely related to deployment and defines integration:

"As the degree of alignment or harmony in an organisation whether different departments and levels speaks the same language and are tuned to the same wavelength. Full integration therefore, requires total harmony and alignment of policy and purpose throughout the organisation".

This is based on the belief that deployment is used in two ways. Horizontal deployment: to measure the extent of efforts across an organisation. Vertical deployment: to measure the extent to which strategic objectives have been passed down from the top to the lower levels of the organisation (Garvin, 1991).

Horizontal deployment is seen as an important test where an organisation may start by implementing a management system for example Quality, in manufacturing and marketing but then appreciating its interfaces with other departments, it is extended into finance, marketing and human resource management etc and eventually leading to company wide registration of ISO 9001. This interpretation of integration addresses the practical implications of systems implementation. It implies that integration is possible only when all systems are expanded across the whole organisation.

d) Integration as co-ordination

This notion of integration is based in the field of organisation theory. Lawrence and Lorsch (1967) use integration and co-ordination in the same sense. Co-ordination is defined (Dessler 1992) as:

> *"The process of achieving unity of action among interdependent activities".*

Co-ordination is considered essential where departments aim to achieve a common goal. Descriptions and techniques have been developed for achieving co-ordination (Galbraith, 1977 and Mintzberg, 1983), one of them is the co-ordination by rules and procedures, which involves the standardisation of work processes. This is agreed to be as one of the simplest and most basic facilitators of co-ordination/integration (Dessler, 1992). This interpretation is targeted more at a strategic level where all the systems are united in line with an organisation's objectives. It is followed by streamlining all separate systems adopted in an organisation.

e) Integration as combining

Another interpretation for the integration is that of combining systems together. From this perspective Institute of Quality Assurance (IQA, 2000) explains it:

> *"Integrated means combined: putting all the internal management practices into one system but not as separate components".*

On the same lines (Beckmerhagen *et al.*, 2003b) define integration as:

> *"A process of putting together different function-specific management systems into single and more effective integrated management systems (IMS)."*

It can be argued that for these systems to be an integral part of the company's management system, links need to be established so that the boundaries between processes are seamless. Hoyle (1998) also expresses the same view saying that for IMS and for the systems to be an integral part of a company's management systems there must be linkages to hide any joints. The notion of separation disappears; even the terms disappear so the management system covers Quality, Health and Safety, Environment and Security. The IMS is then a management system that integrates all components of a business into one coherent system to enable the achievement of its purpose and mission (IQA, 2000). This interpretation of integration goes a step ahead of compatibility and alignment and points to a single but comprehensive management system.

Interestingly, if the definitions are analysed from the start, they progress from simply bringing systems parallel to each other to one compressive system that addresses all areas. It suggests that all definitions reflect the level of integration desirable. The pattern makes IMS, a gradual process that brings the individual management systems together to a level that reflects an organisation's strategic objectives. Wilkinson and Dale (2000) agree that what is meant by integration depends to a grater extent on what organisations want it to mean. However, if the culture and climate do not match their aims then the resulting integrated management systems is likely to be no more than merging of system documentation.

3.3 DIFFERENT APPROACHES FOR INTEGRATION

Different approaches advocated and adopted vary in line with different definitions and interpretations of IMS. How integrated systems are defined has a great impact on the implementation approach (Integrate, 1998). The approach selected also depends on an organisation's current position, as recognised by the Institute of Quality Assurance (2000). A study into the integration (Wilkinson and Dale, 1998) shows that the integration was being carried out in a number of ways from the implementation of a system throughout the whole organisation, to the combination of two or more systems through similarities in their structure and to a company wide integration of all three systems with the policy and objectives of each system aligned to the overall company policy.

However, as pointed out by Millidge and Smith (1999), the way an organisation structures its management system must be entirely governed by its own internal needs. This is intended to show how the various elements that need addressing can be considered together, rather than as separate elements from the existing management systems standards. A number of different approaches for IMS are discussed in detail as follows.

a) Following links suggested by standards

This approach follows the links suggested by standards in ISO 9000, ISO 14001 and BS 8800 systems and is attracting the most attention (Wilkinson and Dale (1999b). Although the certification bodies have not actively supported integration, whatever interest is shown is limited to the promotion of integration by the identified linkages between systems. The Institute of Quality Assurance (IQA, 2000) also supports this approach by suggesting that a Quality management system and an Environmental system can be merged and extended to other systems. With this method, the organisation can merge the documentation where it supports the same process. It is also agreed that integration through standards is an easier option than other approaches (Wilkinson and Dale 2000). Beechner and Koch (1997) feel that ISO 9000 and ISO 14000 are so similar that they require integration in order to give improved performance and remain focused on objectives. They suggest one follows the links suggested in the standards. On similar lines, Griffith (2000) identifies the common elements between the systems, i.e. policy, aims and objectives, organisation, documentation, plans (programs), procedures, records, audit and review.

To begin with the integration of QMS and EMS, Karapetrovic and Wilborn (1998) suggest three possible strategies:

- Establish a QMS first and subsequently an EMS
- Establish a EMS first and subsequently a QMS
- Establish an EMS and QMS simultaneously

Conversely, Millidge and Smith (1999), consider integration between ISO 14000 and BS 8800 easier than integration with ISO 9000: 1994 which is the odd one in number of respects. Nevertheless, the new version (ISO 9000: 2000) brings Quality standards more closely into line with ISO 14000 and BS 8800. A study by Douglas and Glen (2000) report the organisational tendency of implementing QMS prior to the EMS.

Although the integration through links is simple and easy to follow, Byrnes (1996), Hoyle (1996) and Powley (1996) feel that the approach ignores the differences in the systems. Wilkinson and Dale, (1999b) put it as a narrow approach with the objectives of achieving reduction in the documentation and auditing fees related to certification. The increased benefits that come from increased integration through the involvement of everyone, alignment of objectives and policies and continuous improvement are being given less emphasis. This method also indicated an attempt to design the system around the standards, when its documentation should arguably be designed for the user rather than the certification body. Wilkinson and Dale (2000) reports that Health and Safety Executive (HSE) and the Institute of Safety and Health (IOSH) agree that integration through the standards ignores the differences in the boundaries that occur when the QMS is not company-wide. Trying to integrate standards, which have different boundaries, is like trying to match a circle with a square, there will always be parts that are left out of the integrated system. The initial attempt at integration by the Chemical Industries Association (Wilkinson and Dale, 1999a) was also based on the framework of ISO 9001 but it was later concluded that this was too restrictive.

b) Multi-level approach

Wilkinson and Dale (1999b) see the integration of management systems occurring at four different levels.

1) Implementation of a system throughout the whole organisation
2) Combination of systems through structural similarities
3) Use of a separate system to deal with activities such as training, which are common elements in other systems
4) Combination of the above, with the policy and objectives of each system aligned to and supporting the overall company policy

In the first stage, management systems for Quality, Health and Safety and Environment are implemented in an organisation. A Quality management system is mostly adopted in manufacturing or customer-facing departments, where Health and Safety and Environmental management systems have organisation wide remit. At this level Quality is also expanded organisation-wide to facilitate integration.

A second level of integration is seen as combining systems based on the identified linkages as discussed earlier.

The third level involves integrating selected parts of the QMS, EMS and OH&SMS with other certified systems but without using identified linkages. An example of this is the use of Investors in People (IIP) to manage the training requirements of all the systems.

The fourth level integrates both certified and uncertified systems with the overall management system, resulting in what could be seen as true IMS. It requires the involvement of everyone in the organisation, with the policies and objectives of the QMS, EMS and OH&SMS (and every other system used) aligned to and supporting the overall strategy, policy and objectives of the business.

Wilkinson and Dale (1999b) suggest that all four levels have a part to play in achieving full integration and that focusing only on the linkages in the standards may give some savings but misses the real benefits of integration. Karapetrovic and Wilborn (1998) seem to support the multi-level approach; they suggest integration of Quality assurance and Environmental management systems as a first step that is subsequently broadened to Health and Safety, Finance and other inter-linked systems.

A study by Douglas and Glen (2000) suggests that the majority of organisations had achieved level 1 and 2 integration. All had company-wide Quality systems in place and those that had integrated their EMS and QMS had done so based on the shared linkages of the standards, for example document control and auditing. This in turn given the benefits of less paper work, less procedures, multi-functional auditors, reduced costs and easier to manage systems.

c) TQM approach

Research by Wilkinson and Dale (2000) show two main approaches to integration, reflecting both the differences in culture and the needs of organisations. The aligned approach, discussed earlier and a Total Quality management (TQM) approach. The latter takes a comprehensive and holistic view of management systems. The TQM fundamentals of customer focus (in its broader context: stakeholder concept) and employee participation are connected with Quality, Health and Safety and Environment management systems. Instead of structuring stand-alone, independent and isolated management systems, they fit in an organisation's objectives and aims in a TQM Environment. Wilkinson and Dale (2000) in support, indicate that achieving a common philosophy, approach and aims are more important than achieving compatibility of terms and definitions. It is helpful to view the scope in a wider sense than the physical boundary of a system. Scope can then be seen as including the philosophy and aims of the system, where compatibility means more than making the terminology and definitions consistent and a TQM approach offer a way of doing this.

The approach offers potential for more than reduced audit and administration costs and allows more effective implementation of an IMS, as well as the additional benefits. Top management support and commitment are required for the successful implementation of management systems and the IMS. Wilkinson and Dale (2000) see similarities between TQM and full integration. In their view (Wilkinson and Dale, 1999b) companies that have not yet adopted TQM are only likely to see integration as a combination of standards and view it as an easy way of reducing system audits costs by third party certification. Experience in introducing the TQM initiatives is likely to make the implementation of IMS easier and lead to secure the additional benefits that full integration offers. Senior managers in the Health and Safety Executive (Wilkinson and Dale, 2000) also believe that the TQM way of integration required the implementation of a philosophy, which would involve everyone in the organisation.

At this time however, standards writers are emphasising achieving compatibility between the standards. This has distracted attention from the TQM approach. From implementation considerations, Wilkinson and Dale (1999b) suggest that if differences in scope are seen as preventing integration then perhaps, the starting point is to implement the ISO 9000 series, company wide. The question here arises for the necessity for full integration equivalent to level 4 in the multi level approach. Karapetrovic and Wilborn (1998) agree that increased integration gives improved definition but few companies are planning full integration and those that also are likely to have extensive experience in introducing Total quality management (TQM) initiatives.

d) Phased approach

This approach suggested by Jonker and Klaver (1998) advocates to develop a methodological framework for integration and IMS. It identifies five different phases of integration ranging from abstract to practical.

1. Policy integration: Continuous and ever growing number of management initiatives (for example in the Quality field) entails careful consideration before integration as a right choice and a thoroughly crafted strategy. Otherwise, the result is parallel policy deployment, frustration and wasted money.

2. Conceptual integration: For conceptual description of reality, organisations need a conceptual model. Functions and their relations are named for element reconstruction of reality. Best example is a number of well-known models used in Quality world. Conceptual integration requires a dominant model-like the EFQM, which offers possibilities for adaptation.

3. System integration: This phase is to put the conceptual model in operation, which in turn requires method and system. It is in developing the method that integration is achieved. A system is an essential requirement in order to assure the fundamental principles of feedback loops such as the Deming's plan do check act cycle. Building a system based on a model (and a method) means those, requirements such as preparation, assessment, auditing improvement and assurance are brought into one system.

4. Normative Integration: This phase takes into account the differences in the standards. Those can be in the scope, remit or structure etc. A system functions only on agreed standards. Integration involves taking into account the main standards as well as the underlying norms and values. When the differences between the two are handled in explicit manner integration at the standard level becomes easier.

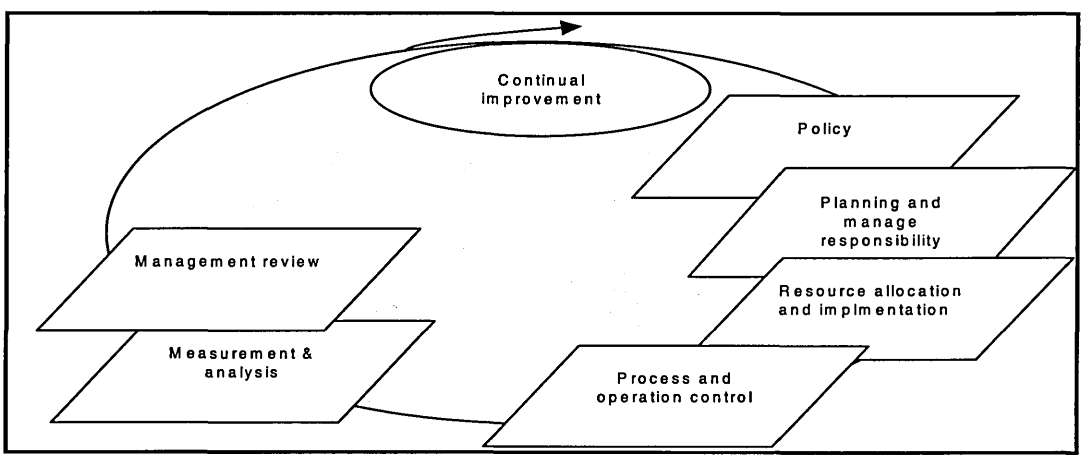
5. Pragmatic Integration: It is the integration at functional and operational levels, where employees can easily bog down in numerous manuals,

instructions and procedures. At this level it is pragmatic and practical to integrate all different documents and procedures down to a workable level.

e) PDCA approach

This approach, more like the third stage of the phased approach, advocates the development of a system for all management systems on a standard PDCA (Plan, Do, Check, Act) cycle design. Hall (1998) believes that the fundamentals of managing any activity are described in the PDCA process. If an effective and economically viable method can be developed, which adequately addresses the requirements of Quality, Health and Safety and the Environmental management, as well as addressing every day activities (finance, marketing, purchasing, production, personnel. property, and products or services), this could be true IMS. Millidge and Smith (1999) also agree and in their view new ISO 9000 series approach is based on a process model embracing the PDCA cycle that ISO 14000 and BS 8800 also use. Though it is noted that the headings in the boxes may be different but the content are similar. A compromise solution is not difficult to reach, see figure 3.1.

Figure 3.1, Integrated Approach



Source: Millidge, C. and Smith, D. (1999) Unifying Management Systems, Manufacturing Engineer June 1999.

Millidge and Smith (1999) elaborate some elements and sub-elements of their conceptual integrated model as follows.

1. Policy

2. Planning and management responsibility

Stakeholder needs / requirements

- customers expectations
- Environmental aspects
- occupational Health and Safety risks
- (food hygiene risks)*
- (security risks)*
- (fire risks)*
- training needs (IIP) etc.

(*not currently the subject of standards but may be in the future)

3. Legal and other requirements

Objectives and targets

Assignment of management

Responsibilities

Provision of appropriate resources

Management systems requirements

Human resources

- competence, training and awareness
- communication

Other resources

- infrastructure

- information / communication
- finance investment etc.

Management system arrangements

Process responsibilities

Operational control

Process documentation

Preparedness for emergencies and product recall

4. Measurement and analysis

Monitoring and measurement

Corrective action

Preventative action

Internal audit

5. Management review

Needs of interested parties

Changes in regulation etc.

Continual improvement

The planning step of identifying customer expectations/ needs is considered as an important one. A risk-based approach allows extension to using a common approach for identifying the crucial Quality, Health and Safety and Environmental aspects. Involvement of employees in organisation can be ensured using a matrix, such as used in BS8800. Involvement is invaluable and essential for success as it allows a positive culture to be developed.

f) Combined PDCA and process approach

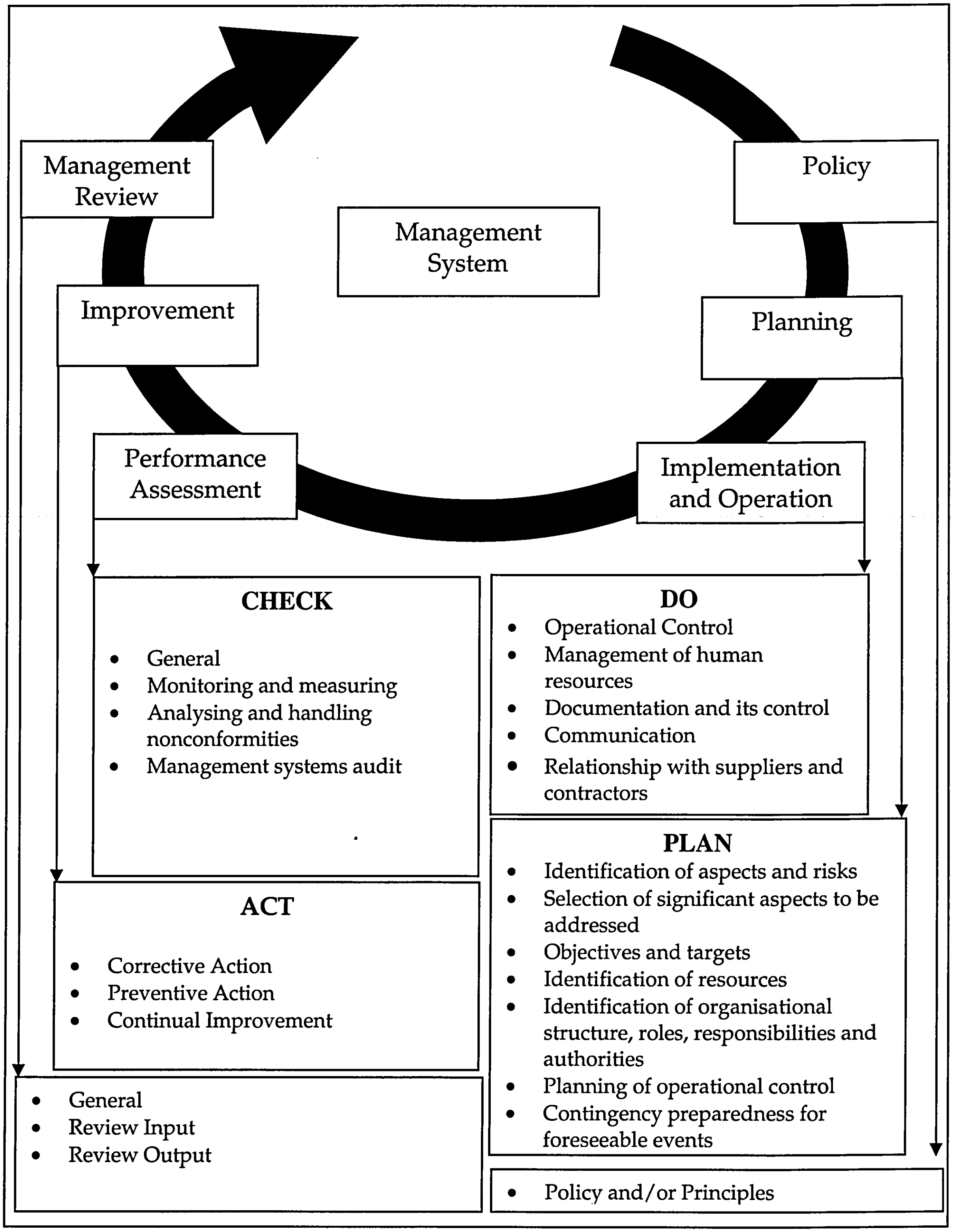
On the same broader principles as the previous PDCA approach, a combined PDCA and process-based approach has been put forward by Smith (2001) as a framework for IMS. It basically draws on the process-based structure in the latest ISO 9000:2000 Quality management systems. Figure 3.2 schematically represents the approach. Smith (2001) believes that taking existing Quality, Health and Safety and Environment management systems and wrapping them together in a one set of manuals cannot work. There is need of an organisation wide single integrated management structure in which Quality, Health and Safety, Environment management systems are brought together along with other management systems and business activities as required.

g) Conversion approach

This is same in many aspects as to follow the links between the standards. The main difference is the use of Quality management system (QMS) as the foundation for other systems to be integrated. Griffith (1999a) suggests the same approach. The Institute of Quality Assurance (IQA, 2001) regards it as an approach for integration where, necessary processes to cater for Health, Safety, Environmental and other requirements of management system standards can be added to a certified QMS. All systems should share the following processes.

- Document development
- Training
- Internal audit
- Management review
- Corrective action
- Preventive action

Figure3.2, Framework for Integrated Management Systems



Source: Smith, D. (2002), IMS: Implementing and Operating, British Standards Institute, London.

Addition of new practices to existing entails the revision of documentation to cover the Health and Safety and Environment and other additional management systems. Some of the additions would be necessary, such as:

Risk assessment: This should address Safety risks, Environmental impacts and process failure modes. Common approach will make risk comparison easier.

Regulations management: This should cover the capture of regulation on Health and Safety, Security etc and analysis and impact.

Programme management: This should focus on specific improvement programs such as Health and Safety, Environment and Security improvement.

Public awareness: This should address the notification aspects of Health, Safety and Environment.

The main weakness of the approach as identified by IQA (2001) is its dependency of the outcome on the strength and structure of the original QMS. The difference in the scope of systems may also be a problem. Health and Safety and Environmental management systems cover the whole organisation, where as Quality system is usually limited to certain departments. The solution may be the implementation of QMS across the whole organisation first.

h) System approach

The approach can be further spilt into two.

i) System engineering

It is about designing the bespoke system keeping the organisational and business needs in consideration. IQA (2001) explains it as a system design top down to fulfil a specific objective. The steps, which follow on from this, are as follows:

- Business Modelling
- Function Deployment
- Business Process Analysis
- Operational Policies Formulation
- Procedure Development
- Existing Documentation Capture
- Identification of Documentation Needs
- Document Development Plan Development
- Systems Documentation
- New Practice Implementation

The approach focuses on processes. Keeping business objectives in mind a coherent system is designed, which serves both organisational objectives and other regulatory and external requirement. The system does not stick to any standard, but different standards are used to assist in identifying tasks and processes.

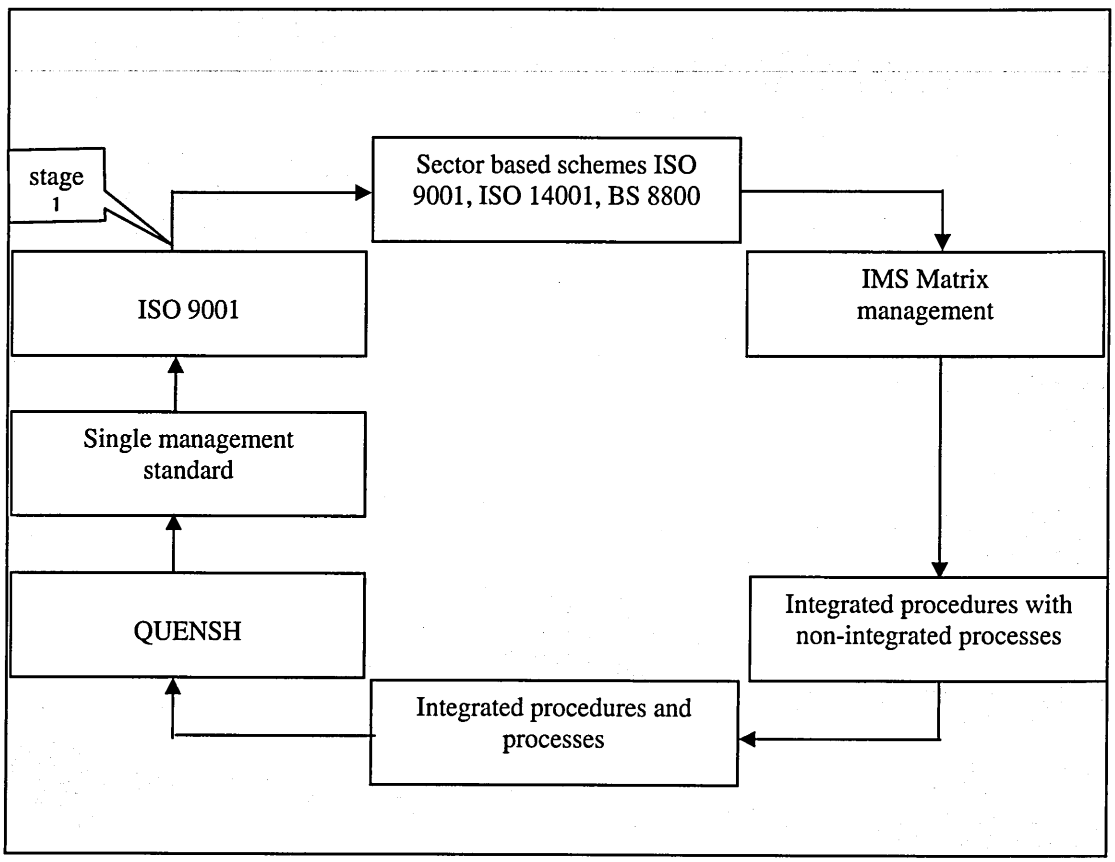
ii) System view

System engineering advocates designing a bespoke comprehensive system aimed at organisational objectives and covering all other management areas, where as the system view is applied on existing management systems and their integration. Many authors like Velury (1996), Castle (1996), Bititci *et al.* (1997) and Karapetrovic and Willborn (1998) have written on this aspect. For example, Karapetrovic and Willborn (1998b) consider that their model helps to identify the relationship between the elements of standards that make up the management systems and how they fit into the overall management and business systems. Linking two systems in a way that results in a loss of independence of one or both means that systems are integrated. The integrated systems then form a "system of systems" where the individual systems still retain their identity. Griffith (2000) also agrees on the system of systems concept. However, in his view the purpose of integrated systems is to provide a single open system in which all the tasks needed to satisfy the management functions are configured. Tasks are fully integrated within and are fixed into the one system, rather than being separate systems which sit alongside each other. It is interesting here to see that while systems view is being advocated, ISO 9000:2000 series indicate a move from a system based approach to a process based approach (BSI, 1998b).

I) Risk assessment approach

This approach is backed by Griffith (2000), who sees "the unplanned event" as the common element in management systems and identifies detailed planning as the real synergy of IMS. The risk assessment is considered as a base component for structuring integrated systems. Millidge and Smith (1999) also point that BS8800 employs the concept of risk, and the approach is commonly adopted for ISO 14001, favouring the integration on this common element. In addition, Labodova (2003) supports the development of IMS on a risk analysis approach. As a staunch advocate of the approach, Renfrew and Muir (1998) put forward the idea of QUENSH (Quality, Environment and Safety and Health). It is based on the premise that in organisations, concentrating on strategic management, every decision and activity is risk associated. In implementing organisation strategies within the marketplace, as well as ensuring that its processes are controlled from a Quality, Health and Safety and Environmental viewpoint, element of strategic risk management is missed out in current arrangement. QUENSH resolves this by including the requirements for risk management as part of a single business management standard based on the process model for the latest version of ISO 9001. Different stages for QUENSH are shown in figure 3.3.

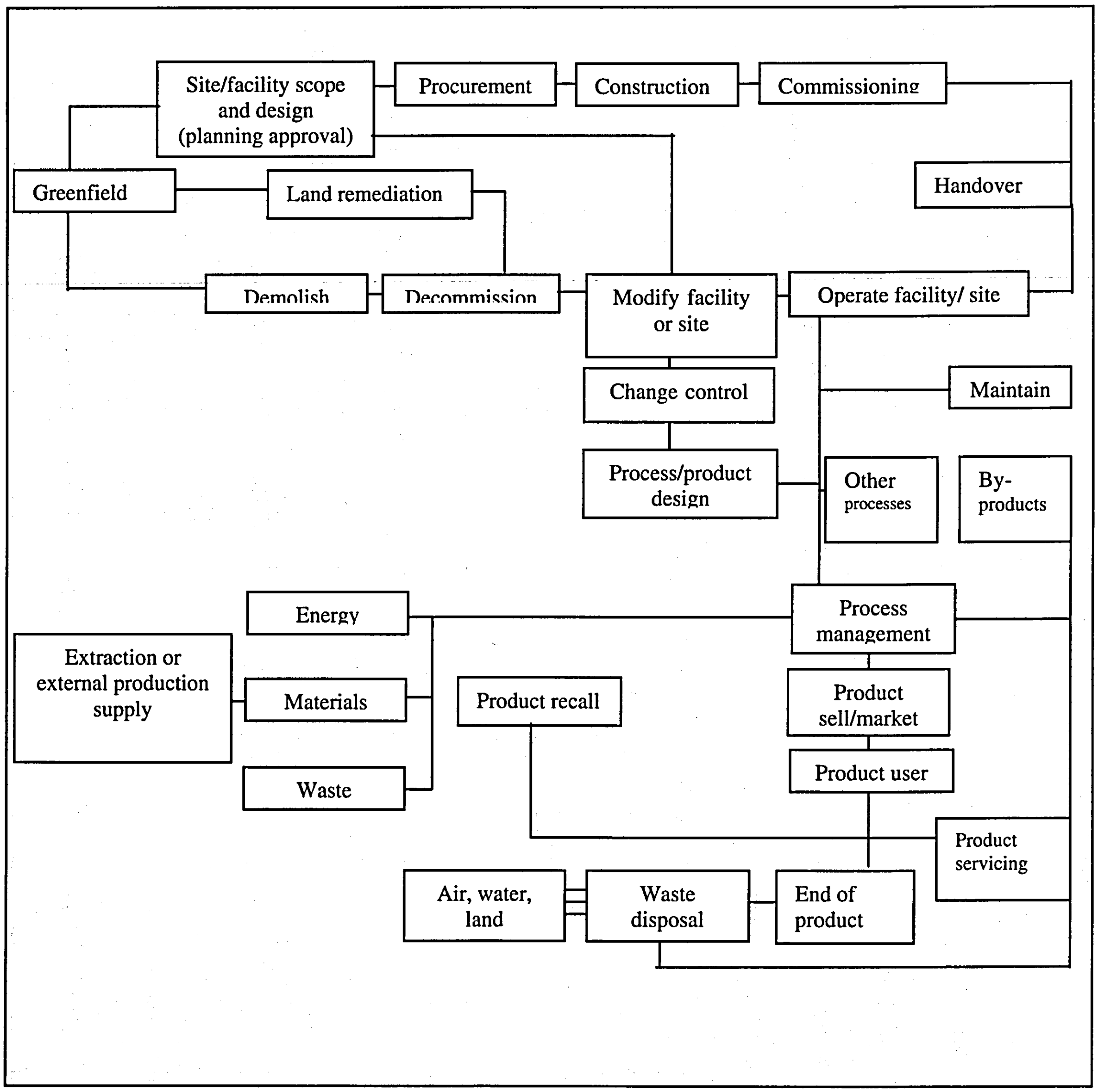
Figure 3.3, Stages to QUENSH



Source: Renfrew, D. and Muir, G., (1998) QUENSHing, the thrust for integration, Integrated Quality Management, Quality World, 98.

Figure 3.4 gives a visual representation how a QUENSH management system would operate within industry. Hence, as shown in Table 3.1, an organisation's activities can be arranged under three main headings, process, product, and business.

Figure 3.4, the Life Cycle of a Site and Its Processes



Source: Renfrew, D. and Muir, G., (1998) QUENSHing, the thrust for integration, Integrated Quality Management, Quality World, 98.

Table 3.1, Principal Elements of QUENSH

Process	Product	Business
Process capability verses design and tolerances	Design	Executive management
Examination, maintenance, inspection and testing	Handling storage	Measuring support
Use of clean technologies	Process control	Auditing and improvement
Provision and maintenance of safe plant and equipment	Servicing	Incident investigation
Safe place of work/ergonomics	EMIT	Communication with regulator
Safe system of work	Packaging	Change control
Control of materials	Information, instructions/record	Purchasing
Hazardous/non-hazardous	Reliability	Land usage/past history/remediation
Human factors	Customer satisfaction / value for money	Risk management
Mass balancing	Product recall	Legislation review and implementation
Waste management	Ergonomics	Public relations
Transport and distribution	CE and ECO/marketing	Insurance
Noise, vibration, dust, odour	Transport and distribution	Nature and ecology
Visual impact on Environment	Noise, dust, vibration, odours	Indirect effects by: suppliers, contractors, business interests
Energy and water treatment	Coolants/ CFCs/oil/water/air	Customers
Information, instruction and training	Usage and disposal	Suppliers
Handling and storage	Water and energy consumption	Building services
Contingency arrangement	Inspection and testing records	Document control/ records
Process design	Recycleability	Contract review
	Human factors	Management review
	Product ID and traceability	Product and process
	Control of nonconforming product	
	Customer supplied product	

Source: Renfrew, D. and Muir, G., (1998) QUENSHing, the thrust for integration, Integrated Quality Management, Quality World, 98.

QUENSH is stated as a comprehensive model in which IMS is only a stepping-stone from the current management systems towards a single management system. QUENSH is the single management solution of the future, which provides an organisation with a framework for complying with the law, as well as missing its losses using strategic risk management (Renfrew and Muir, 1998).

3.4. DIFFICULTIES WITH INTEGRATION

The integration is not easy to achieve. As Beckmerhagen *et al.* (2003b) agree, true integrated systems are difficult to implement and maintain. Many issues need to be resolved before finding any solution. The different potential problems to IMS are categorised as follows.

a) Difference in scope of management systems

The IMS in principle targets Quality, Health and Safety and Environment management systems. Moreover, ISO 9000, ISO 14000 and BS 8800 (or OHSAS 18001) respectively are the main standards employed for these management systems. They have emerged as the stand-alone standards as the concern have grown in these areas. Consequently, there was no planned effort to a make room for the integration. Despite the fact that ISO 14000 incorporates many lessons learnt from ISO 9000:1994, and standard institutions have identified links between systems, to make them more compatible, the wider differences in their structure and scope still remain. Matias and Coelho (2002) ague that although an affinity can be found generally among the systems, there are differences found in their internal requirements.

As Millidge and Smith (1999) explain, Quality defined in ISO 9000 is concerned only with product related activities when developed for the external customer. However, OH&S and Environment standards are broader in that respect (EMAS is a site specific where as ISO 14001 is organisation based, where organisation mean a company, corporation or even a single operating unit). Every employee, every person, every activity and every part of the company is to be covered. Environmental management system is even wider in scope than an OH&SMS. Other authors on the subject also emphasise and appreciate the differences in the standards (Byrnes (1996) Hoyle (1996), Powley (1996), Struebing (1996), Stapleton (1997) and MacGregor Associates (1996). Although the differences in the scope of the systems do not hinder merging of the documentation through the aligned approach, never the less the implementation of an IMS is likely to be adversely affected by these differences. Then perhaps the solution is to implement ISO 9000 organisation wide. In this case the QMS must include functions such as finance, marketing and personnel as well as manufacturing and services. Thus the organisation avoids the danger of creating a situation where some personnel are involved in a QMS and others are not. It also gives a good foundation for the TQM (Wilkinson and Dale 2000 and 1999a).

b) Cultural issues

Introduction of any system brings the changes that impact on organisational culture. Implementation of management system for Quality, Health and Safety and Environmental is no exception. For successful deployment of IMS the cultural considerations are essential. However, it also depends on the interpretation of integration and the approach adopted.

The systems and standards have cultural differences too. Jarvis (1997) feels that the differences could be a problem when introducing an OH&SMS, which may influence its integration. Health and Safety experts have had a traditional role of inspection, leading to expectation of failure, whereas Quality auditors expect compliance. Wilkinson and Dale (1999b) also identify the fact that standards are driven by separate requirements. ISO 9000 is driven by customer requirements and ISO 14000 and BS 8800 are driven by different legislation. Byrnes (1996) and Jarvis (1997) also see cultural issues as hurdles that need to be overcome when introducing EMS, OH&SMS and IMS.

Risk assessment, effects of Quality, Health and Safety and the Environment and continuous improvement are considered as the main differences. The need for a public declaration of Environmental policy and the commitment to improve its performance is single difference, which also requires a cultural change in the organisation (Wilkinson and Dale 1999a).

Wilkinson and Dale (2000) suggest that focusing efforts on compatibility will still leave culture as an important issue. Although it is unlikely to hinder merging of the documentation (i.e. the aligned approach that is being used for certification purposes with the objective of reducing audit and administration costs, as compatibility, scope and culture are not major issues in that case), it will affect successful implementation of the IMS. It limits the approach adopted and restricts the benefits gained. They identify the issue to be addressed by organisations and practitioners. In doing so it is also important to consider the degree of culture change achieved prior to introduction of the IMS and support, ownership, training and the successful implementation of existing systems also need to be considered. If ignored, it is quite possible that, introduction of IMS may be taken as "flavour of the month" and another quick fix.

Continuous improvement is considered as a catalyst for behavioural changes for IMS but it must cover the whole organisation (Hoyle (1996). Wilkinson and Dale (2000) see the solution in the Total quality management (TQM). Each system should be integrated into every function in the organisation and policy and objectives of each must support the overall business policy and objectives. They believe that the risk assessment and continuous/continual improvement are addressed by BS 8800, ISO 14000and EMAS and although ISO 9000 is less clear in this area, continuous improvement and the evaluation of Quality is a part of the TQM philosophy.

c) Attitude of certification bodies

The standards institutions do not favour the total integration of management systems. As an ungainly task, it is considered to have a stultifying effect on the further development and revision of the standards. Alignment was found to the best way forward (Millidge and Smith, 1999). ISO has also recently decided to take not further action on introducing an international OH&SMS standard (Wilkinson and Dale, 1999b). Major UK certification bodies on their part were not found to be promoting integration actively. Where there was an interest, it was limited to integration via the identified linkages between systems standards. This could be related to their role as independent third party auditors, which prevents them acting in this manner (Wilkinson and Dale 1999b).

However, Hoyle (1998) contradicts these findings. He believes that the certification agencies encourage the integration and certify the integrated systems. A study by Douglas and Glen (2000) also found the reaction of the certification bodies to possible integration as positive and in some instances, encouraging.

d) Lack of standards and methodology

Other major issue in the integration of management systems is the lack of an agreed mechanism and benchmark for integration. As the Institute of Quality Assurance (2000) states, there are no national or international standards for IMS. Alternatively, Jonker and Klaver (1998) consider integration difficult, mainly because the lack of a proper methodology. There are few well founded results on how to implement IMS (Mackau, 2003). They emphasize on development of methodological body of knowledge for integration. This will facilitate integration not only at the start but also when newly emerging Quality systems have to be integrated into existing ones.

e) Organisation Size

The size, organisational structure and complexity of the company also have impact on the decision for IMS. Millidge and Smith (1999) supporting it suggest that a large firm may well have completely separate departments for Quality, Safety and Environment; there will be a little appeal in having a totally unified system. Conversely, a small company, where all these responsibilities are in the same area, may find the prospect of integration appealing. A study on small to medium size organisations by Douglas and Glen (2000) also confirm that the SME are simplifying their management systems with the constraints laid down by the standards themselves and the certification bodies. Mackau, (2003), sees the obvious advantages for SME in integration. As more and more systems are introduced, their management will become more complex and so true integration will become more desirable.

However, Hall (1998) believes that the benefits of simplified and integrated management systems, such as reduce risks and increased profitability can be successfully accrued in both small and large organisations.

f) Excessive workload

A research project on IMS (Integrate, 1998) reports the practitioners' view that systems for Quality, Health and Safety and Environment will be too much for one person to manage if combined when each requires different expertise and people working in different areas of the company and having different responsibilities. In their view separate people for Quality and Health and safety are working in different areas of the company and having different responsibilities and it will be too much for one person if combined and each requiring different expertise and experience. Another problem can be the increase in bureaucracy, which may get larger given the complexity intertwined with systems integration (Matias and Coelho, 2002). Furthermore, Karapetrovic and Wilborn (2000) point out to the difficulties in internal auditing of integrated management systems.

g) Miscellaneous

In addition to the main factors mentioned above which are considered important for successful integrated management systems, there are some minor factors who may have their impact also. Wilkinson and Dale (1999b, 2000) and Beckmerhagen *et al.* (2003b) identify some additional factors, which may be overlapping the cultural issues. They are as follows:

- Lack of support from top management
- Resistance from middle managers
- Weaknesses in organisations' existing systems which might be amplified by integration
- Lack of pressure from customers or competitors to implement IMS
- Doubts about added value
- Ownership of the IMS, and
- Lack of adequate training.

3.5. CHAPTER SUMMARY

The chapter presented a detailed account of the integrated management systems (IMS) and its application and implementation in industries. The literature review showed, from the start, a strong support among academics, consultants and practitioners for the concept of integrated management systems. The main reason, among many and diverse reasons, for this favour of integration seem to be the anticipated reduction in the complexities and problems associated with maintaining many management systems with similarities in the structures. This aspect is also closely linked with the benefits from the integration. The different perspectives on integration presented, clearly indicated that the successful model of integration would be one that transfers management systems functioning as a formality to become a necessary part of the core business and the concepts get deeply imbedded in the culture of the organisations. However, the fundamental issue with integration, as identified in the chapter, is the clearly of integration concept. The meaning and purpose of integration is not clear and many definition and terms are being used interchangeably. The chapter then extensively covered the various different approaches and methods suggested to achieve the integrated management systems. In essence demonstrating that the approach is dependent on what exactly is meant by integration. In the end, the chapter covered the opposing views on integration and problems identified in the integrated systems implementation. Essentially, most of criticism is associated with the conceptual ambiguity about the integration, its definition and purpose. Moreover, the understanding of the management systems, their scope, objectives, and boundaries are also important for the success of integrated systems. It is concluded, that most of the apprehension will disappear, once this relatively new management initiative gets maturity in terms of research and application. This chapter dealt the subject from a broader view; the next chapter will examine the integration from a focused construction contractor perspective.

Chapter 4

Integrated management systems in Construction Industry

4.1. AIMS OF THE CHAPTER

In the previous chapter, the integrated management systems (IMS) were discussed generically, whereas this chapter examines the IMS from a construction industry perspective. Contractor organisations are the particular focus. The chapter covers the current position on management systems for Quality, Health and Safety and Environment. With that background, the integrated management systems, implementation, advantages and problems with reference to construction contractor organisations are the other main topics covered. The chapter concludes with preliminary analysis of the literature covered and the issues identified for further research in this thesis.

4.2. THE ROLE OF A CONTRACTOR

Contractors are the public face of the construction industry. Their performance, focuses, policies, processes and methods have direct impact on all stakeholders in the industry. In terms of the management systems, the majority of contractors are certified to the ISO 9000 Quality series. Most of them have some type of Health and Safety management system in place, mainly because of the CDM regulations. In addition, there is a desire now for certification of Environmental management systems. The aftermath of any negligence in Quality, Health and Safety and Environmental management can be catastrophic owing to the often high risk nature of construction projects. Given the importance and sensitivity of the many management areas, the contractor occupies the pivotal position in the construction industry and a public demonstration of the compliance with the legal and regulatory requirements and with the management system standards. The efficiency and effectiveness in processes brought by the configuration of the management systems will have great positive effects on all stakeholders of the business.

4.3. CURRENT MANAGEMENT SYSTEMS

Over the years and especially in the recent past the construction industry has passed through radical changes, changes that have major effects over the nature of construction business. Clients' demand for value for money and customers emphasizing the delivery of a "Quality" product in a "Safe" and "Environment friendly" way are all as important as delivery on time and to the right price (CIRIA, 2000). Hall (1998) agrees and points to the construction design and management regulations (CDM Regulations 1995) which are one of several pieces of legislation giving legal status to this type of customer requirement. Generally, there is today an enhanced focus and concern for Quality, Health and Safety and Environment and their management is too important to be ignored. As Griffith (1999a) identifies, Quality, Health and Safety and Environment issues are aspects of construction, utilizing corporate and project management systems. All are subject to increasingly stringent regulations, legal requirement, monitoring and assessment. For many companies, regulatory or other external pressures have been a major factor in the development of management systems for Quality, Health and Safety and Environment (CIRIA, 2000). Nevertheless, the impact of the systems is wider than merely providing a response to any standard or regulation. They can have a positive effect upon the development of the business as a whole (Griffith, 1999b).

Before the adoption of formal management systems, contracting organisations used systems based largely on custom and experience; informal and rudimentary by today's standards. Construction has become more complex. Contractors have onerous responsibilities with a greater involvement of clients and multiple consultant inputs (Griffith, 2000). Implementation of management systems helps to manage the responsibilities systematically. However, the enforced complexity of different standards and regulations that have developed over time, is also a problem for modern construction management (CIRIA, 2000).

Griffith (2000) agrees that Quality, Health and Safety and Environment are standards-based (project) functions that need to be managed in a systematic way. However, as CIRIA (2000) explains, the traditional method of designing a management system to comply with a particular regulatory or conformity requirement is based on the structure of the requirement itself, rather than the way the company actually operated. Organisations develop management systems clause by clause as suggested in standards i.e. ISO 9001, the CDM regulations and the Environmental management ISO 14001.

4.4. INTEGRATION OF MANAGEMENT SYSTEMS

Leading construction organisations have shown considerable interest in integrating Quality, Health and Safety, and Environment management systems following the examples in manufacturing and the chemicals industry. It can be argued however, that models and approaches adopted in manufacturing and the chemicals industry cannot be replicated blindly in construction owing to the different nature of the industry. This section explores IMS further from the industry perspective.

Moore (1998) defines IMS from the construction industry view as follows.

> *"The planning, monitoring and control of all aspects of a construction project that are necessary to ensure that all those involved are aware of their responsibilities and perform them safely, to the required Quality and with due regard for the Environment."*

The total construction process heavily relies on functional specialization. For Quality, Health and Safety and now the Environment, departmentalisation is the easiest option. However, as Griffith (1999a) comments, developments in communication media and information technology will reduce the need for functional specialists to be present at each production or process site. There is still need of traditional roles (of Quality and Safety managers) but their understanding of other functions is broadening (Moore, 1998). Griffith (2000) advocates that conventional separate or segmentalized systems generally meet the requirements of construction, however, as additional management functions need to be accommodated, an integrated system can be advantageous. A recent report from CIRIA (2000) also identifies potential of integrating the management systems for Quality, Health and Safety and Environment in the construction organisations.

Moore (1998) finds from a case study of a leading construction company that separation of its Quality, Safety and Environmental functions compounded the difficulties employees already faced in their daily roles. The company was too close to its main problem to actually see that complying with individual systems was how other people thought the business should be run rather than how it actually was run. A CIRIA (2000) study also strengthens the same view that separate systems for certification reasons and for clients' serve no purpose. At project level, policies, procedures and plans (Quality, Safety, and now Environmental) are produced for external consumption, rather than used as tools to improve the effectiveness of the business. Exercises have shown that all these documents aim to describe how the project is being managed, while retaining a slant to the particular area of interest that triggers the document production. These several plans, their use and effectiveness may be limited by the sheer effort required to decide on the systems and controls needed for a particular activity.

The separate management functions need to be integrated in line with business objectives of the organisations. The people doing work need one set of instructions not a hotchpotch of potentially contradictory guidance. Griffith (1999a) points out that as more systems are introduced the boundaries between systems can become indistinct and control procedures can become vague, particularly at the project level during the production phase.

It is perceived that a tendency to address the Environmental management of construction by creating parallel yet separate management systems operating alongside existing Quality and Health and Safety systems will overload the site management resources and the will not allow the benefits of such management to be delivered. There is an opportunity to take advantage of the need to introduce some form of Environmental management to reconsider the management structure and processes for the disciplines of Quality and Health and Safety (CIRIA, 2000).

Structurally, Griffith (2000) reminds that, established systems used by contractors to manage Quality and Environment serve both the corporate and project organisation, and an IMS should be consistent in this respect. The corporate organisation for IMS must have strong linkage with and not merely have a joint to the project organisation. Only in this way can the system provide a holistic service to the core business and then IMS can extend and work across professional boundaries and become an important element within an integrated management process (Griffith, 1999b).

4.5. CONSTRUCTION SPECIFIC ADVANTAGES OF AN IMS

In addition to the generic benefits that were outlined earlier, construction can have some extra advantages owing to the project-based nature of business. Integration of the plans at project level ensures that information is at least concise and more efficient in its use and updated.

A report by CIRIA (2000) identifies the following benefits for construction firms from integrated management systems:

- Improved delivery of the specified product to the customer
- Improved communication within the project team
- Removal of duplication of paperwork arising from separate systems
- Improvement in delivery and communication are linked to reductions in the level of risk in a project

The last one is more important as it is one of the functions of any collection of management systems (whether integrated or separate) to eliminate, or at least minimize, the risk of problem occurring. Moore (1998) agrees that IMS remove unnecessary bureaucracy and systems and give an organisation more time to focus on the real issues such as risk planning. The intent of IMS is to provide the focus vehicle for implementing project risk assessment, Griffith (2000) maintains this whilst capitalizing on the available benefits of a single system solution for project control.

4.6. IMS ADOPTION IN CONSTRUCTION

In the view of Griffith (2000), early approaches to IMS will likely bring together existing Quality, Health and Safety and Environment procedures into a vertical framework of co-ordinated parallel systems for company and project application. Over time, these may be merged into a single cross-functional horizontal management system. For this, he regards understanding the boundaries between specialist disciplines as essential as this may point the way forward for restructuring the various inputs to create the IMS.

Effective risk assessment is a critical aspect for the success of a construction project. It appears that risk assessment will be an underpinning factor for IMS adoption. The integrated structure provides the foundation for detailed project risk assessment within the system and can encourage useful reductions in fuzziness between management boundaries and general bureaucracy (Griffith, 2000).

The cross-functional management system would be a major step forward but Griffith (2000) anticipates that such change will not be easy. His research shows that PMPs (Project Management Plans) were seen as vital in driving the management ethos as project implementation would be the true test of company policy and instilling culture. Achieving the benefits of IMS also requires the contractor to devise and to implement revised methods of working, focusing explicitly on the role of IMS within the corporate and project organisations. It is seen as essential that contracting organisations have well conceived and structured management procedures to give clarity and purpose, reduce effort and duplication but without the traditional problems of over-management and bureaucracy. With careful consideration and configuration IMS was perceived as a feasible way forward.

4.7. PROBLEMS WITH INTEGRATED APPROACH

Culture, the attitude of certification bodies and differences in the scope of management systems were discussed in an earlier chapter as the potential problems in the implementation of IMS. All of those factors apply to construction as well. However, each organisation and the industrial sector are different and construction industry has historically claimed its excessive share. Founded on the concept of function specialisation and with long-wall syndrome still prevalent, the departmental boundaries in construction organisations, may pose a greater problem for the IMS among many others issues. CIRIA (2000) outlines in more detail the potential areas of concern specifically raised by construction organisations as follows:

- An integrated system needs the commitment, support and encouragement of senior management within an organisation, to ensure that the work of revising existing systems is properly resourced and focused.

- Focus on customer and end user needs is essential rather than mere reduction in volume of paperwork.

- Ownership of the integrated system by the business managers, with support from specialist departments and personnel. Implementers should focus on early and quick gains from any integrated system in order to convince opponents and cynics.

- With an integrated system, there is an inherent difficulty of keeping different records for the appropriate lengths of time.

- There is also a difficulty in maintaining the tractability of correlation between the clauses within the system and the requirements of standards or regulations, to enable the system to be kept up to date. However, it is seen from examples that integrated systems encourage the systematic and logical filing of all project records, which provides for easier referral to these documents.

- It is also to be noted that the level of commitment and the resources required to turn a set of separate management systems, each of which has evolved over a number of years in response to changing needs, into single integrated systems should not be underestimated. It may be an activity best undertaken when one or other of the separate systems requires overhaul.

CIRIA (2000) report also presents construction industry views in opposition of IMS.

- Management is split into separate chunks, each of which is manageable and supportable. New requirement and completely new systems can be grafted onto the collected systems with little disruption (by establishing new specialist support departments).

- Time and effort required to review and revise separate systems.

- Single system may be seen as too large to be manageable and to keep up with change in requirements.

- System may be under constant revision.
- Difficulties with revision control.

Interestingly however, neither was the opposite view found, namely that those who had tried integrated systems were abandoning them and reverting to separate management systems. Some of the views against the integration system approval put forward by those who still used separate systems (e.g. that integrated systems would be unwieldy or complicated), were not reported by those who have actually implemented integrated systems (CIRIA 2000).

4.8. CURRENT IMS APPLICATION BY CONTRACTOR ORGANISATIONS

It is reported in the literature that both large and small contractors in UK have implemented integrated management systems (Smith, 2002, CIRIA, 2000, Griffith, 2000, Moore, 1998).

Moore (1998) explains in detail the process for IMS implementation in Tarmac Civil Engineering, TCE (now Carillon). First the objectives of the QMS were agreed. Once it became clear that the system should be for the benefit of the company and not external auditors, the company was able to plan the way forward. One of the most obvious views was to consider integrating the various systems TCE operated on site. Existing plans duplicated and in parts contradicted each other, and as such they were unused and ineffective. The integrated approach is being promoted across TCE on all new contracts. Previous Quality, Health and Safety and

Environment responsibilities are now grouped under a business systems banner that reflects the services of all areas of the business.

However, Moore (1998) quickly points out that it was fortunate that a director responsible for Quality, Health and Safety and Environment and had been appointed, as without this kind of senior commitment, an integrated approach would have been harder to implement.

On the drivers for IMS in construction, Griffith (2000) observes the introduction of IMSA (Integrated Management Systems Assessment) by BSI and the lead by a small number of prominent contractors to seek dual and triple certification for their management systems. The construction industry in UK is perhaps at the leading edge of IMS developments and a small number of UK contracting organisation are currently pioneers within the construction industry.

In TCE's case (Moore 1998), the approach has resulted in the development of a single project management plan on all its contracts. This document, which is effectively a method statement for how it manages the job, is the basis for all systems, roles and responsibilities that in the past were spread over a variety of documents. Griffith (2000) also advocates a single project management mechanism, perhaps on the SHE (Safety, Health and Environment) approach. This mechanism is set within a framework of Quality approach, enabling the development of a combined management to Safety and Environment of construction projects

However, there is yet no concerted drive among contractors to implement integrated systems, although many are adopting Environmental management systems (CIRIA, 2000). Griffith (2000) also found lack of in-depth awareness of the emergence of the IMS.

CIRIA Report (2000) concludes that the development of integrated management systems is an organisation-specific decision and different circumstances will lead to different decisions as to the degree of integration that is desirable or achievable. Moreover, as Moore (1998) maintains, only when people realize that systems are tools to help, not hinder them, that an integrated approach can be fully adopted.

4.9. PRELIMINARY ANALYSIS (LITERATURE REVIEW)

The section analyses the literature review presented in the preceding sections. The analysis is particularly focused on the application of integrated management systems concept by contractor organisations. The section makes a robust background for the following section that identifies the focus and direction for the next phase of the project i.e. the preliminary case studies.

4.9.1. Importance of Management Systems in Construction Industry

Construction is one of the important industrial sectors for any economy. Statistics given in chapter one reinforce the huge contribution of the industry in UK and also world-wide in terms of employment and the share in the Gross Domestic Production. This business volume naturally results in industry's impact on economy and on others spheres of our society. The industry provides the delivery mechanism for provision and moderation of nation's built environment. However, in the public eyes, construction is an untidy, strident and time-consuming process disturbing the everyday chores. Egan (1998) also pointed to client dissatisfaction with construction contractors. Industry is also famous for its cowboy culture. In terms of Health and Safety the industry has the highest rate of fatal accidents in UK and across Europe (Eurosat, 2001, 2002 and HSS, 2001, 2003). Industry is also one of the main contributors to the depletion of natural resources and a major cause of unwanted side effects (Augenbroe and Pearce, 1998, DETR, 2000). Hence, Quality, Health and Safety and Environment management especially in the contractor organisations need great improvements. Growing competition, customer and stakeholder focus, stringent legal requirements and an urge for community responsible image also vitalises the Quality, Health and Safety and Environmental management. Across the various industrial sectors, implementation of the formal standard based management systems is found as a convenient and structured arrangement for the management of Quality, Health and Safety and Environment. The construction industry in that respect has adopted ISO 9000 to certain extent. After the introduction of CDM regulations especially, industry has seen the adoption of Health and Safety designed around BS 8800 as well. Whereas, the Environmental management systems, like ISO 14000 are also consolidating in construction gradually.

4.9.2. Role of Contractor

Construction is a multifarious process involving many organisations on a single project; however, the contractor's role is pivotal for the success of any project. The contractor works as the interface between the public and the industry and the real demonstration of performance of the industry. The Egan Report (1998) was also focused on contractors. Any process that makes the performance of the contractors efficient and effective will have positive impact on the whole industry.

4.9.3. Effectiveness of Management Systems

Quality systems like ISO 9000 are subject to the much debate in terms of effectiveness. As the oldest and most widely adopted management systems, they contribute in the success of other management systems too. It is criticised that third party certification and over-procedural approach have reduced Quality to a function instead of a philosophy or concept. Thompson (1999) maintains that Quality standards have been complied with, for the sake of certification. It is evident that construction is far from satisfied with Quality systems implementation. It is believed that there are many gaps in the ISO 9000 standards. Confusing structure, unclear objectives and boundaries of systems lend to various interpretations (Karapetrovic and Wilborn, 1998, Thompson, 1999). However, it is not fair to apportion blame on the standards alone, as Hoyle (1998) explains; they are not the state of the art but minimally accepted systems. Organisations have to evaluate and adopt the systems around the organisational business needs, not slavishly following the articles in the systems for the sake of certification only, as is the common case pointed by Thompson (1999). In the latter case, as Moore (1998) agrees, businesses end up being asked by consultants about how to do the business. In construction, ISO 9000 systems are criticised as bureaucratic, unwieldy, wasteful and based on an approach that does not add real value to the organisation (Al-Nakeeb *et al.* 1998, CIRIA, 2001). The reason for the criticism lies behind the actual motive for adopting the systems. Al-Nakeeb (1993) finds the client pressure as the strong reason. Hence, intention in most cases is to get certification only. The problem again seems to be the lack of understating the nature of the standards and their correct interpretation. Whenever the intention is the adoption for business process improvement, ISO 9000 can and has formed the basis for efficient Quality management systems in construction (Moatazed-Keivani *et al.*, 1999).

4.9.4. Integration of Management Systems

Analysing the management standards for Quality, Health and Safety and Environment (ISO 9000, BS 8800/OHSAS 18001 and ISO 14000) respectively, similarities are apparent in the structure of the systems. Organisations having all these systems implemented or planning to implement, would be expected at some stage to question the logic of keeping the systems separate. The IMS in that respect offers a holistic approach for Quality, Health and Safety and Environment management. The IMS is gathering increasing support from academics and more importantly practitioners (Jonker and Klaver, 1998, Renfrew and Moore, 1998, Hoyle, 1998, Integrate, 1998, Millidge and Smith, 1999, Wilkinson and Dale, 1999a, 1999b, 2000, Griffith, 2000, Smith, 2001 and others).

It is evident from the literature that no matter how logical it may appear, achieving IMS is not easy. Resolution and understanding is required even when considering the meaning of IMS and ways to accomplish it (Wilkinson and Dale, 1999b). Alignment, compatibility, co-ordination, deployment, combination are some of the terms being used to define IMS (Garvin, 1991, Dessler, 1992, McGregor, 1996, IQA, 2001, ISO, 2001). If integration is just merging the documents than it is far short of its potential advantages. True integration will be nearer to the framework advocated by Smith (2001), where a single management system is established and all the bit and pieces for Quality, Health and Safety and Environment and other current and future management systems fit fully into it. In practice, this entails a huge organisational change that is an uphill task and with questionable viability.

The current approaches to integrate mainly depend on what is really meant by the IMS. Integration through the links suggested by standards has the strongest support and is attracting most attention (Beechner and Koch, 1997, Karapetrovic and Wilborn, 1998, Millidge and Smith, 1999, Wilkinson and Dale, 1999b, Douglas and Glen, 2000, Griffith, 2000, IQA, 2000). Although it is simple and easy to follow, Byrnes (1996), Hoyle (1996), Powley (1996) and Wilkinson and Dale (1999b) consider it as a narrow approach that ignores the differences in the systems. The main objectives are only to achieve reduction in the documentation and auditing fees related to certification.

4.9.5. IMS in Construction Industry

As discussed earlier, the majority of construction contractors have Quality systems in place with some semblance of Health and Safety management systems. Growing emphasis on sustainable construction is driving the adoption of Environmental management systems also. The project-oriented nature of the business means that staff on-site has to deal with different set of documents and manuals to comply with each management system. Not forgetting, that the compliance with the systems is also essential to the benefit of all stakeholders in the project. Systems, in addition to compliance, also help in business process improvement. Integration in this scenario seems to be a viable option to streamline the documentation, leaving room for more focus on the process improvements, resulting in more efficient, effective, productive, sustainable and safe construction.

Evidence in the literature suggests the tendency of clause-wise implementation of systems for compliance and certification resulting in the frustration and dissatisfaction with the management systems. The need is to understand the nature of systems and mould them around the business needs, to make most from the implementation. Definition by Moore (1998) in section 4.4 catches the essence of IMS by suggesting the systems to be imbued in the core processes, as part of culture rather than superimposed separate functions.

Integrated management systems' practical implementation is limited at present as contractors are still in the process of having all the systems in place. Whatever examples are quoted in the literature, they are not very advanced from simple document merging. Conversely, this is the right time while implementing the additional systems for Health and Safety and Environment to overhaul the systems and look for integrated solutions. The literature is full of suggested advantages and disadvantages of the IMS and where most of the disadvantages can be tackled by thoughtful and planned integration of the systems.

The study of different approaches recommended for the IMS suggests strong support for the model based on the risk assessment (Griffith 2000, Smith 2001). Further research in this thesis will clarify the model most favoured by the industry.

It is also a fact that each organisation is different and each will need its own bespoke solution for the IMS based on its specific business requirements. However, there is a need to develop a general framework for the implementation of IMS by contractor organisations to:

- consolidate the different approaches for IMS;
- work as a practical guide;
- be a general framework for standard management systems;
- be helpful in benchmarking activity;
- reduce the chances of segmentation;
- help in developing IT support system for the IMS;
- take the IMS beyond the document merging exercise.

4.10. ISSUES IDENTIFIED FROM THE LITERATURE REVIEW

The IMS is a new research area and much exploratory work will be needed for the development of integrated systems. In this section, in line with aim and objectives of the research, some issues identified from the literature review and the preliminary analyses are given as follows. Further fieldwork in the next phase of the research, will crosscheck and refine the list and will identify new issues, areas and problems related to the integrated management systems.

4.10.1. Issues Related to Implementation of Management Systems

Adoption of the systems

- Reasons for implementing management systems (Quality, Health and Safety and Environment);
- Management structure in place for management systems.

Effectiveness of management systems

- The level of satisfaction or dissatisfaction with existing systems, problems and the reasons;
- Applicability and appropriateness of management systems to construction contractor;
- Effectiveness of the systems, (meaning of effectiveness) and methods to measure it;
- Readiness for new standards for sustainability etc;
- Line staff observations and understanding of the management systems implementation and assessment of the benefits.

Problems with management systems

- Problems, issues and complexities caused by management systems implementation on site;
- Extent to which systems are in line with business objectives and needs;
- Assessment of current structure to be in line with business objectives;
- Initiatives and suggestion to bring the systems in line with business objectives;
- Extent of top management support for the management systems.

Separate management systems

- Effectiveness of separate management systems;
- Level and extent of satisfaction or dissatisfaction with separate systems;
- Assessment of separate systems capability to be more effective and workable;
- Level and extent of staff satisfaction with separate structure of the management structure;
- Problems with separate management systems.

4.10.2 Issues Related to Integration of Management Systems (General)

Understanding of IMS

- Understanding of the IMS (meaning, concept, definition, terminology);
- Awareness of the issues associated with integration.

IMS Implementation approach

- Configuration of the integrated management systems;
- Structure of the integrated management systems;
- Approach adopted or suggested for an integrated management systems;
- Assessment of how the systems can be/have been brought in-line with the business objectives through integration.

Advantages and problems anticipated with IMS

- Assessment of easiness or difficulties from integrated management systems.

Expansion of IMS

- Possibility and potential of expansion of integrated systems to other departments like training, human resources, finance and marketing.

4.10.3 Issues Related to Integration of Management Systems in Construction

Understanding of IMS

- Level of understanding of IMS in construction contractor organisations;
- Extent to which contractors are ready for change with an IMS implementation;

Applicability and practicality of IMS

- Examination of the practicality and applicability of IMS with contractors;

- Desirable, practical, effective and workable level of integration with construction contractor, that facilitates project as well as corporate objectives;
- Extent to which the IMS have been thought about or tried at all;
- Extent to which the IMS will make implementation of other management systems easier or difficult.

Implementation approach

- Examination of the systematic implementation of IMS;
- Desirable characteristics for the propose IMS framework;

Benefits and problems associated with IMS

- Benefits expected from an integrated approach;
- Potential problems faced or anticipated for the IMS;
- Suggestion on the ways to tackle the problems;
- Issues for IMS from people, procedures and technology perspectives.

IMS and process automation

- Extent to which the IMS supports the process automation or the use of information technology;
- Role of information technology in the implementation of IMS.

The issues listed above are neither definitive nor exhaustive but merely a broader identification of the aspects related to research focus. The list is to refine further as the research progresses in the next stage of fieldwork.

4.11. CHAPTER SUMMARY

In line with the focus of this project a state-of-the-art assessment of integrated management systems from a construction industry perspective was carried out in this chapter. The work focussed on the application of integrated systems in contractor organisation. The chapter examined and justified the importance they have in the industry. The review evaluated the application and importance of management systems, and illustrated that the contractors, being the interface of industry with society and other stakeholders, will be the true beneficiaries of improvements in the management of Quality, Health and Safety and Environment. The chapter looked at the integration of management systems in contractor organisations; covering the scope, advantages and anticipated problems with the IMS. Assessment of the current level of the research and application of integrated management systems in construction particularly in contractor organisation was also conducted. The chapter included the critical preliminary analysis of the literature, emphasising the importance of the subject matter in view of the current performance of the industry in relevant fields and complexity of the processes on corporate and project levels. The detailed list of issues that have been identified from the critical review of the literature concludes the chapter. Chapter five will cover the next phase of the research work starting with the pilot studies.

Chapter 5

Pilot Research Study

5.1. AIMS OF THE CHAPTER

The chapter reports the pre-data collection phase of the pilot study. The introduction to the pilot studies and their importance in the research makes the start of the chapter. Subsequent sections discuss the pilot study design for this research. It is followed by the list of objectives set out to achieve from the study. An important section of the chapter consists of the presentation of findings from the study. Emerging issues from the analysis of the literature review and the pilot study are also included. This leads to initial theory development. The important issues from this study, having implications on the further research, are identified in the end.

5.2. INTRODUCTION TO PILOT STUDIES

The following sections introduce the pilot studies.

5.2.1. Definition

Before the start of the main data collection for any major research project, it is a good practice to run a trial of the methods and procedures to be employed. This helps to identify any potential flaws and shortcomings in the designed methods. Important time, which is wasted in modifying the methods later, is saved. Moreover, it authenticates the relevance and practicality of the research issues and methods early on in the research.

Cassell and Symon (1994) view piloting as:

> *"A study that involves a small-scale investigation or trial of the materials and methods adopted in search of the study's general objective(s).'.*

Blaxter *et al.*, (1996) term pilot studies the "reassessment without tears" and maintain that a researcher may think of knowing well enough, but things never work quite the way envisaged, even if done many times before. If not done, probably the initial period of data collection turns into a pilot in any case. In addition, research is an arduous and significant time commitment and better be preceded by a pilot (Janesick, 1994).

5.2.2. Piloting in Case Studies Research

As mentioned earlier under methodology in chapter one and later discussed in chapter six, this research mainly employs a qualitative research methodological approach achieved through the case studies. In that context, Robson (2002) argues that there are aspects which can make piloting both more difficult to set-up and fortunately, less crucially important in case studies. There may be only one case considered or the particular features of the case selected (such as geographical or temporal accessibility, or the prior knowledge of the case). Therefore, there is no sensible equivalent, which could act as the pilot. The design of pilot for this research is presented in a later section in the chapter.

5.2.3. Selection of Pilot Studies

There is no fixed criterion for the selection of a pilot. There may be different reason depending upon the research methods. For case studies, Robson (2002) mentions earlier the geographical or temporal accessibility or the prior knowledge of the case. Reasons may be unrelated to the selection of final cases. Yin (1994) describes unusually congenial informants, unusual amount of documentation and data or most complicated of the real cases (so that nearly all relevant data collection issues will be encountered) as some in addition to the reasons cited by Robson (2002). Generally, convenience, access and geographical proximity standout as the main criteria for selecting pilot case(s).

5.2.4. Advantages of Piloting

A pilot study helps to refine the data collection plans with respect to both the content of the data and the procedures. Janesick (1994) maintains that the pilot study allows the researcher to focus on particular areas that may have been unclear previously. In addition, pilot may be used to test certain questions. This initial period allows the researcher to develop an understanding with participants. Some insight into the shape of the study that was not apparent, is uncovered also by reviewing the records and documents.

Yin (1994) emphasise the difference between a pilot test and pre-test. The pilot is used more formatively to develop relevant lines of questions, possibly even providing some conceptual clarification for the research design as well. In contrast, the pre-test is the occasion for a formal dress rehearsal in which the intended data collection plan is used a faithfully as possible as a final test run. However, Robson (2002) regards pilots as case studies in their own right with an essentially exploratory function, where some of the research questions are methodological. In his view a formal dress rehearsal, in which the intended data collection plan is used as faithfully as possible is perhaps closer to the usual meaning of a pilot study.

5.2.5. Nature of Pilot Inquiry

A pilot inquiry can be much broader and less focused than the ultimate data collection plan, covering both substantive and methodological issues (Yin, 1994). Effective use of time, participant issues, and researcher issues are some matters to be decided in pilot study. Janesick (1994) recognises the unpredictability of fieldwork a good deal of the time. The qualitative research must be ready to adjust schedules, to be flexible about interview times and about adding or subtracting observations or interviews.

5.2.6. Reports from Pilot Studies

One difference between the pilot reports and the actual case study reports is that the pilot reports should be explicit about the lessons learned for both research design and field procedures. The pilot reports might even contain sub-sections on these topics (Yin, 1994).

5.3. PILOT STUDY DESIGN FOR THIS RESEARCH

The nature of the research subject and the research question directed this work to be a qualitative one carried through the case studies mainly (details in chapter six). As a part of that research strategy, it was decided to conduct a pilot research study by interviewing and reviewing the relevant literature and documents with at least two contracting organisations that have management structures in place for Quality, Environment and Health and Safety. The first interview was aimed at a broader assessment of the issues identified from the literature review for integration of management systems in the construction industry and the second interview to crosscheck, consolidate and authenticate findings of the first interview. The Quality

Manager was identified to be the main contact person for the pilot assessment. Since, literature identified the Quality management system as the bedrock in majority of integration approaches. In addition, Quality is widely implemented among systems. Exploratory interviews were conducted with semi-structured formation. The next section gives the details of the lines of discussion followed in interviews.

The criteria used for selecting organisations for the pilot study were as follows:

- Organisations listed in top 50 construction contractors by turnover, operating profit and margin;
- Management structure in place for Quality, Environment and Health and Safety (preferably registered with ISO 9000 and 14000 and compatible BS 8800 or OHSAS 18001 system);
- Geographical proximity, and
- Access to the Quality Manager.

The Quality and Environmental Manger (joint position) was interviewed in the first organisation. The second interview took place in the other organisation with Quality Manager, Assistant Quality Manager, and Health and Safety Divisional Advisor (three separate positions).

5.4. OBJECTIVES OF PILOT STUDY

The main objectives for the pilot study were as follows.

1-Assessment of current state of affairs with management of Quality, Health and Safety and Environment systems:

a. Systems and standards currently is use for management of Quality, Health and Safety and Environment.
b. Scope and extent of the implementation of management systems
c. Reasons for systems implementation
d. Level of satisfaction, dissatisfaction, benefits and problems with the current management systems
e. Management structure in place for systems

2-Evaluation of progress towards integrated systems:

a. Understanding of the integration (meaning, scope, definition, terminology)
b. Advantages and disadvantages anticipated from integration
c. Anticipated problems in IMS application
d. Progress made towards IMS, if any
e. Approach adopted for IMS (TQM, PDCA, SHE, BSI etc)
f. Desirable and practical level of integration

3-The proposed IMS framework (outcome of this research project):

a. Feasibility and relevancy of the research aim, objectives and methodology
b. Desirable characteristics for the suggested IMS framework
c. Support of the organisation for the research project as a case study
d. Available material related to Quality, Health an Safety and Environment management (policy, procedures, manual, reports etc)

5.5. PROFILES OF PILOT ORGANISATIONS

ORGANISATION A

Activities	Building services engineer, Specialist consultant, Project manager, Construction manager, Main contractor, Specialist Contractor, House Builder
Turn over	454.7 million for year ending June 2000 (Building, 2001)
Position Interviewed	Quality and Environment Manager (Joint position)

ORGANISATION B

Activities	Main contractor, Specialist Contractor, Specialist Contractor- Demolition, Renovation , Specialist Contractor - Civil Works, House Builder
Turn over	349.6 million for year ending June 2000 (Building, 2001)
Position Interviewed	Quality Manager, Assistant Quality Manager, Health and Safety Divisional Advisor (three separate positions)

5.6. FINDINGS FROM PILOT STUDY

The section presents the findings from interviews conducted as the pilot study. As stated earlier, interviews were not structured as such, however, loosely followed the same lines of questions. Organisations are referred to as A and B for confidentiality.

5.6.1. Management Systems Implemented

Both organisations have set structures for the management of Quality, Health and Safety and Environment. Organisation A is registered to ISO 9001:1994 (very soon to be upgraded to ISO 9000:2000 and registered to ISO 14000:1996), and B certified to ISO 9000:2000 and ISO 14000:1996. For Health and Safety, none is certified or complies with BS 8800 or OHSAS 18001 (Organisation A though reported some discussions to register for OHSAS 18001). However, both have a management structure in place for Health and Safety (mostly built around the CDM Regulations and claimed to be same in any other major UK contractor organisation). Distinctly, Quality management system in organisation B is termed the Business Management System, covering wide areas of business including some areas of Environmental systems, but excluding Health and Safety.

5.6.2. Main Reason for Systems (Standard) Implementation

As anticipated, clients/customers is the main influence for the implementation of systems especially Quality (ISO 9000) in both organisations.

5.6.3. Level of Satisfaction or Dissatisfaction with Implemented Systems

Although Quality systems initially have been implemented to appease clients, Organisation B maintained that after fifteen years of the implementation, it has reached to a stage where there is a realisation that systems are needed and especially the up gradation to latest version of ISO 9000 has been totally management driven. The research did not find any unanimous factor described as cause of satisfaction or dissatisfaction in either organisation. As rightly said, each person in the organisation will produce a different answer to this (Organisation A). Organisation A recognised that although ISO 9000 did not bring any thing drastically new, it formalized the Quality system and brought an element of consistency into the procedures, practices and policies they already had. Introduction of Quality plans is considered a positive contribution from systems but in practice, it has proved to be difficult to succeed, except on large projects. For some projects, it has been a matter of ditto copying plans from the previous projects to fulfil the formality. Moreover, on sites, Quality management is still confused with Quality control. Consideration of Quality as a whole project life process, guided by the client requirements is missing. It is more thought in terms of the physical attributes of workmanship. However, Organisation B believed that ISO 9000:2000 is a vast improvement over the 1994 version. It is more process oriented and emphasises the continuous improvement. Nevertheless, some requirements of the system especially the document control were criticised to be over formal and strenuous. Interestingly, in terms of reducing the paperwork, IMS is not considered to be much help either, as it is believed to maintain the same documentation. There is a general consent that there is too much paperwork and many forms to be filled for the management of Quality, Health and Safety and Environment systems. There is a need to cut down this paperwork.

5.6.4. Management Structure for Systems

There is a completely separate structure for Health and Safety management in both entities. In Organisation A, Health and Safety Manager holds the key position supported by Health and Safety teams implementing and monitoring procedures across regions and sites. Whereas in Organisation B, every division has a separate Health and Safety Representative responsible for the divisional compliance to the group Health and Safety policies and procedures and reporting to group Health and Safety Advisor. For Quality and Environment, Organisation A has a common management structure. Quality and Environmental Manager is at the crucial level reporting to Technical Director. Quality Control Manager is responsible for sites working under Quality and Environment Manager. Organisation B has a separate structure for both Quality and Environment. Quality management is quite independent of the group, though buying-into the group policy. The MD in each division has the responsibility for Quality, implemented through a Quality Manager. Quality management is functional and process based and implemented through Project Manager, Contract Manager, and other functional heads. Environmental management has a sort of similar structure to Health and Safety, but more flexible. Each division has an Environmental Representative reporting to Group Environmental Advisor. In this particular division of Organisation B, Environmental Manager is following the PDCA approach for the implementation, which is based on sites instead of functions.

5.6.5. Integration at the Moment

Interestingly, both organisations have started the integration with Quality and Environmental management systems. Both are at a preliminary development and exploratory stage. One has chalked out a process manual identifying key processes as a part of integrated Quality and Environmental system. Whereas, the other has identified the common processes between Quality and Environment plans. Organisation A has kept Health and Safety away from integration to give it a separate way to keep its importance. However, it is pointed that the final decision rests on the performance of Quality and Environment integration. If that model proves successful then

Health and Safety will be considered for integration. In Organisation B, Health and Safety is simply too inflexible a system and a sensitive issue legally to be considered for integration at this point in time. A sense of commercial protectionism surrounds the issue. The Health and Safety is governed by group and is the same across the organisation. Hence, it cannot be altered or developed at the divisional level. The group Health and Safety system is rigidly enforced and is inflexible enough to be included in the more flexible mix of Quality and Environment management.

5.6.6. Case for Integration

All participants agreed that the systems for Quality, Health and Safety and Environment management have lot in common. Organisation B has identified some areas in Heath and Safety systems that overlap with Environment management. Separate complaint system for Quality and Environment was specially mentioned which realistically should be combined into one. Noticeably, Project Management Plan is considered as an important tool for integration. Suggestion is that it should bring together project Quality, Health and Safety and Environment under one umbrella. Operationally, it was pointed that at the project level, all system should be looked-at and planned together, as they all have impacts over each other. As earlier pointed, Organisation A admitted the disappointment with Quality plan implementation on specially the small projects. It was recommended to make the plan more significant and important on site by including Environment and risk register and other such issues into it. Then, proposed plan may be called the Integrated Project Management Plan (for Quality and Environment). Another reason mentioned for the integration is the overload of forms and documents on sites. By integrating, the aim is to reduce them down to one set of documents, to make life easier on projects. Organisation B believes that a complete integration is also possible with wider remit than Quality, Health and Safety and Environment; however, at the moment it is not clear how it could be achieved. There is a faith that integrated model will streamline things in its most efficient way and will be successful in construction contractors as long as it is expressed in such a way that people understand it.

5.6.7. Understanding of Integrated management systems

"Integration is to organise the organisational functions and processes in the most efficient way" defined the Quality Manager in Organisation B. The out come of the integration should be the shortest possible communication routes and the production of minimum documentation, he continues. Organisation A regards integration (for Quality and Environment) a whole process starting from the creation of an opportunity (project inception) to completion and demolition. Both systems need to go together every step in the process, recognising that the other aspects such as Health and Safety, programme implication have the effects on this process. It is admitted (Organisation B) that lot of duplication is there, and integration meant to find and combine the areas of duplication and minimise the efforts to implement systems. Because many people still perceive systems as a big burden and on sites, operators do more administrative work than the actual job. It is the view that end-user should not be filling too may and repetitive forms for Quality, Health and Safety and Environment separately.

5.6.8. Approach/Model Adopted for Integration

In fact, both organisations interviewed are in infancy in terms of integration, hence could not really elaborate the approach they are/will be adopting for integrating the systems. However, process model of ISO 9000:2000 is most favoured. Leads have been taken from this latest version of ISO 9000. Organisation A is taking guide form BSI (British Standard Institute) and has identified nine key processes based on the way the business works and the guidance from ISO 9000:2000. Although Health and Safety is not included in the model, important recognition is there in the integrated process model. The model under preparation in Organisation A has been checked and okayed for its compliance with ISO 9000 and ISO 14000 by the BSI. Organisation B similarly, taking lead from ISO 9000:2000 model and using guidance from CIRIA (2000) report on integration, has prepared a simple model for the integration of Quality and Environment project plans. However, both organisations have not practically implemented the integrated system on projects yet.

5.6.9. Anticipated Problems for Integrated management systems

It is agreed that there would be a predictable resistance from sites. Since, the system requirements are considered quite repetitive and real benefits are not seen readily. Appropriate instigation of people to see the benefits from integration may be a problem. The other opposing theme to integration raised was the difference in the scope of management systems especially in Health and Safety. Health and Safety management is legislative driven and no document can be reduced, they are must to keep for investigation purposes as evidence (organisation B). The CDM Regulations 1994 require maintenance of a separate Health and Safety plan and on that basis Heath and Safety management staff seems completely opposite to the idea of including it in any form with Integrated Project Management Plan. However, it was also pointed that the Environmental management is also driven by legislation and this should not be used as an excuse for excluding Health and

Safety management. In addition, there is a bit ambiguity or a lake of imagination to visualise the integration of systems, which follow different requirements all together, achievable.

Both organisations agreed that on sites, there is still a fire fighting approach and necessary planning is missing from the management systems implementation. As raised by Organisation B, staff on site needs to be educated for systems. They should be made aware of the benefits. So that they can appreciate the business needs for operating systems correctly. A more proactive approach is needed on sites, so much so that it comes to a point where system requirements become part of a process. Nevertheless, both organisations agreed that things have come a long way far and sites do accept a degree of document formality especially for Health and Safety but still more planning is needed for Quality and Environment. A way out may be the reduction in the paperwork for Quality and Environment management (Organisation B). However, it is essential that sites should plan for Quality, Health and Safety and Environment together and upfront for the project.

5.6.10. Desirable Characteristics for IMS

Noticeably, both organisations mentioned the preference for integration based on the EBEM (European Business Excellence Model) and a kind of comprehensive integration model. However, Organisation A described their current integration approach to be more sort of bolt-on type. It was also pointed that finance system should be included in the integrated model as it has impact over all the processes (Organisation B). Organisation A suggested the additional emphasis on the project planning process for Quality, Health and Safety and Environment. More use of case studies in the model was also suggested to convince staff of benefits of integration and as an example of best practice. However, identification of areas of duplication in the systems and their subsequent bringing together was considered the most importance factor for the success of integrated model.

One interesting suggestion came for a single construction industry specific system for management of Quality, Health and Safety and Environment (Organisation B). In support of this argument, the management of Health and Safety based on the CDM Regulations, which are the industry specific, was mentioned. Moreover, need for a paper work consistency across the industry was emphasised, suggestively possible from a single system.

5.7. EMERGING ISSUES FROM THE LITERATURE REVIEW AND PILOT STUDY

This section enlists the issues that have been identified from the analysis of the literature review and the pilot study, as follows.

1-Management Systems at Present

- Quality systems (ISO 9000) have been implemented in contractor organisations.
- Growing emphasis on the implementation of ISO 14000 is also evident.
- Most contractors are not certified to or strictly comply with BS 8800 or OHSAS 18001; however, a compatible system for Health and Safety developed around the CDM Regulations 1994 is common.
- Current management structure is vertical and separate for each system in most organisations.

- The decision to implement management systems is greatly influenced by the client pressure and the legislation requirements.
- Management systems have formalised the procedures and brought-in an element of consistency.
- Documentary requirements of systems are regarded as over-formal and strenuous.
- Site staff especially, do not comprehend systems, appreciate or even accrue the full benefits, resulting in the systems application as a formality in some cases.
- Successful project planning for management systems, demands more system education and cultural changes.
- Health and Safety is considered as a very sensitive issue.
- Still, site staff regards systems as a big burden, as too much time is wasted in filling too many repetitive forms.
- However, there is an acceptance for a degree of formality and documentation for systems on project sites.

2-Integration of Systems

- It is agreed that management systems for Quality, Health and Safety and Environment have many similarities.
- There is lot of duplication in documents and efforts in the systems application.
- No clear understanding and agreement on integration is found, each organisation is interpreting the issue on its own way.
- Contractor organisations see a strong logic behind the integration of systems.
- The current integration approaches and models are basic and varying.

- Tendency is apparent for integration of Quality and Environment to start with.
- At the moment, Health and Safety management is kept away as being a legally sensitive and inflexible issue.
- It is opined that large-scale integration is possible but no clear concept or method is available at the moment.
- Current approaches on ground for integration seem to focus on the merging of systems documentation and based on ISO 9000:2000 process model.
- Project Management Plan is regarded as most important tool for integration.
- It is considered crucial for integration that end-user should be handling a simple (integrated) set of documents on site, focussing more on the actual job.

3-Features of Integration Framework

- It is suggested that an integrated model will be successful only if produced in the way the people understand it easily.
- Risk assessment and planning for Quality, Health and Safety and Environment will be the import factors for integration.
- Predictable cultural resistance will be there for integration on sites especially.
- Creating awareness of the integration benefits would be a problem but it is also crucial for that early benefits are visible in order to gain the acceptance.
- Difference in the scope of systems especially in Health and Safety is seemed a hindrance to integration.

- Preference is visible for following the EBEM (European Business Excellence Model) for integration.
- It is emphasised to extend the integration from Quality, Health and Safety and Environment to cover finance and other systems.
- For successful integration, quick identification of the areas of duplication and their combination is regarded crucial.
- A very slim support is visible for a single management system for Quality, Health and Safety and Environment and specific to construction.

5.8. THEORY DEVELOPMENT

The literature review and the pilot study suggest that a growing number of organisations in the UK and internationally, are managing Quality and Environment issues by standard based solutions (i.e. registration to ISO 9000 and 14000). General and sector specific Health and Safety at work legislation dominate the management of Health and Safety. Nevertheless, some organisations comply with BS 8800 or OHSAS 18001 for compatibility with Quality and Environmental systems. Integration of the systems is getting attention from academics and practitioners. However, various definitions, interpretations, approaches and models are on offer for the integrated management systems (IMS). UK construction contractor organisations also correspond to the statement. Client influence and legislation requirements have been the key drivers for the systems implementation in the contractor organisations. This has resulted in a formal and superficial approach. Sites have shown dissatisfaction with systems. Now, integration is on organisations' agendas in a way to alleviate some of the problems associated with systems implementation. However, confusion and ambiguity surrounds the issue. Eventually, every organisation will have its own solution; nevertheless, obvious need is there for a broader and generic guiding framework for systems integration. This is to bring clarity and understanding to the issue of integrated management systems (IMS), identify the approach(s) that are more appropriate to contractors' requirements and suggests the structural and methodological aspects of IMS for contractor organisations.

5.9. IMPLICATIONS FOR THE PRIMARY RESEARCH

The emerging issues outlined earlier show the significance of the literature review and the pilot study. Where the preliminary research has an insight and understanding of the systems, at the same time, it has opened up many unresolved issues. Some are as follows.

- Great interest is shown in the European Business Excellence Model and a wider integration. However, it is not clear how far organisations are ready to go with the systems that are still struggling to be implemented fully.

- As research shows that a narrower document merging exercise for integration will not bring the real benefits, however, on ground, contractors seem to be aiming in that direction. Will this provide solutions to prevailing system problems?

- Health and Safety is being kept away from integration. It is a very sensitive issue and difference in its scope is regarded a hurdle for integration. What will be the solution, would integration result in some sort of compromise on Health and Safety?

- The perception of integration in contractor organisations asks for more efforts to; remove the ambiguity and clearly define the integration from construction perspective.

- Contractors' requirements for systems require more understanding in order to make a better choice from the integration approaches.

This clearly shows the need for a deeper understanding of the issues. However, the research area is relatively new and not enough is available in the literature. Hence, the research requires a flexible and very informative primary research methodology. It vindicates that a qualitative approach would be more appropriate than a quantitative methodology. Qualitative research is able to provide insight and deeper understanding of the issues, practices and problems. Research will be able to explore and provide insight on the necessary theoretical, cultural, structural and political issues associated with integration of Quality, Health and Safety and Environment in contractor organisations.

5.10. CHAPTER SUMMARY

This chapter laid a foundation for the primary research of the project. A brief introduction to the pilot studies was given in the beginning. This emphasised the importance of pilot studies in any research project. The introduction touched upon the general criteria for the selection of pilots and the broader issues to be covered. In this background, the chapter outlined the pilot study design for this research. Interviews and document reviews stood out as the apparent choice as pilot tools. It was identified early on that the research objectives would be best achieved with a qualitative methodology. The selection criterion for the pilot organisations was also given in the chapter.

Criterion was successfully met-with in finding the pilots. Then, the broader objectives set out for the study followed. These objectives reflect the analysis of the literature review. For relating the pilot study findings with organisational background, the profile of pilot organisations was presented. Organisations selected for the pilot studies were not identified with the names but with the fictitious names of A and B for the confidentiality reasons. It was followed by the all-important section of the findings from the pilot studies. These findings are critical for the research, as they authenticated, consolidated the issues and unmasked those that did not show in the literature review. Based on these findings the chapter then outlined the emerging issues from the research (literature review and pilot study). The list will be greatly helpful in defining the lines of inquiry for the primary research. The implications of the pilot studies on the primary research were provided to compare the deviations that study has generated from the earlier associations. The section consolidated the views on the nature of the research work and identified the themes that need a deeper understanding in the primary research. The next section presents in detail the research methodology to be followed for this research work.

Chapter 6

Research Methodology

6.1. AIMS OF THE CHAPTER

The chapter aims are to describe, explain and justify the methodological process adopted for this thesis research. The research methodology has been briefly introduced in chapter 1 and this chapter will cover it in more detail. The chapter begins with the description of the methodological framework of the research. It then provides the logic and rationale for the selected approach. It also explains how the methodology fits in with the research objectives presented in the chapter one. The discussion then moves to explore the research techniques used. A critical analysis of the research design adopted is also included.

6.2. RESEARCH

It may look over-simplistic to start with the definition of research but it has been included purposefully to keep sight on the fundamentals behind any research project and as a aid in designing the methodological framework in line with the aims of the project.

The oxford dictionary defines research as:

> *"The systematic investigation into and study of material, sources, etc in order to establish facts and reach new conclusions." or "an endeavour to discover new or collate old fact etc. by the scientific study of a subject or by a course of a critical investigation."*

Alternatively, Burns (2000) takes research as a systematic investigation to find answers to a problem. More elaborately, as suggested by Blaxter *et al.* (1996), research is a planned, cautious, systematic and reliable ways of finding out or deepening understanding. For the social scientists or researcher in applied fields, research is a process of trying to gain a better understanding of the complexities of human experience and, in some genres of research, to take action based on that understanding. Through systematic and sometimes collaborative strategies, the researcher gathers information about actions and interactions, reflects on their meaning, evaluates, arrives at conclusions and eventually puts forward an interpretation, most frequently in written form (Marshall & Rossman, 1999).

6.2.1. Types of the Research

Research can be conducted in many ways. Blaxter *et al.* (1996) maintains that even a brief review of writings on research will uncover a lengthy and potentially baffling list of types of research.

Types of research include for example:

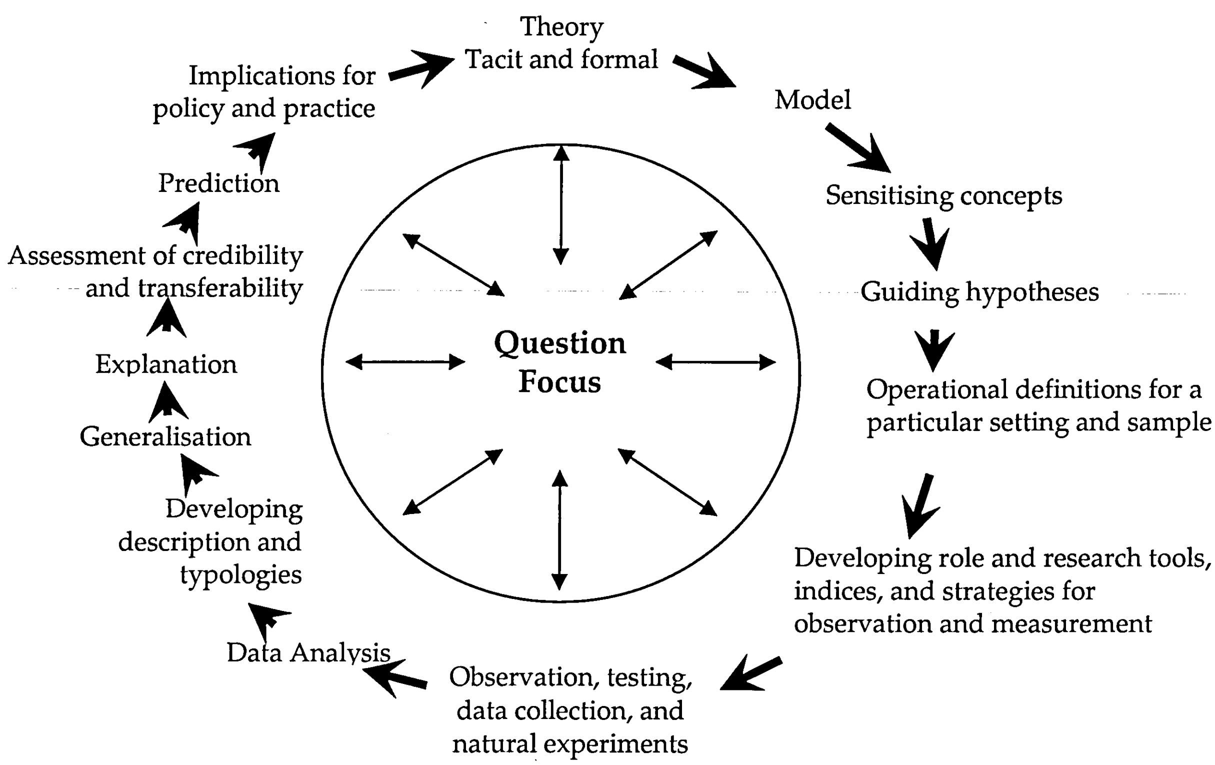
- Pure, applied and strategic research
- Descriptive, explanatory and evaluation research
- Market and academic research
- Exploratory, testing-out and problem solving research
- Covert, adversarial and collaborative research
- Basic, applied, instrumental and action research

Essentially, all the different kinds and views of research share the same characteristics given in the definitions earlier (Blaxter et al., 1996).

6.2.2. Research Process

There is no hard and fast process model available for every research project to follow. However, figure 6.1 provides a schematic description of the dialectic relationship between theory, practice, research question, and personal experience. Called as the cycle of inquiry; it suggests that a research project may begin at any point in this complex process.

Figure 6.1, Cycle of Inquiry



Source: Marshall, C. and Rossman, G. B. (1999)

6.2.3. Research Paradigms

A paradigm is a pattern underlying a theory or a viewpoint. Guba and Lincoln (1994) view paradigms as a set of basic beliefs (or metaphysics) that deal with ultimates or first principles. It represents a worldwide view that defines, for its holder, the nature of the world, the individual's place in it, and the range of possible relationships to that world and its parts, as for example cosmologies and theologies do. The beliefs are basic in the sense that they must be accepted simply on faith (however well argued); there is no way to establish their ultimate truthfulness. If there were, the philosophical debates reflected in these pages would have been resolved millennia ago.

6.3. METHODOLOGICAL FRAMEWORK ADOPTED IN THE THESIS

Nachmias & Nachmias (1996) view scientific methodology as a system of explicit rules and procedures upon which research is based and against which claims for knowledge are evaluated. This system is neither unchangeable nor infallible. Rather, the rules and procedures are constantly being improved; scientist looks for new means of observation, analysis, logical inferences, and generalisation. Methodology provides rules for (Nachmias and Nachmias, 1996):

- Communication
- Reasoning
- Inter-subjectivity

For this research work, aims and objectives presented in chapter one indicate that the study revolves around exploring and understanding integrated management systems and its application in contacting organisations. It is therefore, an exploratory research study with principal aim to develop a framework for construction contractor organisations for implementation of integrated management systems (IMS) for Quality, Heath and Safety and Environment management systems. The research aims to provide a foundation to the development of theory, for future qualitative and quantitative research. The methodology adopted satisfies the need for exploration, insight, depth and knowledge. Given the nature of the research project, inductive approach has been identified as appropriate for the research, with mainly qualitative methodology (Case studies as a main method for data collection). This will be further explained and justified in subsequent sections.

6.4. RESEARCH QUESTION

Research questions, in fact, define the methodological foundation of any research project. Morse (1994) emphasises that the wording of the research question determines the focus and scope of the study. Designing a good research question is considered as the most difficult task of a researcher (Stake, 1995). As Blaxter *et al.* (1996) state, when one gets research question right, it then should suggest not just the field for study, but also the methods for carrying out the research and the kind of analysis required. If not, it is probably pitched at too general a level. Research questions are like objectives, rather than aims: they should contain within themselves the means for assessing their achievement.

A research issue is an intellectual stimulus calling for a response in the form of scientific inquiry. However, as Nachmias and Nachmias (1996) explain, not all intellectual stimuli can be studied empirically, and not all human behaviour is guided by scientific knowledge. In fact, the basic assumptions of science cannot be researched empirically, they are neither proven or nor provable. In general, problems that cannot be empirically grounded (that is, identified in observable behaviour) or that are concerned with subjective preferences, beliefs, values, or tastes are not amenable to empirical research. Hence, structure of research enquiry is the corner stone for any research project.

The main research question for this thesis project, after carrying out the critical review of the literature, has been identified as follow:

> *"How can the contractor organisations best streamline the management systems for Quality, Health and Safety and Environment in adopting the integrated management systems (IMS) approach?"*

Essentially, the research is about the understanding of integration from construction-contracting organisations perspective. Further to this, the research will not only describe intentions, but also will also evaluate in-depth and analyse the IMS for the development of an implementation framework.

Following sub-topics have also been identified to elaborate further the research question:

- Characteristics of multi-layered contracting organisations;
- Management issues (for Quality, Health and Safety and Environment), affecting the organisations;
- What organisations have actually done in response to those issues;
- The attitudes and motivations, which underline and explain these responses.

Marshall and Rossman (1999) point out the need of flexibility in the research questions, so that data gathering can respond to increasingly refined research questions, especially in the qualitative approach, which is uniquely suited to uncovering the unexpected and exploring new avenues. However, it should be sufficiently clear enough to be evaluated for practicality; on the other hand, it should reserve the flexibility that is the hallmark of qualitative methods. This suggests that the research question should be general enough to permit exploration but focused enough to delimit the study. This is not an easy task. The type of the research proposal put forward for this thesis dictated the choice of research methodology i.e. a qualitative approach. However, it has been endeavoured to make the research question focused enough to make it feasible and manageable for the restricted research remit and resources.

6.5. FUNDAMENTAL RESEARCH CONCEPTS

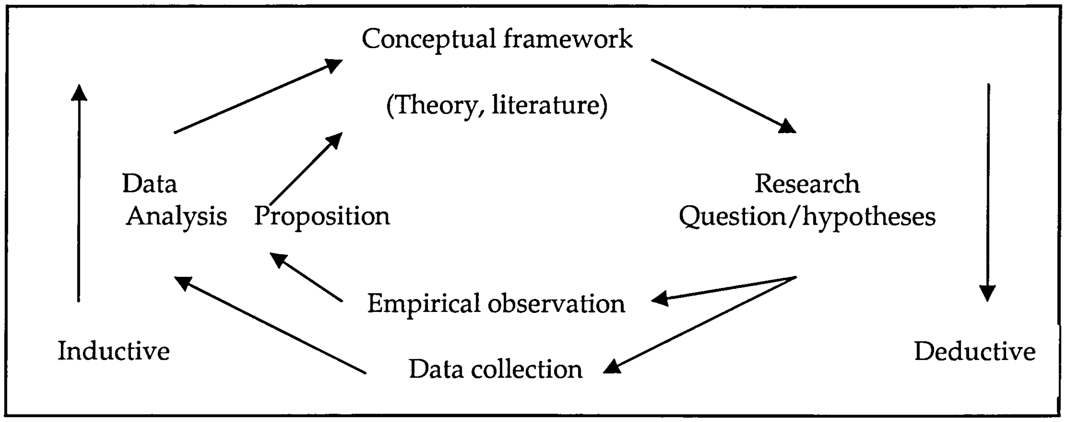
The literature indicates two main schools of thought on basic research concepts:

a) Positivism or scientific approach leading to deductive research theory and

b) Naturalism or phenomenological approach leading to inductive research theory

Bonoma (1985) credits this categorisation, to fourteen classic case studies presented by Hippocrates some 2300 years ago resulting in the splitting of science along two divergent paths of knowledge. A deductive approach involves the testing of already established ideas, theories and hypotheses using data collected specifically for this purpose. Whereas, an inductive approach involves deriving ideas and opinions directly from research data to enhance understanding of an issue or situation. Typically, the inductive approach involves a qualitative methodology and deductive approach utilises a quantitative methodology. Both qualitative and quantitative approaches are explained detail in subsequent sections. Figure 6.2 elaborates the difference between two concepts in schematically.

Figure 6.2, Representation of Research process (inductive verses Deductive)



Source: Blaxter et al., 1996 p8, original source (Rudestam and Newton (1992)

A key element of positivism as elaborated by Johnson & Duberley, (2000) is the exclusion of the metaphysical from the warranted knowledge. The theme can be traced from the pre-Enlightenment philosophers through to the positive logicalism positivism of twentieth century. While it originated in demands to liberate science from the constraints of theological dogmatism, it was interpreted as excluding the intangible and the subjective or abstract from of legitimate scientific activity, assumed to be empirically unobservable. On the contrary, inductive research starts with real world data and categories, concepts, patterns, models and eventually, theories emerge from this input (Gummesson, 2000).

It is a fact that research has followed the traditional scientific method. Burns (2000) indicates to the countless generations of scientists who using scientific inquiry have collectively built a foundation of premises and beliefs, including an assumption of the validity of the utility of empiricism.

Uncritical acceptance of this approach had led the point where measurement and control have been seen as the central locus of investigative endeavours.

However, since the 1960s, a strong move towards a more naturalistic and subjective approach has left social science research divided between two competing methods. Johnson & Duberley, (2000) maintain that positivism's rejection of the meta-physical immediately runs into trouble because it is self-contradictory. It rejects as meaningless the abstract, metaphysical knowledge of subject-object relationships on which any epistemology, including positivism's own, is ultimately grounded.

Gummesson (2000) however, suggests that in practice, only the starting point of research separates deductive and inductive research---but this is a very significant distinction. After the initial stages, all type or research becomes an iteration between the deductive and inductive called as "abductive research".

6.5.1. Strength of the Scientific Approach

The main strength lies in the precision and control. Burns (2000) maintains that control is achieved through the sampling and design; precision through quantitative and reliable measurement. Another strength is that experimentation leads to statements about causation, since the systematic manipulation of variables have been eliminated or controlled. Furthermore, hypotheses are tested through a deductive approach and the use of quantitative data permits statistical analysis. In total, the method provides answers which have a much firmer basis than the lay-person's common sense or intuition or opinion.

6.5.2. Limitations of the Scientific Approach

Human beings are far more complex than the inert matter that is studied in physical sciences. Burns (2000) explains that this arises because humans are not only acted on by a plethora of environmental forces, but can interpret and respond to these forces in an active way.

Some other factors that limit the scientific approach are as follows (Burn, 2000):

- The educational or social science research cannot operate in the sort of controlled environment available to the physical scientist with formal laboratory techniques and rigid control of conditions.

- Many are concerned that the scientific quantitative approach denigrates human individuality and ability to think. Its mechanistic ethos tends to exclude notions of freedom, choice and moral responsibility. Quantification can become an end in itself rather than a humane endeavour seeking to explore the human condition. It fails to take account of people's unique ability to interpret their experiences, construct their own meanings and act on these.

- It leads to the assumption that facts are true and the same for all people all the time.

It is a fact that a scientific approach cannot be totally objective, since subjectivity it is involved in the very choice of a problem as worthy of investigation and in the interpretation of the results.

6.6. COMPETING METHODOLOGICAL APPROACHES

As stated earlier, the scientific approach is usually associated with quantitative methodology, whereas the naturalistic or phenomenon with qualitative methodology. Here, both approaches are briefly explained and compared. This will explain and substantiate the choice of the approach for this research.

Historically, there has been a heavy emphasis on quantification in science. Guba and Lincoln (1994) maintain that sciences, such as physics and chemistry that lend themselves well to quantification are generally known as hard. Where as less quantifiable such as biology and particularly the social sciences, are referred to as soft, less with pejorative intent than to signal their (putative) imprecision and lack of dependability. Quantitative approach some times gets more respect, reflecting the tendency to regard science as related to numbers and implying precision (Berg, 1998). Quantitative research is regarded as "objective" in nature.

Naoum (1998) defines quantitative research as:

> *"An inquiry into a social or human problem, based on testing a hypothesis or a theory composed of variables, measured with numbers, and analysed with statistical procedures, in order to determine whether the hypothesis or the theory holds true."*

Generally, it employs strategies like surveys, structured interviews and other modes of research resulting in statistically significant contributions. Quantitative approach is selected under the following circumstances when (Naoum, 1998):

- Facts about a concept, a question or an attribute are required, and
- Collection of factual evidence and study of the relationship between these facts is desired in order to test a particular theory or hypothesis.

Alternatively, qualitative research is considered "subjective" in nature. Nachmias and Nachmias (1996) hold that qualitative research attempts to understand behaviour and institutions by analysing values, rituals, symbols, beliefs and emotions. The approach emphasises meanings, experiences (often verbally described), description and so on (Naoum, 1998). Qualitative methods are stereotyped with open interviews, focus groups, case studies etc. However, the contrast between quantitative and qualitative evidence does not distinguish the various research strategies. Yin (1994) points out to some experiments (such as studies of psychological perceptions) and some survey questions that rely on qualitative, and not quantitative, evidence. Likewise, historical research can include enormous amounts of quantitative evidence.

Nevertheless, for some time, as identified by Alvesson and Deetz (2000), considerable dissatisfaction has existed with conventional approaches to social research. Much conventional research was dominated by positivistic or neo-positivistic assumptions and methods emphasizing ideals such as objectivity, neutrality, scientific procedure, technique, quantification, replicability, generalisation, and discovery of laws. The inadequacies of the dominant quantitative, hypothesis-testing approach have led to an increasing use of qualitative method (Denzin and Lincoln, 1994). In addition, qualitative methods allow flexibility. Thus, the responsiveness of the individuals and organizations conceptualisation of themselves is also related to a willingness to formulate new hypothesis and alter old ones as the research progresses in the light of emerging insights (Cassell and Symon, 1994). However, still the popularity, status and use of qualitative methods vary among different social and behavioural sciences.

6.6.1. Differences between Quantitative and Qualitative Research

Table 6.1 compares the differences between two modes of research from different perspectives and table 6.2 Compares further the differences between two approaches. However, as suggested by Robson and Foster (1989), it is a mistake, to present the two methodologies, quantitative and qualitative as alternative procedures. Clearly, there is a need for both methodologies.

Table 6.1, Some Differences between Quantitative and Qualitative Research

	Quantitative	**Qualitative**
1-Role	Fact-finding based on evidence or records	Attitude measurement based on opinions, views and perceptions measurement
2-Relationship between researcher and subject	Distant	Close
3-Scope of findings	Nomothetic	Idiographic
4-Relationship between theory/concepts and research	Testing/confirmation	Emergent / development
5-Nature of data	Hard and reliable	Rich and deep

Source: Naoum, 1998

Table 6.2, Comparison of Qualitative and Quantitative Methods

Qualitative	Quantitative
Assumptions	
Reality socially constructed	Facts and data have an objective reality
Variables Complex and inter-woven, difficult to measure	Variables can be measured and identified
Events viewed from informant's perspective	Events viewed from outsider's perspective
Dynamic Quality to life	Static reality to life
Purpose	
Interpretation	Prediction
Contextualisation	Generalisation
Understanding the perspectives of others	Casual explanation
Method	
Data collection using participant observation, unstructured interviews	Testing and measuring
Concludes with hypothesis and grounded theory	Commences with hypothesis and theory
Emergence and portrayal	Manipulation and control
Inductive and naturalistic	Deductive and experimental
Data analysis by themes from informant's description	Statistical analysis
Data reported in language of informant's	Statistical reporting
Descriptive write-up	Abstract impersonal write-up
Role of researcher	
Researcher is instrument	Researcher applies formal instruments
Personal involvement	Detachment
Empathic understanding	Objective

Source: Burns, 2000

6.6.2. Approach Adopted for this Research

The research work for this project is focused on organisations and their processes, cultures and strategies. Clearly, it requires a deeper understanding of the intentions underlying the action. As explained above, for this type of the research inquiry, the qualitative approach makes more sense. It is also evident in view of Cassell and Symon (1994) that qualitative methods are more appropriate to the kind of research questions focusing on organisational processes, as well as outcomes, and trying to understand both individual and group experiences of work. Marshall and Rossman (1999) and Gummesson (2000) agree that qualitative methodology (and case studies) provide powerful tools for research in management subjects, including general management, organisation, corporate strategy, and more. Moreover, the research question for this thesis will be best addressed in a natural setting, using exploratory approaches. Marshall and Rossman (1999) emphasise the strength of qualitative methodology in such studies for the following types or research:

- Research that delves in depth into complexities and processes;
- Research on little-known phenomena or innovative systems;
- Research that seeks to explore where and why policy and local knowledge and practice are at odds;
- Research on informal and unstructured linkages and processes in organisations;
- Research on real, as opposed to stated, organisational goals;
- Research that cannot be done experimentally for practical or ethical reasons;
- Research for which relevant variables have yet to be identified.

6.6.3. Triangulation

A commonly used technique to improve the research validity is triangulation. Burns (2000) defines triangulation as:

> *"The use of two or more methods of data collection in the study of some aspects of human behaviour."*

Triangular techniques explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint and/or using a variety of methods, even combining qualitative and quantitative methods in some cases. The essence of triangulation is to minimise the degree of specificity of certain methods to particular bodies of knowledge, two or more methods of data collection can be used to test hypotheses and measure variables (Nachmias & Nachmias, 1994). Exclusive reliance on one method may bias or distort the investigation. Burns (2000) explains that triangulation in interpretive research will naturally produce different sets of data. More the methods contrast with each other, the greater the confidence about the finding.

Denzin and Lincoln (1998) enlist five types of triangulation:

- *Data Triangulation*: use of variety of data sources in a study;
- *Investigative Triangulation*: use of several different researchers or evaluators;
- *Theory Triangulation*: use of multiple perspectives to interpret a single set of data;
- *Methodological Triangulation*: use of multiple methods to study a single problem;
- *Interdisciplinary Triangulation*: use of multiple disciplines input into research inquiry

In qualitative analysis especially, Burns (2000) maintains that triangulation contributes to verification and validation by checking out the consistency of, findings generated by different data-collection methods and different data sources within the same method.

6.7. QUALITATIVE RESEARCH FRAMEWORK

Qualitative research has a long and distinguished history in the human research disciplines. Denzin and Lincoln (1998) attribute the work of "Chicago School" in the 1920s and 1930s in establishing the importance of qualitative research. During the late twenties, the qualitative approach attracted attention when it became apparent that the results from the conventional quantitative methods often yielded erroneous results (Robson & Foster, 1989). Alvesson and Deetz (2000) maintain that much of this has come about due to the weakness of quantitative work in term of the thinness of date, the control orientation often displayed, and issues surrounding the relevance of findings. Conventional method also fostered a naive faith in the substantiality and ultimacy of facts. Burns (2000) elaborates that in that era a more diffuse recognition of the implicit relationship between knowledge and human interests led to the advocacy of an alternative, more humanistic, investigative paradigm. The paradigm is based on the concept of *verstehen*, a form of subjective understanding. In current research, movements towards humanness are based on recognition of the need for critical inquiry and meaning in educational action. The traditional emphasis on 'factual' knowledge and singular truths has become obsolete as the avenues for knowledge generation and culture interchange increase. The qualitative researcher attempts to gather evidence that will reveal qualities of life, reflecting the 'multiple realities of specific settings from participants' perspectives.

6.7.1. Qualitative Research Process

Three interconnected, generic activities define the qualitative research process. Denzin and Lincoln (1998) maintain that they go by a variety of different labels, including theory, method and analysis and ontology, epistemology, and methodology. The gendered, multiculturally situated researcher approaches the world with a set of ideas, a framework (theory, ontology) that specifies a set of questions (epistemology) that are then examined (methodology, analysis) in specific way. That is, empirical materials bearing on the question are collected, analysed and written about. The process is elaborated further in Table 6.3.

Table 6.3, Qualitative Research Process

Phase1: The researcher as a multicultural subject

history and research traditions
conceptions for self and the other
ethics and politics of research

Phase 2: Theoretical Paradigms and Perspectives

positivism, post positivism
constructivism
feminism (s)
ethnic model
Marxist models
cultural studies model

Phase 3: Research Studies

study design
case study
ethnographic, participant observation
phenomenology, ethno methodology
grounded theory
biographical method
historical method
action and applied research
clinical research

Phase 4: Methods of Collection and Analysis

interviewing
observing
artefacts, documents, and records
visual methods
personal experiences methods
data management methods
computer assisted analysis
textual analysis

Phase 5: The Art of Interpretation and Presentation

criteria for judging adequacy
the art and politics of interpretation
writing as interpretation
policy analysis
evaluation traditions
applied research

Source: Denzin and Lincoln, 1998

6.7.2. Strength of Qualitative Approach

Qualitative studies may pull up unexpected and striking perspectives on the subject matter. (Nachmias and Nachmias, 1996) explains that qualitative research moves in the opposite direction of quantitative research, using analytic induction. The research formulates hypotheses based on the data collected in the field, test the hypotheses and attempt to develop theory. The theory developed is called *grounded theory* because it arises out of and is directly relevant to the particular setting under study. Moreover, as Burns (2000) maintains, unlike many of the traditional, narrower approaches, the qualitative mode of inquiry is characterised by methodological eclecticism, a hypothesis-free orientation and an implicit acceptance of the natural scheme of things. Because of the close association with participants and activities, research gains an insider's view of the field. This proximity often allows to see (and document) the qualities of social interaction too often missed by the scientific, more positivistic inquiries. Table 6.4 enlists some characteristics of qualitative research.

Table 6.4, Characteristics of Qualitative Research

Qualitative research • Takes place in the natural world • Used multiple methods that are interactive and humanistic • Is emergent rather than tightly prefigured • Is fundamentally interpretative
The qualitative researcher • Views social phenomenon holistically • Systematically reflects on who she is in the inquiry • Is sensitive to her personal biography and how it shapes the study • Used complex reasoning that is multifaceted and iterative

Source: Rossman and Rallis (1998, p. p) (Marshal and Rossman, 1999)

6.7.3. Critique on Qualitative Methodology and its Limitations

Qualitative research is heavily criticised for its lack of objectivity i.e. it is a subjective approach (Robson and Foster, 1989). The problem of adequate validity and reliability is a major criticism placed by quantitative researchers on qualitative methods. Denzin and Lincoln (1998) attribute the resistance to qualitative research to the politics embedded in this field of discourse. Qualitative researchers are called journalists, or soft scientists and their work unscientific or only exploratory or entirely personal and full of bias. The resistance reflects an uneasy awareness that the traditions of qualitative research commit the researcher to a critique of the positivist project.

Burns (2000) maintains that because of the subjective nature of qualitative data and its origin in single contexts, it is difficult to apply conventional standards of reliability and validity. Contexts, situations, events, conditions, and interactions cannot be replicated to any extent nor can generalisations be made to a wider context then the one studied with any confidence. Those who dismiss qualitative research for its lack of objectivity have failed to appreciate its major, compensating strengths. These include its ability to dig deep into the research area to provide unique insights, so contributing substantially to knowledge through the development of theory (Robson and Foster, 1989). In addition, as Gummesson (2000) states, qualitative research is frequently assessed in terms of a positivistic deductive paradigm, rather than an inductive paradigm. The sustainability of this is fairly obvious, the two approaches differ fundamentally in their philosophies, aims and abilities, qualitative research is not about providing statistical evidence for its findings, it is about providing insight and depth. Qualitative research is typically an iterative rather than a linear process. It is often involves a researcher moving back and forth between sources of data and ongoing data analysis (Naoum 1998).

6.7.4. Grounded Theory

As stated earlier, grounded theory is a general methodology for developing theory that is grounded in data systematically gathered and analysed. (Denzin and Lincoln, 1998) explain that the process of developing theory starts during actual research and it does this through continuous interplay between analysis and data collection. A central feature of this analytic approach is a general method of (constant) comparative analysis (Glaser & Strauss, 1967), hence the approach is often referred as the constant comparative method.

The researcher must approach the field with an open mind to ensure that their ultimate theory is grounded. Preconceived ideas and rigid hypotheses may influence the observations recorded for analysis, which can compromise the resultant theory. It is an analytic induction consisting of finding and delineating relationships between categories of observations. The goal in developing grounded theory is to produce a set of propositions that explain the totality of the phenomenon. Research makes use of observations and quotations from members of the group under study to support theories. In some cases, grounded theory can be used to develop empirically testable hypotheses amenable to statistical analysis (Nachmias and Nachmias, 1996).

6.8. STRATEGIES OF INQUIRY IN QUALITATIVE RESEARCH

The strategy of inquiry comprises the skills, assumptions, and practices used by the researcher when moving from a paradigm and a research design to the collection of empirical materials. Strategies of inquiries connect researcher to specific approaches and methods for collecting and analysing empirical material.

Denzin and Lincoln (1994) list some of the qualitative strategies as follows:

- Case study
- Ethnography and Participant Observation
- Phenomenology, Ethnomethodology and interpretive Practice
- Grounded Theory
- Biographical Method
- Historical Method
- Applied and Action Research
- Clinical Models

Alternatively, Marshall and Rossman, (1999) group it in core and secondary methods. Core methods consist: (a) participation in the setting, (b) direct observation, (c) in-depth interviewing, and (d) analysing documents and material culture. Whereas the secondary or specialised methods include life histories and narrative inquiry, films, videos, and photographs, kinesics, proxemics, unobtrusive measures, questionnaires and surveys, projective techniques and psychological techniques. A useful research design can use different research strategies in different phases of a research project (Cassell and Symon, 1994). Table6.5 gives a useful comparison between different qualitative research strategies.

However, as discussed earlier, the research strategy is determined by the nature of the research question. As Denzin and Lincoln (1998) affirms, research strategies are merely tools; it is the researcher's responsibility to understand the variety available and the different purposes of each strategy, to appreciate in advance the ramifications for selecting one method over other and to become astute in the selection of one method over another. Each qualitative strategy offers a particular and unique perspective that illuminates certain aspects of reality more easily than others illuminate and produces a type of results more suited for some applications than others produce. For this research work case studies was found to be appropriate as a main research method. Case studies are elaborated further in subsequent chapters.

Table 6.5, Comparison of the Major Types of Qualitative Strategies

Type of research Question	Strategy	Paradigm	Method	Other data sources
Meaning questions--eliciting the essence of experience	phenomenology	philosophy (phenomenology)	audio-taped conversations written anecdotes of personal experiences	phenomenological literature; philosophical reflections; poetry; art
Descriptive questions---of values, beliefs, practices of cultural groups	ethnography	ethnography (culture)	unstructured interviews; participant observation; field notes	documents; records; photography ; maps; généalogies; social network diagrammes
'Process' questions--experiences over time or change, may have stages or phases	grounded theory	sociology (symbolic interactionism)	interviews (tape recorded)	participants observation; memoing; diary
Questions regarding verbal interaction and dialogue	ethnomethodology discourse analysis	semiotics	dialogue (audio/video recording)	observation; field notes
Behavioural questions macro macro	 participant observation qualitative ethology	 anthropology zoology	 observation; field notes observation	 interviews; photography videotape; note taking

(Source: Denzin and Lincoln, 1998)

6.9. CASE STUDIES

Case studies research is not new. Burns (2000) point out to significant cases central to the world of medicine and law, and cases have long been included in the disciplines of anthropology, psychology, political science, social work and management. Case studies are increasingly being used a research tool and as a research strategy (Hakim, 1987, Gummesson, 2000). Their use in many situations, include (Yin, 1994):

- Policy, political science, and public administration research
- Community psychology and sociology
- Organisational and management studies
- City and regional planning research
- Business administration, management science, and social work

Hakim (1987) regards the case studies as the most flexible of all research designs. When used in an intellectually rigorous manner to achieve experimental isolation of selected social factors, they offer the strength of experimental research within natural settings. In addition, case studies are remarkably hard (Yin, 1994) though traditionally considered "soft" research. Paradoxically, the softer a research strategy, the harder it is to do. The case studies are the social science equivalent of the spotlight or the microscope, its value depends crucially on how well the study is focused.

Yin (1994) defines case study in two ways:

> *"A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident."*
>
> *and*

> *'The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion and another result benefit from the prior development of theoretical propositions to guide data collection and analysis.''*

The case studies typically involves the observation of an individual unit, e.g. a student, a delinquent clique, a family group, a class, a school, a community, an event or even an entire culture. Burns (2000) maintains that they should focus on a bounded subject/unit that is either very representative or extremely atypical. Case study research is a detailed investigation with a view to providing an analysis of the context and processes involved in the phenomenon under study (Cassell and Symon, 1994). A case study is not necessarily identical to naturalistic inquiry and it can be either quantitative or qualitative or even a combination or both. However, Burns (2000) states that with the restrictions for statistical inference most case studies lie within the realm of qualitative methodology. Moreover, a wide range of information-gathering techniques can be used in case studies (Gummesson, 2000).

The selection for research method strategy depends on three conditions as Yin (1994) suggests:

(a) Type of research question posed,
(b) Extent of control an investigator has over actual behavioural events, and
(c) Degree of focus on contemporary as opposed to historical events.

Table 6.6 displays these three conditions and shows how each is related to five major research strategies.

Table 6.6, Research Strategy Selection

STRATEGY	FORM OF RESEARCH QUESTION	REQUIRES CONTROL OVER BEHAVIOURAL EVENTS	FOCUSES ON CONTEMPORARY EVENTS
Experiments	how, why	yes	yes
Survey	who, what, where, how many, how much	no	yes
Archival Analysis	who, what, where, how many, how much	no	yes/no
History	how, why	no	no
Case Study	how, why	no	yes

Source: Yin, R.K. (1994)

Burns (2000) agreeing with above adds that case study allows an investigation to retain the holistic and meaningful characteristics of real life events. In case studies, the focus of attention is on the case in its idiosyncratic complexity, not on the whole population of cases. It is not something to be represented by an array of scores but to find out what goes on within that complex bounded system.

Case study methodology is an under-utilized research strategy (Cassell and Symon, 1994). It is meaningful and rich compared with the sometimes dustbowl empiricism of quantitative techniques. It can easily serve as the breeding ground for insights and hypotheses to pursue in subsequent studies (Berg, 1998).

6.9.1. Key Features of the Case Studies Method

The case study is an in-depth investigation. It accordingly utilises different methods to collect various kinds of information and to make observations (Hamel et al. 1993). The case study thus considers materials of different origins, which are produced by different types of knowledge. Nonetheless, this wide variety presents analytical problems. Case study research can include both single and multiple case studies. Though it has been tried to delineate sharply between these two approaches (using such terms as the comparative case method as a distinctive form of multiple-case studies) single and multiple case studies are in reality but two variants of case study designs (Hamel et al., 1993).

In case studies, major conceptual responsibilities of researcher are as follows: (Stake, 1994, Denzin and Lincoln, 1994):

- Bounding the case, conceptualising the object of the study
- Selecting phenomena, themes or issues--that is, the research question
- Seeking patterns of data to develop the issues
- Triangulating key observations and bases for interpretation
- Selecting alternative interpretations to pursue
- Developing assertions or generalisations about the case

Initial focus of the case study may be very broad and open-ended. However, as Cassell and Symon (1994) explain some structure is needed to avoid the twin dangers of being overwhelmed by data and being drawn into narrative rather than theory building. The theoretical framework at the beginning may not be same one that survives to the end. Theory building is the key to case study analysis but to do this there has to be theory to examine, contest, find, supporting or conflicting evidence for. Even the most open-ended approach to theory building--grounded theory (Glaser and Strauss, 1967) argues for an initial framework, which is then tested against the data, gained in the study.

In case studies, there are four main components to the research design (Burns, 2000):

1-Intitial case study question: It must be clarified and stated succinctly before moving on. Without at least one initial question, no start can be made.

2-Study proposition: each proposition directs attention at something that should be examined within the scope of the study.

3-Unit of analysis: It is concerned with defining what the case study really is. The actual context, person, or event needs stating.

4-linking data to proposition and criteria for interpreting findings: This component is least well developed and relates to the data analysis step.

6.9.2. Sampling

Non-probability sampling is more often applied in case study. Burns (2000) states the logic that in probability sampling probability of a population element can be specified to make estimates of the representatives of the sample, and generalise the result back to the population. In non-probability sampling, there is no way of estimating the probability of being included, there is no guarantee that every element has had an equal chance of being included, or that the case is representative for some population. The usual form of non-probability sampling is termed purposive, purposeful or criterion-based sampling, that is, a case is selected because it serves the real purpose and objectives of the research for discovering, gaining insight and understanding into a particularly chosen phenomenon. This sort of sampling is based on defining the criteria or standards necessary for a unit to be chosen as the case. A blue print of attributes is constructed and the research locates a unit that matches the blue print of recipe. As the research learns the roles and relationships among participating unit, appropriate informants may be identified (Denzin and Lincoln, 1998).

6.9.3. Objectivity

Objectivity is a somewhat elusive term. For some researchers it involves the creation of analytic strategies in an almost sterile environment. Often, qualitative research of any type is viewed as suspect when questions of objectivity area asked. However, objectivity is closely linked with reproducibility (replication). It is often argued that case studies are lacking in rigour and reliability and that they do not address the issues of generalisability, which can be so effectively tackled by quantitative methods. However, Cassell and Symon (1994) maintain that this is totally outmoded. There is nothing about a method per se which makes it weak or strong. The argument depends on two factors: a) the relationship between theory and method and b), the way researcher attends to the potential weaknesses of the method. Burn (2000) identifies that bias can also enter into the conduct of experiments, and in the designing of questionnaires to an unknown degree too. In all research the interpretation of collected information is problematic, but especially so with the case studies. content analysis will often be involved to convert qualitative data into quantitative, but in so doing the richness, uniqueness and contexuality of case study data are lost.

6.9.4. Generalisation

It is argued that case studies provide little evidence for scientific generalisation (Stake, 1995). However, Burns (2000) points out that a feature of the case study critic is the assumption that generalising theory is the only worthwhile goal of a research. In fact, scientific facts are rarely based on one experiment, but on replications that produce consistent results. In addition, as Cassell and Symon, 1994) suggest generalising data may mean slightly different things in qualitative and qualitative research in technical terms, although be very similar in epistemological terms. Generalisation from case studies can be difficult however; the same is true for quantitative studies. Just because there are established techniques for generalising does not make it easier where there is heterogeneity, and where the process have not been elucidated. This is where case studies can be useful.

The case studies like experiments are general sample to theoretical propositions, no to statistical populations, and the goal is to expand theoretical propositions, and not to undertake statistical generalisation. Yin (1994) explain that it is because cases are not "sampling units" and should not be chosen for this reason. Rather, individual case studies are to be selected as a laboratory investigator selects the topic of a new experiment. However, when case studies are properly undertaken, they should not only fit the special individual, group, or event studied, but generally provide understanding about similar individual, group or events (Berg, 1998). The case studies should be aimed toward analytic generalisation. Yin (1994) suggest to avoid thinking in such confusing terms as "the sample of cases" or "the small sample size of cases" as if a single case study were like a single respondent in a survey or a single subject in an experiment.

In fact, the value of the case study is its uniqueness; consequently, reliability in the traditional sense or replicability may be pointless here (Denzin and Lincoln, 1998).

6.10. RESEARCH DESIGN OF THE PROJECT

The research design is the blueprint that enables one to come up with solutions to the problems (Nachmias and Nachmias, 1996). It is to a guide to the process of collecting, analysing and interpreting observations. It is a logical model of proof that allows drawing inferences concerning casual relations among the variable under investigation. The research design also defines the domain of generalisability, that is, whether the obtained interpretations can be generalised to a larger population or to different situations.

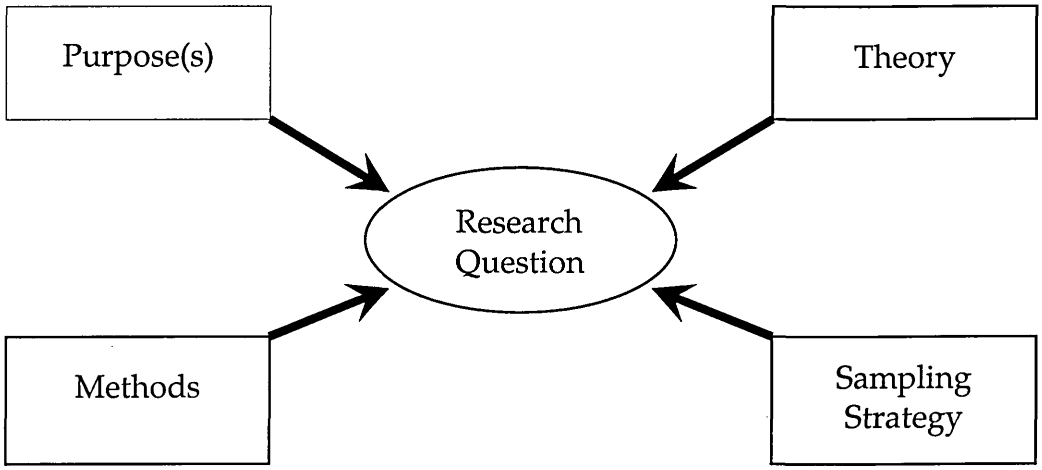
Denzin and Lincoln (1994) identify four basic questions structure the issue of the research design:

(a) How will the design connect to the paradigm being used?
(b) Who or what will be studied.
(c) What strategies of inquiry will be used?
(d) What methods or research tools will be used for collecting and analysing empirical materials?

Research design covers the various things, which should be thought and kept in mind when carrying out a research project. Many models have been put forward. Figure 6.3 is one such attempt (Robson, 2002). All these aspects need to be inter-related and kept in balance.

The main purpose of the design is to help to avoid the situation in which the evidence does not address the initial research questions.
In terms of case studies, five components of a research design are especially important Yin (1994):

Figure 6.3, Framework for Research Design



Source, Robson, 2002

1. a study question;
2. its propositions, if any;
3. its unit (s) of analysis;
4. the logic linking the data to the propositions, and
5. the criteria for interpreting the findings.

Research design adopted for this research project is elaborated in figure 6.4. The design consists following main phases.

- Literature Review
- Case studies
- Questionnaire Survey
- Framework Development
- Framework Validation

As identified earlier, the nature of the inquiry in this project influenced the choice of the research method. Inductive approach by mainly the qualitative research method was employed. The case studies were conducted as the main primary data source. However, for the purpose of triangulation, a quantitative element was also incorporated to serve as an additional source of the primary data and for validating, further investigating and refining the case studies data.

6.10.1 Literature Review

Keeping in mind the aim and objectives of this research project and the research question, a thorough literature review was conducted as the first phase of the research design. This secondary method of data collection generated comprehensive information on the integration of management systems, providing a direction to achieve the research aim and objectives. The literature review and the analysis were given in chapter one, two, three and four.

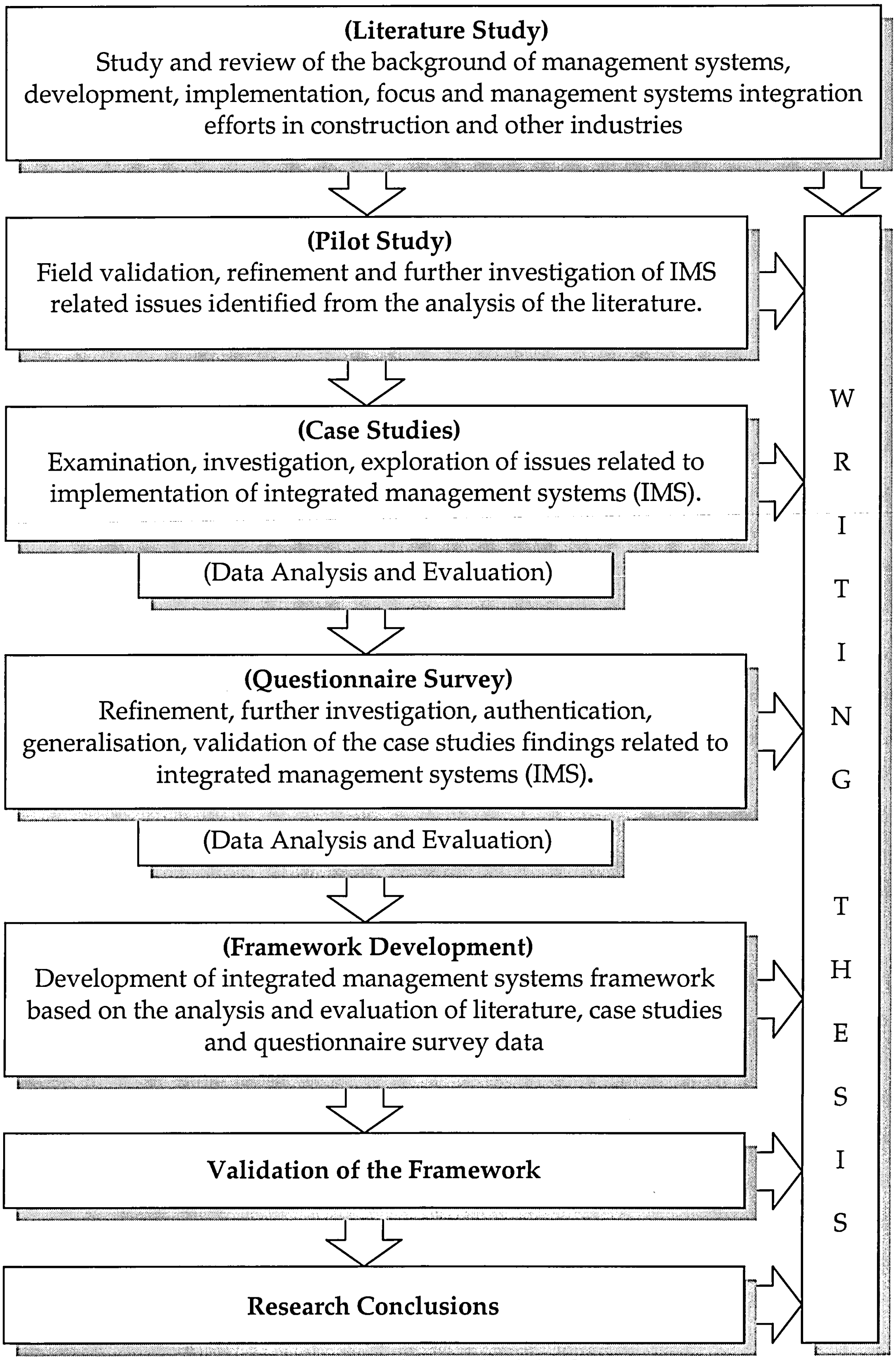
6.10.2. Case studies

The case studies were conducted in five major UK construction organisations. In depth interviews, field observations and related documentation constituted the main data sources from the case studies. Chapter seven elaborates further on the case studies data collection and analysis.

6.10.3. Questionnaire Survey

As a method of triangulation, a questionnaire survey was conducted in top 90 UK construction contractor organisations. Chapter eight provides further details of the questionnaire survey design, data collection and analysis.

Figure 6.4, Research Design for this Project



6.10.4. IMS Framework Development

The aim of this research project is to develop a framework of integrated management systems for the application by the contractor organisations. Based on the analysis of literature review, case studies and the questionnaire survey, that aim was achieved. Chapter nine gives the details of the developed framework.

6.10.5. Framework Validation

As a final phase of the research design, the external validation of the developed framework was established through the construction industry feedback. Validation process is elaborated further in chapter ten.

6.11. CRITERIA FOR JUDGING THE QUALITY OF RESEARCH DESIGN

Yin (1994) identifies four aspects of the quality of to be maximised in any design:

(a) Construct;
(b) Internal validity (for explanatory) or causal case studies only);
(c) External validity; and
(d) Reliability.

Because a research design is supposed to represent a logical set of statements, quality of any given design can be judged according to certain logical tests. Concepts that have been offered for these tests include trustworthiness; credibility, confirmability, and data dependability, the four components above effectively address such structural need. Table 6.7 outlines the strategies to address the set requirement for quality of research design.

6.11.1. Reliability

According to Burns (2000), research reliability is based on two assumptions. First, the study can be repeated. However, as qualitative research occurs in natural settings and often is undertaken to record processes of change, it is especially vulnerable to replication difficulties. Problems of uniqueness and idiosyncrasy can lead to the claim that no ethnographic study can be assessed for reliability. Second, the assumption, that two or more people can have similar interpretations by using these categories and procedures. However, in qualitative research, it is difficult to replicate the findings of anther researcher, because the flow of information is dependent on the social role held within the group studied and the knowledge deemed appropriate for incumbents of that role to possess. Nevertheless, reliability can be enhanced in these ways (Burns, 2000):

- Investigating outline the research reason and the major question addressed.
- Explicating perspectives on the question, stating research assumptions and biases.
- Explaining data-gathering procedures, including timing and timelines of observations, spatial arrangements of interviews, relationships with subjects and categories developed for analysis.

The best way is to achiever reliability in qualitative research is triangulation, in which it can be argued that if different methods of assessment or investigation produce the same results, then the data are likely to be valid. In this research work, the triangulation was adopted to achieve the reliability.

Table 6.7, Case Studies Tactics for Four Design Tests

Tests	Case study tactic	Phase of research in which tactic occurs
Construct validity	• use multiple sources of evidence • establish chain of evidence • have key informants review draft case study report	data collection data collection composition
Internal validity	• do pattern matching • do explanation building • do time series analysis	data analysis data analysis data analysis
External validity	• use replication logic in multiple case studies	research design
Reliability	• use case study protocol • develop case study data base	data collection data collection

Source: Yin, 1994, Cosmos Corporation

6.11.2. Validity

Establishing validity necessitates demonstration that the propositions generated, refined or tested, match the causal conditions that exist in human life. Burns (2000) explains that the issues involved in matching scientific explanations of the world with its actual conditions resolve into two questions. First, do scientific researchers actually observe or measure what they think they are observing and measuring? This is the problem of internal validity. Solving it credibly is considered to be a fundamental requirement for any research design. Second to what extent are the abstract constructs and postulates generated, defined or tested by scientific researchers applicable across groups? This addresses the issues of external validity.

6.11.2.1. Internal validity

In qualitative research, the claim to high internal validity derives from the data collection and analysis techniques used by ethnographers. Burns (2000) maintain that first; the proximity among participants and collecting data for long periods provides opportunities for continual data analysis and comparison to refine constructs and to ensure the match between scientific categories and participant reality. Second, informant interviews, a major qualitative data source, necessarily must be phased close to the empirical categories of participants. Third, participant observation the second key source of data is conducted in natural settings that reflect the reality of the life experiences of participants more accurately than do more convinced or laboratory settings. Finally, analysis incorporates a process termed disciplined subjectivity that exposes all phases of the research activity to continual questioning and re-evaluation.

Parallel to this in observation is the credibility of informants' reports in interviewing. In addition, research must demonstrate, in cases where presentation of the perspective of participants is important, that the categories are meaningful to the participants, reflect the way participants experience reality and are actually supported by data (Burns, 2000). As given in chapter five, the lines of inquiries were validated earlier before initiating the main case studies data collection phase in this research. Rigorous case studies protocol used in this project helped achieving the internal validity.

6.11.2.2. External validity

External validity depends on the identification and description of those characteristics of phenomenon salient for comparison with other similar types. Once the typicality or atypicality of a phenomenon is established, bases for comparison then may be assumed, and results may be translated for applicability across sites and disciplines (Burns, 2000).

Single case studies are often criticised as a poor basis for generalisation. However, critics implicitly contrast the situation to survey research. It is an incorrect analogy as survey research relies on statistical generalisation, whereas case studies rely on analytical generalisation. In that, the research strives to generalise a particular set of results to some broader theory. The generalisation is not automatic, however. A theory must be tested through replications of the findings. Once such replication has been made, the results might be accepted for a much larger number of similar situations, even though further replications have not been performed. Here a major insight is to consider multiple cases as one would consider multiple experiments that is to follow a "replication" logic. Generalisability in case studies is often left up to the reader, who may ask, "to what extent can I relate what is in this study to my own situation? This is helped by the study providing a rich description, so that readers can see whether the study is applicable to their situation (Burns, 2000). External validity in this research project was achieved through the questionnaire survey and the validation of IMS framework developed on the basis of primary and secondary data collection sources.

6.11.2.3. Construct validity

Many case study investigators fail to develop sufficiently operational set of measures, and subjective judgement is used to collect the data. There are two ways of improving construct validity (Burns, 2000).

- Use multiple sources of evidence to demonstrate convergence of data from all sources;
- Establish a chain of evidence that links parts together.

Chapter seven gives further details about the case studies elaborating the case studies design used in this project.

6.11.3. Rigour

There are numerous methods of ensuring rigour in qualitative work. The major methods for ensuring rigour are intricately linked with reliability and validity checks. List of the main methods is as follow (Denzin and Lincoln, 1998):

- Criteria of adequacy and appropriateness of data;
- The audit trait;
- Verification of the study with secondary informants;
- Multiple raters.

Burns (2000) points the lack in rigour will make, the results suspect and case studies more literary artistry than reliable and valid explanation. Perhaps it takes longer for exponents of qualitative work to develop the skills needed for a rigorous study. The routines and research activities are not as neat, orderly and cookbook-like in fashion as quantitative methods. However, rigour is brought in to the research following the methods stated above. This research project adopts some of the points mentioned about to establish rigour of the research findings.

6.11.4. Selection and Sampling of Case Studies

It may be useful to try to select cases, which are typical or representative of other cases, but as Stake (1995) suggests, sample of one or just a few is unlikely to be representative. Case study research is not a sampling research; it is primarily to understand other cases.

As discussed earlier, qualitative research employs non-probability sampling, especially snowball sampling and theoretical sampling. In snowball sampling, an informant, identified as a valid member of a group to be interviewed, is to provide the names of others who fit the requirements. In theoretical sampling, data collection is controlled by the developing theory. As information is gathered from the first few cases, the underlying theory becomes extended, modified, etc. and therefore informs the research as to which group(s) are relevant to approach (Stake, 1995). For this research work, theoretical sampling has been employed. The details of the case studies design used for this research are given in chapter seven.

6.11.5. Unit of Analysis

In a qualitative research problem, serious consideration must be given to the unit of analysis, the most elementary part of the phenomenon to be studied. Nachmias and Nachmias (1996) maintain that the unit (or level) of analysis influences the research design, data collection, and data analysis decisions. It provides such basic clues as to what the research problem call for the study (perceptions, attitudes, or behaviours) and should the concentration be on individuals or groups, institutions or societies.

In principle, there are no limitations on the selection of units to be analysed in a research project. However, once selected research must adjust the research procedures, particularly the scope and the level of generalisation and theorising, so that they are congruent with, or suitable to the units of analysis chosen. This part of the research process is crucial as units of analysis have unique attributes; here it is often misleading to shift from one unit to another. Generalisations based on individuals us units of analysis and generalisations based on groups can be quite different. The unit of analysis used for this research work was the five organisational positions (Quality, Health and Safety, Environment and Project Managers, and the Site Supervisor). During the case studies and questionnaire survey, the same unit of analysis were adopted for consistency and internal validity of the research.

6.11.6. Case Study Protocol

The case study protocol contains the procedures and rules that should be followed in the study. Burns (2000) maintain that it increases the reliability of the study by ensuring the standard procedure is followed. The protocol should contain the purpose of the study, the issue, the setting, the propositions being investigated, the letter of introduction, review of theoretical basis, operational procedures for getting data, sources of information, questions and lines of questioning, guidelines for report, relevant readings and bibliography. Chapter seven elaborates further the elements of case studies data phase for this project.

6.11.7. Pilot Case Study

Before devoting oneself to the arduous and significant time commitment of a qualitative study, it is a good idea to do a pilot study. Denzin and Lincoln

(1998) maintain that pre-interviews with selected key participants and a brief period of observations and document review can assist the researcher in a number of ways. The pilot study allows the researcher to focus on particular areas that many have been unclear previously. In addition, pilot interviews may be used to test certain questions. A pilot study was conducted in this research project. The details were already given in chapter five of this thesis.

6.11.8. Source of Evidence

Some of sources used as evidence in case studies research are as follows.

6.11.8.1. Documents

Almost every study finds some need for examining documents (annual reports, correspondence, minutes of meetings, letters, agendas, administrative reports, files, books, diaries, budgets, news clippings, photographs, lists of employees/pupils, etc and the like). Stake (1995) states that studying documents follow the same thinking as observing or interviewing. One needs be organised, yet be open for unexpected clues. Research questions should be fairly developed in advance and a system set up to keep things on track. The potential useful ness of different documents should be estimated in advance and time allocated so that it is judiciously spent. During the case studies conducted for this project, reports and other organisational documents related to integration of management systems were collected. More information about the case organisations was gathered through the company internet sites and the brochures. Different industry-wide information database were also used.

However, Burns (2000) raises an essential point to remember that these documents may not be accurate or lack bias, and produced for a specific audience in mind, for a specific purpose. In fact, many are deliberately edited before issue. Nevertheless, they are important as another way to corroborate evidence derived from other sources. They may specify events and issues in detail than interviewees can.

6.11.8.2. Interviews

Much of what cannot be observed by research has been or is being observed by others. Stake (1995) maintains that qualitative researchers take pride in discovering and portraying the multiple views of the case. The interviews are the main road to multiple studies. Interviews are essential, as most case studies are about people and their activities. These need to be reported and interpreted through the eyes of interviewees who provide important insights and identify other sources of evidence. Most commonly, case study interviewers use the unstructured or open-ended form of interview, so that the respondent is more of an informant than a respondent. However, at times a more structured interview may be held as part of case study. This could involve sampling procedures and survey instruments. Nevertheless, it would form only one source of evidence, rather than the only source of evidence as in a survey (Burns, 2000). Chapter seven provides details of the interviews conducted in the case studies in this project. Semi-structured interview format given in Appendix A, was used for the interviews.

6.11.8.3. Direct Observation

Case studies use both participant and non-participant observation. Participant observation provides unusual opportunities for collecting data that might otherwise not be collected are available. However, as Burns (2000) identifies the major problems associated with participant observation are concerned with potential for bias. The research may become too closely involved and lose detachment, or assume advocacy roles determined to unprejudiced reporting.

Participant and non-participant observation can range from the casual to the formal. In the formal mode, the incidences of various types of behaviour are measured during certain periods. This form will give rise to some quantitative data. The casual mode may be ad hoc observations made during a visit with when other evidence is being obtained (Burns, 2000).

There was not much scope for the direct observation given the nature of the research project. Nevertheless, some interesting behavioural observations were made during the field visits to offices and sites of the interviewees. The observations are incorporated in the case studies analysis given in chapter seven.

6.11.9. Method for Data Analysis

Marshall and Rossman (1999) regard analysis as a search among data to identify content for participants truths. It is the process of bringing order, structure and interpretation to the mass of collected data. It is messy, ambiguous, time consuming, creative, and fascinating process. In qualitative data analysis, Strauss and Corbin (1997) explain it as a search for general statement about relationships among categories of data, to builds grounded theory. In case studies, as Cassell and Symon (1994) state, data analysis and data collection are developed together in an iterative process. It can be strength in allowing the grounded theory to develop. However, it may bring research to premature closure, having been unduly influenced by particularly vivid, unusual or interesting data.

Typical analytic procedures fall into six phases (Marshall & Rossman, 1999):

- Organising the data;
- Generating categories, themes and patterns;
- Coding the data;
- Testing the emergent understanding;
- Searching for alternative explanations, and
- Writing the report.

Some important procedures for data analysis are explained in subsequent sections.

6.11.9.1. Content analysis

Content analysis is used to identify themes, concepts and meaning. It is a form of classifying content. Burns (2000) suggests that as the research focus becomes narrower, the analysis should include discussion about why certain focuses were chosen rather than others, and should reveal emerging ideas, which are strengthened or weakened by successive interviews. Theory emerges from the data in qualitative research, termed grounded theory (Glaser and Strauss, 1967). Thus, research enters situation with no prior theoretical preconceptions and create, revise and refine theory in the light of the data collected. Content analysis needs a coding system that relates to the theoretical framework or research question (explained in subsequent section).

Content analysis is more an art than a science. Its greatest strength is that it can be conducted later, so that the setting is not disturbed in any way, and coding can be determined after the event. As categories and patterns appear, evaluation of the plausibility of emerging hypotheses and testing them against further data can commence. In order to control for bias in the analysis and interpretation, objective perspective should be sought which can play devil's advocate and critically question the coding and analysis (Burns, 2000). The content analysis was helped in this project, by the semi-structured type of the interview format. However, emergence of some interesting themes forced the continuous content analysis and the necessary amendments and improvements in the interview formats.

6.11.9.2. Generating categories, themes and patterns

This is part of content analysis explained earlier. Marshall and Rossman (1999) maintain that the analytic process demands a heightened awareness of the data, a focused attention to those data, an openness to the subtle, tacit undercurrents of social life. Identifying salient themes, recurring ideas or language, and patterns of belief that link people and settings together, is the most intellectually challenging phase of data analysis and one that can integrate the entire endeavour. Through questioning the data and reflecting on the conceptual framework, the research engages the ideas and data in significant intellectual work. The process of category generation involves noting patterns evident in the setting and expressed by participants. As categories of meaning emerge, the researcher searches for those that have internal convergence and external divergence. That is the categories should be internally consistent but distinct from one another.

The data are not to categorize for counting occurrences but to permit analysis and comparison of meaning within a category. As notes are read and re-read it is possible to start grouping items together. Other categories might come from the participants themselves. Some cross categories may be done to produce types (Burns, 2000). The repetitive desk analysis of the case studies data generated the pattern, themes and ideas in this research project, which were later on used for coding the data and designing the questionnaire survey.

6.11.9.3. Coding the data

Coding data is the formal presentation of analytic thinking. After generating categories and themes, some coding scheme is applied to them and diligently and thoroughly passages in the data are marked using the codes. Coding classifies material into themes, issues, topics, concepts, propositions. Codes may take several forms: abbreviations of key words, coloured dots, and numbers (Marshall and Rossman, 1999). Burns (2000) regard coding as first stage in analysing data (especially interviews). It is not a quick process. Some of coding may begin while the data is still being collected, as particular issues are raised consistently across the interviews. This early coding assist to focus on essential features of the project as they develop. The coding system is, in fact, the conceptual model. The coding categories should start developing as soon as the first interview is conducted, as coding facilitates the understanding of the information, which may direct the focus of the next interview. Some useful code categories include (Burns, 2000):

- Event codes, i.e. specific activities
- Definition of the situation codes, i.e. how informants define setting
- Process codes, i.e. stages, steps, phases
- Social structure codes, i.e. patterns of behaviours and relationships
- Strategies codes, i.e. how people do things
- Subject perspective codes, i.e. how informants think about their situations

As stated earlier, themes, pattern and ideas were developed in this project from the content analysis of the data gathered from the case studies. A software tool, QSR NVivo 2.0, was used in coding the data.

6.11.9.4. Pattern matching in case studies

Burns (2000) explains that the pattern matching strategy compares the obtained pattern with a predicted one. If the pattern coincides and there is no pattern to fit, rival alternatives theories, then the case study can claim the internal validity. The important characteristic is that each potentially rival theory or explanation would involve a different pattern of variables or evidence. Hence, if one pattern is valid, the others cannot be. The variables producing these patterns may involve several types of events or characteristics, each assessed by different methods or measures (triangulation). The concern of the case study is the overall pattern of events and the degree to which the pattern of events and the degree to which the pattern matches the predicted one.

6.11.9.5. Explanation building for case studies

The explanation arrived at by the case study cannot depend on the qualities of sociological writing alone, although it is based on theme. Hamel *et al.* (1993) suggest that the explanation, like any other sociological explanation or, for that matter any scientific explanation, must be accurately and completely transmissible in a written statement. Accordingly, the case study must produce an explanation that cannot refer to or suggest any intuitive, tacit, and imitative fields of knowledge that the study cannot provide and contain within a written statement. The theoretical and methodological foundations of the explanations resulting from the case study may thus be clearly understood through the depth of description of the object of study, as was previously emphasised.

The explanation building procedure is similar to pattern matching. To explain a phenomenon implies stipulation a set of causal links about it. In most case studies, explanation building has been employed in those producing narrative data in which explanations reflect some theoretical propositions. Burns (2000) maintain that the explanation building processes is often iterative; that is, as the initial proposition is compared with some initial findings it is revised and compared with further data. This process repeats itself as many times as is needed until the explanation and theoretical proposition fit. This it will be the case that the original proposition will have changed in some degree as evidence is examined and new perspective obtained.

6.11.10. Reporting Process

The major components of the report are usually as follows:

- Purpose for the study; the problem that gave rise to it; philosophical orientation
- methodology including the sampling decisions, rich description of site/subjects, transaction and processes and data collection techniques;
- presentation of the data including the patterns, themes and interpretation;
- validation of the findings/outcomes;
- conclusions

The subsequent chapters in the thesis, report the research data collection and analysis phases as outlined in the above points.

6.12. LIMITATIONS OF THE RESEARCH AND INDICATIVE NATURE

No proposed research project is without limitations; there is no such thing as a perfectly designed study. There are always trade-offs in research design. As Marshall and Rossman (1999) maintain that, a discussion of the study's limitations demonstrates that research realities are understood and that no presumptuous claims about generalisability or conclusiveness relative to what has been learnt are made. Limitations derive from the conceptual framework and the study's design. The limitations applicable to this research project are identified in chapter ten.

6.13. SUMMARY OF THE CHAPTER

The chapter covered the methodological approach adopted for this thesis work. As being one of most important parts of the research work, different methodological concepts and approaches were explained in detail. It was evident from the critical literature review early on that the type of research inquiry identified can be best explored, explained and analysed by an inductive approach employing mainly a qualitative methodology. The explanation of different methods in the chapter justified that suggestion. Among different qualitative methods available, case studies best suited the research question and to the objectives of the research. However, to establish the reliability, validity and rigour in the case studies data, a quantitative element was incorporated through the questionnaire survey, as a triangulation method. Research design section in the chapter stipulated in detail the data collection and analysis approaches adopted for the project. In the next chapter, the data collected from the case studies is presented.

Chapter 7

Data Collection and Analysis

(Case Studies)

7.1. AIMS OF THE CHAPTER

This is first of the two chapters reporting the data collection for the research project. The first data collection phase of case studies, which were conducted as a main primary data source, is presented in this chapter. The next chapter reports on the questionnaire survey. The chapter begins with the selection criteria of cases. The profile of case organisations, methods employed for data collection and management positions approached for data collection in each organisation subsequently follow. Then the description of the techniques and tools used for the analysis of case studies data is provided. The major part of the chapter contains the presentation of different themes and patterns, which have emerged from the case studies data analysis. The analysis categorised in various sections and subsections, covers the implementation of Quality, Health and Safety and Environment management systems comprehensively. The chapter concludes with a chapter summary in the end.

7.2. CASE PROFILES

For case studies research, five organisations were selected and approached from the list of top 100 UK contracting organisations. The mix of case organisations is a fair representation of the list. The selection also took into account the various levels of management systems integration within the organisations, giving a representative reflection of the UK contactor organisations. Table 7.1 gives the general description and profile of the case organisations participating in the research. Further description of each case organisation is given in detail in the subsequent sections.

Table 7.1, Profile of Case Organisations

#	CASE ID	TURNOVER (rounded) £000*	Comments
1	A1	350,000	Systems not integrated
2	A2	450,000	Some progress towards developing an integrated systems model, integrated systems not yet implemented
3	B3	225,000	Integration of management systems manuals, integrated systems in place
4	B4	460,000	Integration of management systems manuals, triple certification achieved, integrated systems in place, working towards a process model
5	B5	2,000,000	IT based bespoke integrated systems based on a process model

* Industry Rankings, Building 20 July 2001

7.2.1. Case One (A1)

Organisation: Principal Contractor

Interviewed Staff: Managing Director, Quality Manager, Environment Manager, Health and Safety Manager, Project Manager, Site Supervisor

Management Systems in Place:

Quality Management System	ISO 9001:2000
Environmental Management System	ISO 14001:1996
Health and Safety Management System	No Certification

Integration Level:

The organisation is at a very basic stage in terms of the integration. The Quality and Environment Managers are working to develop an integrated Quality and Environmental project plan. The proactive Quality Management staff is keen on the integration. However, the divisional Health and Safety Representative is not very supportive of the integration.

7.2.2 Case Two (A2)

Organisation: Principal Contractor

Interviewed Staff: Quality Manager, Environment Manager, Health and Safety Manager, Project Manager, Site Supervisor

Management Systems in Place:

Quality Management System	ISO 9001:2000
Environmental Management System	ISO 14001:1996
Health and Safety Management System	No Certification

Integration Level:

The organisation is at a comparatively higher level than the organisation A1. The Quality and Environment Manager (joint position) is the key person in pushing the integration forward. He has developed an eight stage process model for integrated Quality and Environmental management systems. He claims that their registration organisation is satisfied with the model. The Health and Safety management system is not part of the integration. However, Health and Safety is included as a main element in the process model. The Health and Safety Manager is open to integration, however, he wants to see it succeed first with Quality and Environmental management systems.

7.2.3. Case Three (B3)

Organisation: Principal Contractor

Interviewed Staff: Quality Manager, Project Manager, Site Supervisor

Management Systems in Place:

Quality Management System	ISO 9001:2000
Environmental Management System	ISO 14001: 1996
Health and Safety Management System	No Certification

Integration Level:

The organisation claims to have integrated management systems since 1996, with the introduction of ISO 14001: 1996, Environmental management system. However, the integration is limited to Quality and Environment management systems. The Health and Safety management system is not included. The organisation maintains an integrated management system manual. Quality and Environment audits are integrated. The Quality Manager is the key person looking after the integrated management systems.

7.2.4 Case Four (B4)

Organisation: Principal Contractor

Interviewed Staff: Business Improvement Manager, Quality Manager, Project Manager, Site Supervisor

Management Systems in Place:

Quality Management System	ISO 9001:2000
Environmental Management System	ISO 14001:1996
Health and Safety Management System	OHSAS 18001:1999

Integration Level:

The organisation is one of the few early organisations to achieve the triple certification for Quality, Health and Safety and Environment management systems from BSI. The organisation is quite proactive in its approach to wards the integration of management systems. Integrated management systems manual is established covering the integrated Quality, Health and Safety and Environment management systems. A Business Improvement Department is established to facilitate the integrated management systems. The organisation is currently rolling out the integrated systems based on a process model.

7.2.5 Case Five (B5)

Organisation: Principal Contractor

Interviewed Staff: Group Integrated Management Systems Manager, Environment Manager, Project Manager, Site Supervisor

Management Systems in Place:

Quality Management System	ISO 9001:2000
Environmental Management System	ISO 14001:1996
Health and Safety Management System	OHSAS 18001:1999

Integration Level:

The organisation is one of the highly advanced UK construction organisations in the integrated management systems. It operates a fully computerised process based integrated systems easily accessible on the organisational wide intranet. The systems include Quality, Health and Safety and Environment management systems which are certified against the latest relevant standards. The position and management structure for Integrated Management Systems Managers has been introduced to facilitate the implementation of integrated management systems.

7.3. CASE STUDIES DATA COLLECTION

The semi structured interviews (typical formats are given in the Appendix A) were conducted at six different levels in the five case organisations in addition to the related literature collected from the organisations. Table 7.2 gives the management positions in each organisation interviewed during the case studies data collection. In all, 22 positions were interviewed over a period of more than six months in the five case organisations covering the Managing Director, Business Improvement Manager, Group IMS Manager, Quality Manager, Environment Manager, Health and Safety Manager, Project Manager and Site Supervisor levels.

7.4. METHODS EMPLOYED FOR CASE STUDIES DATA ANALYSIS

The data from the case studies were collected in two forms, i.e. interviews and organisational documents and reports. The interviews were digitally recorded, loaded on a PC and transcribed, using a digital voice recorder and accompanying software (Olympus DS-330 and DSS Player 2002 respectively).

Table 7.2, Organisational Levels Interviewed for Case studies

CASE						
A1	**1A1** Quality Manager	**2A1** Environment Manager	**3A1** H & S Manager	**4A1** Project Manager	**5A1** Site Supervisor	**6A1** Managing Director
A2	**1A2** Quality Manager	**2A2** Environment Manager	**3A2** H & S Manager	**4A2** Project Manager	**5A2** Site Supervisor	
B3	**1B3** Quality Manager	**4B3** Project Manager	**5B3** Site Supervisor			
B4	**1aB4** Business Improvement Manager	**1B4** Quality Manager	**4B4** Project Manager	**5B4** Site Supervisor		
B5	**1B5** Group IMS Manager	**2B5** Environment Manager	**4B5** Project Manager	**5B5** Site Supervisor		

The interviews were formatted and coded to remove names or any reference made to any other organisation or person by name. The data was then analysed using the, latest version of the qualitative research analysis software NVivo, version 2.0.163 (refer Appendix B for illustration on the use of software for case studies data analysis in this project). The software supported in coding the data and identifying themes and patterns from the case studies.

7.5. CASE STUDIES RESEARCH OUTPUT

This is the major section of this chapter. It presents the themes that have emerged from the analysis of the case studies data as follows.

7.5.1. Perception of Quality

The term Quality, as identified in the literature review, is a very subjective term. Not surprisingly, it was found difficult to define the term Quality generally.

However, the majority described it in terms of Quality control and Quality assurance. Moreover, the Quality perception varied greatly with different management levels in the organisations. The top and middle management related Quality to the satisfaction of customer or client requirements, whereas, the site staff (Project Managers and Site Supervisors) took Quality more in its narrower perception as the quality control and quality assurance. "The best one can produce with the tools and equipment that one is given to produce it", explained a Project Manager. The organisations seem to be struggling to filter the latest quality understanding to the operational end. As a Quality Manager put it "quality control is being mixed with quality assurance. I have tried to explain to them albeit unsuccessfully, that Quality management is a whole process". The problem can be attributed to the late arrival of quality management systems in the industry, as explained by one Business Improvement Manager, coupled with the superimposed bureaucratic documentation systems taken from a comparatively controlled model of manufacturing industry.

7.5.2. Existing Management Systems Structure

The section looks into the way the management systems for Quality, Health and Safety and Environment are established and structured in the five case organisations.

7.5.2.1. Extent of management systems certification

All the organisations have the certified management systems in place for Quality and Environment as given earlier in sections 7.2.1 to 7.2.5. However, in two of the five organisations (A1 and A2) Health and Safety management systems were not certified. The Health and Safety and Environment systems are mainly group wide implemented systems, whereas the Quality system is left to individual divisions or subsidiaries to manage. On average, the major part of each organisation is covered by a certified Quality management system. The Health and Safety management was observed to be highly focused on fulfilling the legislative requirements. As one Health and Safety advisor explained, "Well it (Health and Safety system) is based on legislation. All the procedures are based around various legislations. CDM......Construction Health and Safety at Work Regulations, so it is all based (all the procedures) are based around legislation".

7.5.2.2. Management structure

The management of Quality, Health and Safety and Environment systems does not show a visible pattern across organisations. Generally, a director is nominated for Quality, Health and Safety and Environmental responsibilities. Furthermore, Health and Safety is managed at a group level with comparatively inflexible system. Except these generalities, management structure is different in each organisation. For instance, organisations A1 and B3 have a group wide Health and Safety and Environmental management structure, but Quality management is left to each separate division to manage. Whereas organisation A2 manages Quality and Environment together at a division level, however, Health and Safety has also a subsidiary level management structure. The management structure in organisations B4 and B5 is completely different from other organisations (A1, A2 and B3) with mainly group structures for Quality, Health and Safety and Environment due to advanced integrated systems.

7.5.3. Reasons for Systems Implementation

Clearly, the main reason for implementing Quality and to some extent the Environmental management system is to fulfil the client requirements for the systems. "The company was told by the client that we should not bother about the project unless we register for ISO 9000", described a Quality and Environment Manager. The Health and Safety system instead is purely driven by the legal obligations. However, the organisations now do realise the importance of the systems to the business and their use as a management tool to communicate staff on "this is how the company way is" (Managing Director, Organisation A1).

7.5.4. Benefits of Current Management Systems

The improved awareness of Quality, Health and Safety and Environmental issues through out the organisations is regarded to be the major benefit from the implementation of management systems. Moreover, the site staff (Project Managers and Site Supervisors) regard, the materials used now more environmentally friendly, sites safer to work and the systems providing a checklist for things they (including the sub-contractor) are expected to achieve on projects, resulting from management systems implementation. From the management perspective (Quality, Environment and Health and Safety Managers), the systems provide consistency, structure to the procedures, identification of level of standards to be achieved and the legal compliance especially in the case of Health and Safety and Environmental management systems. "It sets a way to work. It means as a company across the board we work in the similar way rather than a project manager does one thing and another does other things" said a Quality Manager. Interestingly, making a business case for systems implementations, Environmental Management of organisation B5, saw real evidence that the Environment System is a differentiator in winning projects. "I am not saying that it will be a deciding factor but it is certainly differentiator in terms of work winning. It has just started to come through now. And my view is that it will accelerate" he maintained. In addition, new legislation in pipeline for landfill tax, other economic instruments and fines give businesses incentive to have the management systems in place.

7.5.5. Satisfaction with Existing Management Systems Implementation

The Quality Managers showed more satisfaction with the latest version of Quality management systems ISO 9001:2000 as being more process based and its emphasis on continuous improvement. However, in the majority of cases, their satisfaction relates to the certification from the registration organisations. They feel satisfied with the systems if the organisation gets certification, renewal or the external third party auditors are happy with the surveillance visit. Generally, the management systems for Quality, Health and Safety and Environment are perceived to be going in the right direction. However, Environmental and Health and Safety Managers identified room for more improvement in the relevant systems. The site staff (Project Managers and the Site Supervisors) did not show much satisfaction with the management systems, especially the Health and Safety management systems.

7.5.6. Discontentment with Existing Management Systems

The dissatisfaction with the management systems for Quality, Health and Safety and Environment and problems with the systems currently implemented are categorised as follows.

7.5.6.1 Documentation

The enormous amount of the paperwork, its complexity and the bureaucracy involved with the implementation of management systems is the major issue raised by the majority of organisational staff interviewed. As one Site Supervisor put it "I could sit here and just fill forms, books and tick lists for half a day every day". The Project Managers and the Site Supervisors specially, showed their dissatisfaction with the paperwork they have to deal with in various management systems and the associated auditing. They supported the view that it should be streamlined and made user friendly. "That is what we found that actually follow the full procedures and you never get anything build, there is too much paperwork" said a Project Manager. Even some Quality Managers agreed that demonstrating the compliance with the systems can be difficult and paperwork pressure on sites is too much. The organisations with separate management systems tend to establish separate manuals for Quality, Health and Safety and Environment management systems which the site staff find difficult to refer. The managers in these organisations agreed that there is duplication and overlapping in the documentation. Even in an organisation with integrated systems, site staff showed some dissatisfaction with the documentation. It is also apparent that younger generation of the site staff finds the documentation less problematic than their older counterparts.

7.5.6.2. Project constraints

There is a general consensus that the site staff are under too much pressure to complete projects on schedule, hence, the documentation associated with management systems for Quality, Health and Safety and Environment becomes even more difficult to complete. The Site Supervisors find it difficult to keep the balance in getting the actual job done and completing the paperwork. Moreover, due to resource shortage the documentation gets behind and site staff start taking short cuts as actual job completion takes priority. It is agreed that this is partly contributed by the unrealistic time scales for project completion and also the way projects are procured. The traditional competitive tendering usually works on marginal profits thereby making the sufficient resource provision difficult for the implementation of management systems for Quality, Health and Safety and Environment. More educated and intelligent clients were emphasised by some managers, who appreciate what is realistically possible in the limited resources and the price they have agreed on.

7.5.6.3. Health and Safety systems issues

The site staff struggled to hide some resentment to the way Health and Safety management system is implemented. The attitude of Health and Safety auditors in some organisations is considered reactive and to some extent aggressive like police. Some Site Supervisors were also not satisfied with the Health and Safety site inductions. The typical inductions are not considered sufficient enough to cover the various projects varying in the magnitude and complexity. Interestingly, the attitude of Health and Safety Executive Inspectors also came under some scrutiny. It is suggested, that the Inspectors are sometimes narrowly focused in their inspections. If they are in the negative frame of mind they will find something wrong anyway. On other occasions, they may ignore any obvious non-compliance. It is also the impression among managers that big names are deliberately targeted and punished to make a good press for Health and Safety Executive. Conversely, the advisory role of Health and Safety Inspectors is also appreciated at the same time.

7.5.6.4. Problems with systems implementation

Overall, there is no any particular pattern of problem(s) identifiable in the majority of organisations in the implementation of management systems. Nevertheless, some problems cited mainly relate to the administration, staff awareness and the training, and reluctance of the senior site staff in accepting and following the systems. The temporary and continuously moving from site-to-site nature of the contractor business also does not allow the necessary stabilisation period for systems implementation. Due to the lack of awareness, the site staff often does not see the benefits of systems. The systems are regarded as repetitive. It is recognised that staff need more user friendly training on systems implementation. The site staff recommended the simplification of the procedures and the systems administration, as one Site Supervisor put it "there are certain tasks that you can not do by the book. It is just physically impossible to do them". The managers in the organisation B5, which is quite advance in integrated systems, mentioned the alignment of internal organisational objectives with the systems targets problematic, particularly, the communication and infiltration of the objectives to sites.

7.5.6.5. Sub contractor issues

The sub contractors non-compliance and unawareness of management systems is one of the main hurdles for effective systems. It is generally agreed that the majority of the sub contractors are not fully aware and trained with the systems, no matter how good method statements and risk assessments they produce or other claims they make in the paperwork. The frustration is quite apparent in the words of a Site Supervisor who put it in this way "You get a big sub contractor who got everything in hand and then you get a plastering firm that just took this job on, they can not even spell Environment never mind using Health and Safety". It puts additional pressure on already scarce resources available for the systems implementation. In many cases, the principal contractor feels let down by the sub contractors. However, in the tight profit margins situation in traditional competitive tendering, organisations are somewhat forced to take the sub quality sub contractors on for the work as being the cheapest. The small to medium sub contractor organisations tend to show some indifference towards management systems. In addition, they sometimes fail to keep track with enormous and complicated information coming out from different sources. As a solution to this problem, more preference is shown for partnering agreements with sub contractors. The long term relationships will develop the confidence and trust against the incentive schemes where sub contractors tend to cut corners to make quick money.

7.5.6.6. Systems planning issues

There is some agreement that the contractor organisations are not generally proactive and up to the standards in planning for project Quality, Health and Safety and Environmental aspects. Various reasons lie behind this lack for proper planning. The one-off project nature of the business is considered as a foremost reason. As one Environment Manager put it "We are like Gypsies, we move round and round on construction sites and we never stay on a place". Other contributors are the lack of awareness of importance of the systems for the business, prevalent fire fighting culture and resistance to accept the change on project sites. The insufficient training in planning is also regarded as an issue. The site staff struggles to put things in formal documented form. It is also confessed that the contractor organisations have not been very successful in controlling the project processes leaving room for distractions from the planned schedules. "We allow other (people) to affect what we are doing. If we kept on doing, what we do, I do not think we will do it very well in the long run" explained one Business Improvement Manager. For planning, organisations admit not to be good in continuously improving through the feedback from the previous projects. One Environment Manager confessed that "We never learnt from the mistakes, we learnt as individuals but not as an organisation. That was our fault. One site manager will make mistake, learn form it and he is not on the next job. Obviously, he learns from the mistake, every body needs to benefit from it. That is the knowledge management". The size of organisations may have an effect on the planning as well. Generally, the bigger organisations seemed more comfortable with the planning as they have the sufficient competent resources available. One other factor that also hampers the appropriate planning is the unrealistic project schedules, which has been discussed earlier as well. The site staff often does not get enough lead time to make the necessary preparations before the project commences. The unavailability of necessary information, when needed to plan, also makes planning difficult. As one Project Manager explained, "You haven't got all the information to start with, from the client, engineer and architect etc. So you are always behind anyway, on that sort of project. Your client always wants it next day, and he is not prepared to move that. Part of the problem is in the industry because it is so tight on margins, money, everything, they are all buying on the shortened programme. Lot of them are on unrealistic targets".

7.5.6.7. Reasons for discontentment

Some of the issues that have been mentioned above may relate to the way the systems are perceived and implemented. In the words of a Business Improvement Manager, "I never look at standards, as the definitive answers to our problems. And I think if you look at standards as definitive answer to your problems, then probably yes you will be disappointed. I think they (standards) are very much a starting point". It was emphasised by some proactive staff that standards should not be used as panacea or a magic wand. The standards are revised every four or five years and there is awful lot happening, in terms of business thought process during that time. If the organisations are not doing any thing to improve continuously, they will find themselves behind from their competitors.

7.5.7. Similarities in Management Systems

The majority agreed that the management systems for Quality, Health and Safety and Environment are similar in many respects. All systems recommend good management practices. The staff at Site Supervisor level, however, seemed to be struggling in outlining any similarities between management systems, because of less exposure to the management systems structure. There was a strong agreement on much overlapping between Health and Safety and Environment management systems. However, the disagreement predominantly centred on the different focus of systems, which is being confused with the management structure of the systems. The views are also seemed to be affected by the way the systems are structured in the respective organisations. The Health and Safety and Environment systems are considered to be legislatively driven and Quality as the organisational specific. It was suggested that due to the difference of timing in these systems, organisations should continuously improve to keep abreast with the latest standards in any of Quality, Health and Safety and Environmental aspects to tap on any fresh management ideas.

The Quality Managers find the new version of ISO 9001:2000 more in line with ISO 14001:1996 and OHSAS 18001:1999 as compared to ISO 9000:1994. The Health and Safety Managers view is somewhat different from the majority on this. They generally view the Health and Safety management in terms of fulfilling the legal requirements. As one Health and Safety Manager put it, "The thing with Health and Safety is that it is driven by the legislation and so you know what you have to do. Environment is probably getting like that as well because there is a lot of legislation there as well. And that does run fairly closely with Health and Safety". This comparatively narrower perception makes it somewhat difficult for Health and Safety staff to accept and understand the integration.

7.5.8. Progress towards Integration

The contractor organisations are found to be at varying levels of integration from very basic to highly advance in the implementation of integrated management systems. Moreover, no identifiable pattern is visible for the integration approaches in the case organisations. Every organisation is driven by its own initiative and has a different approach. However, a tendency to bring Quality and Environment management systems together as a first phase is apparent. The Health and Safety is being left on sidelines at the moment in some cases. It is considered to be too sensitive area to mess with and also because of fear of legal non-compliance. The organisations, advance in integration, claimed to have started the integration process since the introduction of Environmental management systems ISO 14001:1996. Strangely, there seems to be a wide time gap between the advance organisations and those who are initiating integration now. This suggests the difference in strategy between proactive organisations starting long time ago and those starting after the recent drive for integrated management systems. Interestingly, the organisation on the advanced side of the integration scale, still consider themselves a far way from completely integrated systems.

7.5.9. Understanding of Integration

The integration is described by the majority as a way of cutting down the documentation from management systems of Quality, Health and Safety and Environment. This is to be achieved by removing the duplication, making the systems more streamlined and easy for the end user. The Quality Managers generally, went further to define the integration in wider terms as looking at product processes holistically from inception to completion. The integration was also defined as an ingrained organisational culture, facilitating the perception of issues or activities in their totality, for instance, looking for Quality, Health and Safety and Environment aspects in a one go. As one Environment Manager defined it "Integration to me is about managing every thing as a whole. We are all here in one business so we should have one management system. And it is about not separating functions out, working within a one process". Not surprisingly, the Project Managers define integration as having Quality, Health and Safety and Environment plans in one Project Management Plan (PMP). At the Site Supervisor level, there seems to be very less understanding of the integration. Conversely, Health and Safety managers showed a bit of reluctance to define the integration.

7.5.10. Need for Integration

The main reason behind the drive for integration is cited to be the huge amount of the paperwork and the apparent duplication and overlapping between management systems for Quality, Health and Safety and Environment. When the organisations put the separate Quality, Health and Safety and Environment management systems in place, the similarities in the systems become visible, opening the opportunities for integration. The clients have been driving the management systems for Quality, Health and Safety and Environment in the contractor organisations. Conversely, the integration of systems is mainly an organisational initiative. The majority agreed that management systems for Quality, Health and Safety and Environment should be integrated and integration is a feasible track to follow, perceiving that it will make things easier. However, the Health and Safety Managers were not sure about it. The Site Supervisors on the other hand saw an opportunity of reduced and streamlined paperwork in the integrated systems.

7.5.11. IMS Implementation Approaches

As discussed earlier, there is no identifiable pattern to suggest for any particular way or method being adopted to achieve the integrated management systems in the case studies organisations. Each organisation has devised its own route. Nevertheless, some common elements visible in the individual approaches are explained as follows.

7.5.11.1. Quality and Environment vs. Safety and Environment

There is an identifiable preference in some organisations to integrate the Quality and Environment management systems and leave Health and Safety management system untouched at the moment. As one Environment Manager explained, "I don't know why people are frightened of Health and Safety. It is just because the legal obligations but again with the Environment we have the same legal obligations. But it has scared people that if they mess it lot is going to happen". Due to that fear running throughout some organisations, the management structure for Health and Safety is inflexible and less favourable for integration compared to the Quality and Environmental management systems. "The problem perhaps we have is that the Health and Safety system is the group system effectively given to us from high level, top of the company", described a Managing Director of a division of Organisation A1. Conversely, some managers advocate the integration of Health and Safety and Environment management systems, because they overlap in many aspects. In addition, both systems are mainly driven by the legal requirements.

7.5.11.2. Integrated project management plan

There is very strong support in the organisations (especially from the Project Managers) for an Integrated Project Management Plan (IPMP), which incorporates the Quality, Health and Safety, Environment and other related project information. It is considered as an important document for the implementation of integrated management systems. The IPMP is believed to make the plans streamlined and provide the Project Management Plan necessary importance and weight to insure adherence. The organisations with integrated systems are already working with Integrated Project

Management Plans. However, not every one agreed to an all embracing nature of IPMP. One Health and Safety Manager strongly argued that Health and Safety Plan must be kept separate under the CDM Regulations.

7.5.11.3. European Business Excellence Model

The staff in the contractor organisations seemed not much aware of the Total Quality Management or the European Business Excellence Model. However, the Quality Managers, who were aware of the initiative, agreed that it may be adopted as an umbrella concept for the implementation of integrated management systems.

7.5.11.4. Quality as a foundation for integrated systems

Generally, staff agreed that Quality does not only cover the Quality System requirements but it is broader in its scope. As one Business Improvement Manager explained, "Perhaps now you can describe it (Quality) as a business management because it is just not focussing on Quality and what you do and input into your process. It is very much about how the whole business is shaped to support that process. I think that standard does itself a disservice by still calling itself a Quality standard". It was strongly suggested that Quality management systems should be used as a foundation for the development of integrated management systems. "Theoretically, you can manage Environment and Health and Safety under your Quality management system, because it is about your business", said one Environment Manager. However, the Health and Safety people did not particularly agree with the suggestion. In their opinion the Health and Safety management system is more important and should be taken as a base system.

7.5.11.5. Process approach

As identified in the literature review and also agreed in the case organisations, one of the fundamental reasons behind the disappointment with management systems in contractor organisations is the establishment of business procedures around the relevant standard clauses. In fact it should be the other way around. The majority strongly agreed that integrated management systems should be based on a process model. The latest ISO 9001:2000 Quality management system also stipulates the adoption of a process model. The process model for IMS is suggested to cover the whole production cycle from inception to completion and demolition and should incorporate the Quality, Health and Safety and Environment systems requirements. As one Managing Director put it, "Say you pick the delivery phase, so why we could not, within that delivery procedures, have like, this is how we deal with Environment, this is how we deal with Health and Safety, this is how we deal with Quality issues', satisfying the customers expectations". The organisations having integrated systems have already in place the process models for their integrated management systems. Those process models are based on the broader business processes, which also cover the requirements of Quality, Health and Safety and Environment certification. The systems registration organisations are claimed to be satisfied with those process models and the associated approach. The registration organisations in their systems assessment locate the relevant procedure from the process model and identify it with clause it satisfies under the relevant Quality, Health and Safety or Environment standards. After satisfying all the procedural requirements, the organisation is certified for the relevant standard(s).

7.5.11.6. Level of integration

Being at different levels of integration and having different understanding of the integration, it was somewhat difficult for the respondents to outline the right level of integration desirable in the contractor organisations. At the moment, organisations are mainly focusing on removing the duplication from Quality, Health and Safety and Environment management systems to make the systems streamlined. It is though agreed that the integration of management systems would be a gradual process for the organisations new to integration as the organisations with integrated systems have been involved with the integration since 1996. However, the ultimate organisational goal is to achieve a total integration. "The management system for Quality, Health and Safety, Environment plus Human Resources, Finance, all the activities together", outlined a Group IMS Manager.

7.5.11.7. Integrated documentation and manuals

As discussed earlier, the prime focus for the integrated management systems at the moment is to reduce the documentation by removing the duplication and overlapping between the management systems for Quality, Health and Safety and Environment. The organisations having integrated management systems have streamlined the documentation to a large extent. However, the site staff still seems not fully satisfied with the amount of paperwork. There is also an agreement that the Quality, Health and Safety and Environment systems manuals should be integrated into one manual. The integrated management systems manual will be a comprehensive reference guide. In addition, it was suggested that all the management levels should be provided the same version of integrated manual.

7.5.11.8. Process mapping

A process model for IMS was strongly recommended and also has been adopted in the organisations with integrated systems, as discussed earlier. To develop that process model, business processes and the activities already in place in the organisations need to be mapped. "I think the way to implement it is to include things that are already done. In other words, they should put their systems based on the process they already have", explained a Quality Manager. Moreover, as one Environment Manager put it "In my opinion, the systems should be the part of every day business, just something as part of everyday routine. One should not be thinking the systems in the slots of Quality, Health and Safety and Environment". This is only achievable when systems are implemented in a process model based on the existing organisational processes, instead of relevant standard clauses. For the process mapping, there seemed to be less awareness of the Process Protocol developed jointly at Salford and Loughborough Universities as a generic construction process mapping tool.

7.5.11.9. Ownership of integrated management systems

The issue of ownership is creating some hurdles to the development of integrated management systems in the organisations with separate systems. There was some evidence of scepticism that Quality Department will take over the integrated management systems. It is feared that internal organisational politics will get involved. Conversely, in the organisations with the integrated systems, there is no visible central command and control management structure for the integrated management systems, whole organisation and every individual assume the ownership of the systems. On the sites, Project Managers have the overall responsibility for integrated management systems. The organisation B4 has the Director for Business Improvement, responsible for integrated management systems, with a slim business improvement organisational structure to facilitate the administration of integrated systems. Further more, every concerned section of the business looks after their bit of integrated management systems in the Organisation B5.

7.5.11.10. Role of IT

One of the ways suggested to streamline and reduce the documentation from the management systems is the extensive use of computers and IT systems. A computer database or a document management system is strongly recommended, where all the necessary documentation is made available in an easily accessible format. This is also regarded as one of the solutions to deal with the comprehensive integrated manual. The organisation with highly integrated management systems has the integrated systems totally electronic, based on the organisational intranet. The organisations B3 and B4 which are currently bit behind in use of IT are pushing forward to develop the computerised document management systems for their integrated management systems and the associated manuals and the documentation. However, some difficulty is experienced in making a cost benefit analysis of the investment in IT against the advantages to be achieved.

7.5.11.11. Health and Safety certification

Some contractor organisations trying to integrate the management systems are not yet certified with any recognised Health and Safety management standard, although certified with Quality and Environment standards. While, the majority of organisations who have integrated management systems are certified to Health and Safety in addition to Quality and Environment standards. No clear view point was found on this issue. Some suggested that the certification does not bring any real benefits; it is just a marketing tool. Alternatively, it is considered important, especially in the organisations with integrated systems, that the systems for Health and Safety are certified. The certification, it is argued by the staff in support, gives the external credibility to the Health and Safety systems, independent assessment and measurement tool to check the performance.

7.5.11.12. Top management support

For the success of any management initiative like IMS, the top management support is vital. In the organisations which are planning to float the shares in the stock markets, organisational commitment to Quality, Health and Safety and Environmental issues is important and hence, more top management support is available for management systems or any initiative to make the systems more efficient and effective. Overall, the top management in every case organisation supports the idea to make the management systems streamlined and easy to use.

7.5.11.13. IMS training

Wide resentment was shown with the training provided for Quality, Health and Safety and Environment management systems. It is generally agreed; especially by the site staff that the training is not sufficient enough. There is need for more user friendly training on systems procedures to make staff involved and aware of the benefits of the systems implementation and management. Only site inductions are not effective as training. However, any need for specific training on integrated management systems could not be identified. The periodic refresher training on systems would suffice. Nevertheless, the organisation B5 does provide training through the IMS Managers on sites which does not separate the systems in Quality, Health and Safety and Environment slots.

7.5.11.14. IMS managers

The organisation B5 with highly integrated systems has established the management position of IMS Manager to deal with Quality, Health and Safety and Environment systems together, especially on large projects. However, the role is not only restricted to the projects but the IMS Managers look after the individual business units as well to cover the systems. The IMS Managers are not supposed to be the experts in all three fields. The necessary support is available to them from Quality, Health and Safety and Environment specialist departments.

7.5.11.15. Merging of management structures

This was one of the controversial issues in the case studies. Interestingly, some agreement was evident for merging the management structure of Quality, Health and Safety and Environment. However, the organisations with integrated systems still retain the management structure for Quality, Health and Safety and Environment. "One management structure for everything as at the end of day that is the way the company directors want our company to operate" said one Quality Manager. It is clear however, that there would be lot of politics involved, not only for the power and authority but also for securing the jobs. Not surprisingly, Health and Safety Managers strongly opposed the suggestion of merging the management structures. "I feel at the moment we are better off by being autonomous because we can concentrate on what we have to do", maintained a Health and Safety Manager.

7.5.11.16. Integrated audits

Although, there was not much support for merging the management structure for Quality, Health and Safety and Environment, many agreed that the site audit functions for Quality, Health and Safety and Environment systems should be integrated. As one Managing Director maintained, "I think it is an idea that we should be taking on board; it is something we have already discussed with our staff and it makes more sense". In the organisations with integrated management systems, the integrated site audits are already in the early implementation stages. "There is still a big emphasis on safety, so we still got the safety team predominantly spending their time doing safety. But then we have Safety and some other internal auditors doing effectively process assessments, they do not go out looking for Safety, Quality, and Environment. They go out and audit the processes" explained the Business Improvement Manager in Organisation B4. However, the Health and Safety staff in the organisations with separate systems was reluctant to accept the integrated audits idea. Some site staff mentioned that it might be too much for one person to cover the Quality, Health and Safety and Environment aspects together. Yet, it is the same site staff who advocated the integrated audits the most. As one Environment Manger told, "I went on the site yesterday for audit; they told me they have in the morning Health and Safety audit, then a Quality one and then an Environment one, all in one day. They have all three on the same day on the same site".

7.5.12. Wider Scope of IMS

The majority seemed to be quite satisfied with keeping the integrated management systems limited to Quality, Health and Safety and Environment. However, some proactive managers view the integration in its wider sense, encompassing the broader activities of the business, like HR, Finance and Commercial etc. As one Environmental Managers put it, "Well integration is not only about Quality, it is about the business. You should manage all your business and it all should be within one system". One highly integrated organisation claimed to be near to that sort of wide integration. However, some found it difficult to perceive the wider integration in the current organisational practice, where some organisational functions are managed at a group level and some at a divisional or subsidiary level. "If it is a company which hasn't got loads of subsidiaries, then yes but if it is company with many different subsidiaries and the group has a series of departments and the function to service them all – it would be difficult." said one Quality Manager. Furthermore, a wider integration is thought to be a gradual process, built very slowly to cover all the organisational activities.

7.5.13. Satisfaction with IMS

In the organisations having integrated management systems in place (although at different stages of implementation), the staff generally seemed satisfied with the systems in the integrated form. As the integration has been there since around 1996 in the Organisations B4 and B5, the staff could not compare the existing systems realistically with the situation when they had the separate systems in place. However, the documentation is still thought to be some times too much even in the integrated systems. More training and support on IT and making systems more computerised, are regarded some ways to lessen the pressure of documentation.

7.5.14. Advantages from Integration

More streamlined and easy-to-fill documentation for end user, which leaves more time to finish the actual job, is regarded as the main advantage from the integrated management systems both in the organisations with separate and integrated management systems. Another suggested advantage is the positive changes in the organisational culture to consider Quality, Health and Safety and Environment together rather than three different entities. The integrated systems are believed to give consistency, which helps the systems to be more efficient and effective. "Advantage of the integrated systems is that you get conformity across the company. Every job has the same criteria and the common procedures right across the company. So you can go through site to site and every site is running basically with same systems" explained a Project Manager in the Organisation B5. It is also found easier to review and maintain the integrated systems by single team, saving management time and resources. The integrated systems make it easy for clients to understand the systems, it was suggested. Conversely, the Health and Safety Managers were not much optimistic with the advantages from the integration. The Quality Managers, Project Managers and the Site Supervisors strongly supported that the integration is advantageous for the organisations. It was also pointed that the integrated systems might over-complicate the documentation. However, no such evidence was found in the organisations with integrated systems.

7.5.15. Disadvantages from Integration

Interestingly, the organisations having integrated systems did not mention any significant disadvantage they have from the integrated systems except the occasional reduced speed of reaction to any urgent change (legal mainly). The organisations still having the systems separate, however suggested that the integrated system would be unwieldy, too complicated, unpractical and inflexible paper giant. The Health and Safety Managers in the later group of organisations maintained that the integration will distract the staff attention from the important Health and Safety issues.

7.5.16. Problems with Adopting Integrated Systems

From the case studies some points were identified which are regarded to be problematic in implementing the integrated management systems. They are outlined in the following sections.

7.5.16.1. General implementation

Some clients are finding it difficult to come in terms with the integrated management systems. Few clients still want to see a verbatim Health and Safety policy in an integrated management systems policy. Furthermore, there is some sort of resistance from site staff to the paperwork; however, it is not the integrated systems specific. The site staff generally, shows some resistance to the paperwork, no matter systems are separate or integrated. The organisations with separate systems, do not foresee any major implementation problems; however, it is feared that if not launched properly, the integrated systems can create problems at the end user level.

7.5.16.2. Different scope of management systems

As discussed earlier, the staff in organisations with separate systems confuses the management systems for the Quality, Health and Safety and Environment, with the scope of Quality, Health and Safety and Environmental issues. The scope of issues may be different, nevertheless, the management systems to support the organisational commitment and demonstration of consideration to the issues is similar in many respects. Quality is thought to be only concerned with the actual product. Where as the Health and Safety and Environment cover all the organisational activities and are driven mainly be the legislation. However, as the Environmental Manager in Organisation A1 put it "The only way that they can all fit it in is to fit Health and Safety and Environment within the Quality system. I think with the spread in its scope, as I said, the Quality is about business, it should cover every thing. Again, people tend to focus more on the product side and the Quality control bit, instead of Quality management and systems. It should be expanded to cover everything".

7.5.16.3. Health and Safety issues

A significant number of site staff were dissatisfied with the Health and Safety management, at the moment. The attitude of the auditors is found to be intimidating rather than advisory. In the most cases, no feedback is provided. There is some evidence suggesting that the Health and Safety staff is somewhat against the integrated systems. In addition, it is believed, that Health and Safety people, sometimes over emphasise the compliance with legal requirements. In doing so, they create unnecessary paperwork and get overly prescriptive. In actual fact as a Business Improvement Manager explained, "When you go back to Health and Safety at Work Act 1974, it actually talks about in there, that Safety needs to be integrated with the business process. If they had it right then, I think we got it right now that it is an integrated part of the business process". A sort of misconception prevails in the Health and Safety staff that integration is about merging the Health and Safety Department with Quality and Environment departments. This misconception and the attitude of Health and Safety staff may create some implementation problems for integrated management systems.

7.5.16.4. Resistance to IMS

The majority could not identify any specific resistance to the implementation of integrated management systems, other than usual resistance to the change faced by every new management initiative. "There will be some predictable resistance. The resistance tend to come from the sites" said one Environment and Quality Manager. Moreover, the organisations with integrated systems did not find any particular staff resistance to the systems. It is agreed that when a properly trained site staff, have easy-to-fill documentation and they are aware of the benefits of the systems, there should not be any major problems to integrated systems.

7.5.16.5. Internal politics

There is evidence of some internal politics at work between the Quality, Health and Safety and Environment departments. It is becoming a hurdle to integrated systems in the organisations with separate systems. As mentioned earlier, the Health and Safety staff generally perceives integration as the merging of the departments rather than the management systems. They are afraid to lose the authority, clout and control over the Health and Safety management system. The politics is more apparent in the organisations where Health and Safety is managed at a group level, whereas Quality system is often managed locally in separate divisions or subsidiaries. As one Health and Safety Manager raised his concerns, "Who would be running it (IMS)? From our point of view, it would be difficult for us to be run by the Quality. There would be things in that system that don't follow the way we should be doing it". The Organisation B4 has established a Business Improvement Section to co-ordinate between the Quality, Health and Safety, Environment and other departments, as a solution to the problem. "We are not wedded to any one discipline. We can work independent, if you like, interface between the commercial requirements and the Safety requirements, when Group Safety Manager and Group Commercial Directors are at loggerheads" maintained the Business Improvement Manager in Organisation B4. Overall, the internal politics is more an inter-organisational issue and depends on the prevalent culture of the organisation.

7.5.17. Suggestions

In the case studies data collection phase, the respondents were also asked the way they would like to see the management systems for Quality, Health and Safety and Environment in an ideal environment. Some of the suggestions put forward are presented in the following categories.

7.5.17.1. IT based system

It has been recommended quite strongly that there should be more use of IT for integrated management systems. More computerised systems will make the systems easier to work with reduced burden of paperwork.

7.5.17.2. More resources

The majority of the interviewees (project staff in particular) desired more resources available on sites for the management systems of Quality, Health and Safety and Environment. Some recommended allocation of a dedicated person to look after the Quality, Environment and especially the Health and Safety systems on projects. In view of one Health and Safety Manager, the supervision ratio in construction industry for managing systems is not satisfactory in comparison to other similar industries because of the resource shortage. This creates other problems as well, as one Project Manager put it, "(systems) to be proactive rather than reactive. Someone did something, you go and check it and correct it. And it all starts again rather than more resources to check it as continue rather than…we haven't enough staff to cover that".

7.5.17.3. Training

More training for the site staff and in particular for sub-contractors was on the top of the wish list. It was recommended that Quality, Health and Safety and Environment aspects should be part of the training courses from the beginning to show a bigger picture of the activities involved in the construction process. In addition, the training should be more practical and a hands-on approach. "You don't want a three day course sat in a classroom because it is boring- it washes over you. You need to have a half a day looking at the paperwork and then coming out on a site and implement that tick sheet", a Site Supervisor explained.

7.5.17.4. Documentation

In an ideal environment, the majority of project staff would like to see an easier and streamlined documentation, more generic, and standardised, tick (check) list type with simple colour coding. As one Project Manager said, "There is lot of waffle that needs cut out a bit. We are cutting them down as we go but it tends to be a lot. It could be lot of generic stuff that can be used. Save them time". The management systems for Quality, Health and Safety and Environment are recommended to be made flexible and easy for site staff to operate. As one Quality Manager put forward, "It should show it is a workable system from essentially a site point of view so they can see it as a practical and feasible system, which does not create too much paperwork".

7.5.17.5. Involvement and teamwork

It is suggested that more staff should be involved in the establishment of the management systems. Different employee groups and functional areas should have their input right from very beginning of the management systems development. This will result in the better understanding and appreciation of the benefits of management systems for Quality, Health and Safety and Environment.

7.5.17.6. Sub contractor

There is a wide spread disappointment with the performance of sub-contractors. "There can be a frustration I think, because you get a wide variants in the standards to which the sub contractors work. One may be superb and other almost not even aware of their responsibility" said a Project Manager. More trained and quality sub-contractor staff in managing the systems is highly desired. It was strongly suggested that the sub-contractors should take more responsibility for their Quality, Health and Safety and Environmental management systems.

7.5.17.7. Single standard

The desire for a single standard for Quality, Health and Safety and Environment came up during the pilot studies. In the case organisations also, some support was shown for a single standard in the industry. "I think we need to have a common standard in the industry, which integrates Health and Safety, Environment and Quality. That common standard should be the starting point", a Quality Manager said. However, the support diminished when it came to assess its practicality. As one Business Improvement Manager put it, "I really do not see any need. I think the quality standard is broad enough to be applied to any industry".

7.6. CHAPTER SUMMARY

A very important phase of the case studies data collection and analysis was reported in this chapter. This phase of the research project is the main source of primary data to be used in developing the framework for integrated management systems. A brief profile of the case organisations, containing the information about the size, management systems in place (also state of certification) and the progress made in integration was given in the beginning. The criteria adopted for the case organisations selection and their industry representative ness were explained. The list of the staff interviewed reflected the in-depth coverage of each case organisation. The chapter also described the tools and techniques used to analyse over eighty seven thousand words (87745 exact) of qualitative interview data in addition to other documents collected from the case organisations. The presentation of themes and patterns emerged from the data analysis formed the major part of this chapter. The complicated documentation involved with the management systems of Quality, Health and Safety and Environment, insufficient training, prescriptive style implementation and the poor quality of sub-contractors were identified as the main cause of discontentment with the management systems. Importantly, an insight into the organisations with integrated systems was provided. The best practice methods, techniques and the approaches adopted by those organisations, like integrated audits, IMS Manager position and process models, along with the relative advantages and disadvantages were identified extensively. Any disadvantages, implementation issues and problems with the integrated management systems were comprehensively covered. Moreover, the suggestions in the end of chapter provided some valuable clues to the success factors for efficient and effective integrated management systems. The next phase of the research project is a questionnaire survey designed to further explore the themes and patterns identified from this case studies phase. The next chapter reports the questionnaire survey in details.

Chapter 8

Data Collection and Analysis

(Questionnaire)

8.1. AIMS OF THE CHAPTER

The data collection and analysis of case studies research phase was presented in the previous chapter presented. This chapter reports the second phase of the data collection i.e. the questionnaire survey. The survey was conducted to investigate further, validate and authenticate the patterns and themes that emerged from the case studies data analysis. The chapter begins with the introduction to the questionnaire. The average rate of response and the detailed break down of responses from different management positions is given. The chapter outlines the method employed for analysing the questionnaire survey. The analysis of the survey constitutes major part of the chapter. The analysis is presented under the same headings used in the questionnaire. In the end a chapter summary is given.

8.2. QUESTIONNAIRE

The analysis of the case studies data revealed some interesting pattern and themes, as given in the previous chapter. However, the limited number of organisations involved in the case studies, necessitated some mechanism where these themes and patterns can be; explored further for more understanding, validated against any misunderstanding or bias due to interviewees strong personal opinions and authenticated by a larger number of UK contractor organisations. Hence, it was decided to conduct a postal questionnaire survey. A questionnaire was designed to include the areas of further interest or needing more clarity for developing the framework for integrated Quality, Health and Safety and Environment management systems. The sample questionnaire is attached as Appendix C. It contains 30 questions with some sub-categories. The majority of the questions are in a form of a statement (29 out of 30). The respondents were asked to give their views by selecting the appropriate option against each statement on a Likert Scale (Agree, Partially Agree, Possibly, Partially Disagree, Disagree). Altogether, 450 questionnaires were sent out in 90 contractor organisations (selected from the list of top 100 UK contractors taken from the Buildings Magazine, July 2001). The questionnaire was targeted at five different management levels (Quality Manager, Health and Safety Manager, Environment Manager, Project Manager and the Site Supervisor) in each organisation. Each questionnaire was colour coded to assess the rate of return and facilitate the analysis. In total, 141 questionnaires were returned attaining a healthy 31.33% response rate. One of the reasons for this comparatively good response rate may be the telephone contacts, which were established prior sending out the questionnaire. The Directors and the Quality Managers in many organisations were approached to secure their commitment for getting the questionnaire filled and returned by various management positions. The detailed breakdown of the questionnaire return is given in the Table 8.1.

Table 8.1, Breakdown of Questionnaire Survey Returns

POSITION	QUESTIONNAIRES SENT OUT	QUESTIONNAIRES RETURNED	% RETURNED
Quality Manager	90	38	42.22%
Health and Safety Manager	90	34	37.77%
Environment Manager	90	36	40.0%
Project Manager	90	23	25.55%
Site Supervisor	90	10	11.11%
Total	450	141	**31.33%**

8.3. METHODS EMPLOYED FOR QUESTIONNAIRE DATA ANALYSIS

This questionnaire was the second source of the primary data. The case studies covered in the earlier chapter were the main source of data for this research project. The returned questionnaires were quantitatively analysed using MS Excel functions. The detailed calculations, tables and the graphical alternatives were generated for each question in the survey, which are given in Appendix D. As visible from Table 8.1, the rate of response from various organisational levels is different. For instance, the Quality Managers returned 42.22% of the questionnaire, whereas 11.11% were returned by the Site Supervisors. To compensate for that difference, the weighted averages of the responses were used in the quantitative analysis of the data.

8.4. QUESTIONNAIRE SURVEY RESEARCH OUTPUT

This is the main part of this chapter. It presents the quantitative data analysis of the questionnaire survey. The analysis uses the same format followed in the original questionnaire (refer Appendix C). The detailed calculations, tables and graphs used for the analysis of each questionnaire response are given in Appendix D, in the end of the thesis. The analysis corresponding to each questionnaire statement is presented as follows.

8.4.1. Documentation

(Q1) statement: *The enormous amount of documentation is the main dissatisfaction with the management systems for Quality, Environment and Health and Safety.*

As discussed in the previous chapter, the complicated documentation emerged as one of the major issues in the implementation of management systems of Quality, Health and Safety and Environment. The majority of the survey respondent either agreed (37.4%) or partially agreed (32.7%) with the statement (total 70.1%). In line with the pattern identified in the case studies, the site staff (Project Managers and the Site Supervisor) was the foremost group in the favour (52.2% and 40% agreed respectively). Interestingly, the Quality Managers were the single largest group in the opposition of the statement (28.9% partially disagreed).

8.4.2. Compliance with Management Systems

(Q2) statement: *It is practically impossible to comply with all the procedures in the management systems because of too much paperwork and time and resource constraints.*

The statement follows a lead from the analysis of case studies that currently implemented management systems are not very user friendly at best, making compliance difficult in an already pressurised construction site environment. 25.3% of all the respondents agreed and 29.8% partially agreed (total 55.1%), with the statement. Nevertheless, there is also substantial opposition (32.2% either partially disagreed or disagreed). Not surprisingly, the Quality Mangers showed a major disagreement by 28.9% disagreeing, compared to only 10.5% agreeing to the statement.

8.4.3. Site Audits

(Q3) statement: *There is too much auditing on project sites. Sometimes staff get bogged down with so many audits and the paperwork to be maintained.*

Every management system (Quality, Health and Safety or Environment), stipulates the regular internal and external auditing (if applicable) for the compliance and review. However, having all three systems in place along with any additional site auditing for the initiatives like Considerate Constructors Scheme, the audits can be sometimes too much. No clear verdict was returned on this statement in the survey. Nevertheless, there is a minor inclination towards disagreement with the statement. A total of 43.2% of the respondent either disagreed or partially disagreed. More importantly, 26.1% of the Project Managers also disagreed. A substantial number of the respondents were not sure (20.2% showed possibility). The Quality Managers strongly opposed (39.5% disagreed and 26.3% partially disagreed). Not surprisingly, majority of the Site Supervisors (40%) partially agreed with the statement.

8.4.4. Effects of Competitive Tendering on Systems Implementation

(Q4) statement: *Competitive tendering restricts the resource availability (including quality sub-contractors) necessary for successful implementation of management systems.*

It was identified earlier during interviews that the traditional methods of project procruemt result in very slim profit margins. There is not much room to make sufficient resources available on the sites to effectively manage the

Quality, Health and Safety and Environment systems. The survey respondents returned a majority in favour of the statement (57.9% either agreed or partially agreed). In addition, a good 21.9% regarded it as a possibility. The Health and Safety Managers showed the strongest agreement by 44.4% agreeing and another 22.2% partially agreeing with the statement.

8.4.5. Management Systems Inductions

(Q5) statement: *Site inductions for Health and Safety are very basic. The projects vary greatly and 40 minutes inductions are not adequate to cover all the Health & Safety aspects.*

The inductions are provided as a requirement under the Health and Safety Law. Moreover, appropriate inductions also form a good practice in the Quality and Environmental management systems. However, it has been identified during this research that inductions are being perceived as a substitute for formal systems training. The statement assesses the adequacy of the existing inductions to be sufficient enough even to fulfil the project Health and Safety requirements. A spilt response was received in the survey, with 45.7% either disagreed or partially disagreed. Alternatively, 41.1% either agreed or partially agreed. In addition, 13.2% voted for possibility in the favour. Understandably, the majority of Health and Safety Managers agreed (34.3% agreed and 25.7% partially agreed). The Project Managers, however, mostly opposed (39.1% disagreed and 21.7% partially disagreed).

8.4.6. Enforcement of Health and Safety Management Systems

(Q6) statement: *The Health and Safety inspections (Internal and from HSE) are formal and reactive. Inspectors act like policemen, finding fault with anything if they so wish. The approach should be more advisory and proactive.*

This is one of the sensitive issues in the research. Generally, as apparent in the previous chapter, the project staff is not fully satisfied with the attitude of Health and Safety auditors. Some criticism has also been raised against the Health and Safety Executive Inspectors. This statement sought the opinion of a wider sample on the Health and Safety systems enforcement. As feared, 59.3% of the respondents agreed or partially agreed with the statement. Further, 14.2% went for a possibility in the favour. The Project Managers stood out on the agreement side with 43.5% agreeing and 34.8% partially agreeing (total 78.3%). Most interestingly, two third of the Health and Safety Managers agreed.

8.4.7. Training and Education

(Q7) statement: *There is a lack of training/education in the site staff to run the management systems effectively (including the senior level staff especially on the paperwork side).*

The sufficient training and education of the site staff has cropped up as one the major obstacles hampering the management systems implementation. The training provided at the moment is thought to be not enough. As analysed earlier in the case studies, more user friendly and hands-on type training is recommended for effective implementation of the management systems for Quality, Health and Safety and Environment. The majority of the respondents returned in the favour of the statement (52.7% either agreed or partially agreed, with additional 12.5% showed possibility) that the current training in not enough. Not surprisingly, the largest group in the favour were the Site Supervisors (40.4% agreed and 30% partially agreed) and also 39.1% of the Project Managers partially agreed.

8.4.8. Construction Skill Certification Scheme

(Q8) statement: *The Construction Skill Certification Scheme (CS Card) can address the training needs for the management systems of Quality, Environment and Health & Safety.*

In continuation to the issue of training and education on the sites raised in the previous question, this statement was aimed to assess the effectiveness of current initiatives like Construction Skill Certification Scheme (CS Card) to address those needs. However, it was realised later that CS Card Scheme does not cover the Quality apects; it mainly deals with the Health and Safety and to some extent the Environment. Nevertheless, the majority of respondent disagreed with the statement (48.8% either disagreed or partially disagreed). The major group who opposed the adequacy of the CS Card Scheme were the Health and Safety Managers, 50% of whom completely disagreed. Interestingly, a good 24% opted for possibility, which may suggest that the site training and education requirements for Quality, Health and Safety and Environment management systems are not fully identified.

8.4.9. Sub-Contractors

(Q9) statement: *There is a strong indication that sub-contractors are not adequately trained and educated for Quality, Environment and Health and Safety management systems.*

The lack of commitment in the sub-contractors to the Quality, Health and Safety and Environmental management systems has been identified as one of the major implementation problems. Typically, small to medium sub-contractor organisations are considered not fully aware of the importance of the systems. They tend not to take due care in maintaining the management systems, no matter how good claims they make in their paperwork. In turn, this creates problems for the principal contractors on the projects, exerting additional pressure on already scarce resources available on sites. The statement returned with a clear majority of 86% of the respondents in favour (56.1% agreed and 29.9% partially agreed). Not surprisingly, the Site Supervisor's fully agreed with statement (70% agreed and 30% partially agreed).

8.4.10. Organisational Structure for Management Systems

(Q10) statement: *The Health & Safety management at a group level, whereas Quality and Environment at a subsidiary/divisional level, hinders integration and results in internal politics.*

In the contactor organisations having separate systems, a pattern of management structure was observed during the case studies. The Health and Safety is being managed at an organisational wide or a group level. Whereas, the Quality and in some instances the Environmental management systems are left for divisions or subsidiaries to implement and manage. In this structure, the Health and Safety tend to become a very inflexible system. Concerns were raised that this structure makes integration difficult and gives rise to inter departmental politics. Although, the questionnaire survey does not show a clear majority agreeing with this view point (47.5% either agreed or partially agreed). However, 23.9% regarded it as possible. A spilt result in the Quality Managers group has been returned. Interestingly, 52.8% of the Health and Safety Managers agreed with the statement. However, the Project Managers did not seem to share this opinion and 30.4% of them disagreed.

8.4.11. Broad Scope of Quality Management System

(Q11) statement: *The Quality System is wide in scope and can be used as a Business Development System, covering Environment and Health & Safety and acting as a base for IMS.*

This is also another contentious issue identified from the first phase of data collection. Some staff especially the Health and Safety Managers, raised concerns that assigning Quality System a lead role will increase the authority and control of the Quality Department over the integrated management systems. As earlier discussed, the reason behind this conflict may be the prevalent confusion that the integration is about merging the relevant departments. Nevertheless, the questionnaire survey results show that majority of the respondents (66.9% either agreed or partially agreed) favour the idea. In addition, other 17.6% gave it a "possibly" rating. The Quality Managers strongly supported the view with 67.7% agreed and 18.9% partially agreed. Interestingly, the Health and Safety Managers did not show any significant opposition as well.

8.4.12. Similarities in Management Systems

(Q12) question: Which management systems are similar in structure for integration?

- All three
- Quality -- Health & Safety
- Quality-Environment
- Environment-Health & Safety
- None

Although, during the case studies there was a general agreement that management systems for Quality, Health and Safety and Environment have a lot in common and there is overlapping and duplication between the documentation. However, some clarity was needed. Some preferred to put Environment and Health and Safety together as more similar, whereas, others thought that the Quality and Environment are more similar than the former grouping. The majority (67.4%) of the respondents maintained that all three systems are similar instead of slotting them in different sub-groups. Only other combination of management systems, which came any near to all three, is the Environment and Health and Safety, securing 19.6% of the survey returns in favour.

8.4.13. Resistance to Integrated Management Systems

(Q13) statement: *Generally, the Health & Safety staff seem a bit averse to the IMS, because they feel threatened that integration will reduce the importance or influence of the department.*

This is by far the most controversial issue emerging from the first research phase. Overall, the attitude of the Health and Safety staff did not seem to be very positive or enthusiastic on integration. They showed contentment with the existing separate systems. It was feared that integration will complicate the systems and will distract the site staff attention away from the important Health and Safety issues. However, the majority of the respondents do not agree with this view. 49.7% either disagreed or partially disagreed with the statement. Understandably, the Health and Safety Managers strongly opposed. More strangely however, 52.4% the Project Managers also disagreed. The survey result suggests that the Health and Safety staff attitude towards integration is not as negative as identified during case studies.

8.4.14. Attitude of Health and Safety Auditors

(Q14) statement: *The Health and Safety auditors usually over-emphasise the legislation in covering all the activities in a reactive style, which sometimes seems more for their own benefit.*

In continuation to the previous statement, further inquiries were sought regarding the management of Health and Safety systems. Some project staff (Project Managers and the Site Supervisors) showed their resentment with the auditors especially of Health and Safety on the sites. The auditors are thought to be rather intimidating than proactive in supporting the site staff. However, the survey responses show that the assertion is somewhat unrealistic and unrepresentative, as 46.4% either disagreed or partially disagreed. Naturally, the Health and Safety Managers came up with the strong opposition. Some agreement is shown by the Project Managers (36.4% rating it as possible) which suggests some minor problems with the Health and Safety site audits.

8.4.15. Resources for Management Systems Implementation

(Q15) statement: *The projects need quality resources. Top management commitment is vital as few staff are available for Quality and Environment in comparison to Health and Safety.*

During the case studies it was observed that the Quality and Environment management systems do not receive same consideration in term of staff availability as compared to the Health and Safety system. Obviously, Health and Safety gets priority on sites. However, it is often forgotten that a good Quality and considerate Environment culture contributes greatly in making the site safer. The systems are interlinked. The majority of respondents agreed with the statement (69.7% either agreed or partially agreed) that not enough staff is made available for Quality and Environmental systems. The Quality and Environment Managers clearly favoured with 52.6% and 50.0% respectively agreeing.

8.4.16. Project Planning

(Q16) statement: *Project planning for management systems is still problematic mainly because of:*

a. *Lack of timely flow of information from parties (engineer, architect & client etc).*
b. *Unrealistic project schedule, with very short project lead time.*
c. *Ever changing client requirements.*
d. *Incomplete Head-Office planning without consulting the project execution team.*

The project planning issue surfaced during the pilot studies. It was maintained that the planning and following the plans on sites is found somewhat difficult on sites. In the case studies, a mix response appeared which also suggested many causes for the difficulties with project planning. Hence, this statement sought to clarify the issue further by identifying the potential problem areas more thoroughly. The survey returned following responses for each sub-heading.

a. The lack of timely information appears to be one of the main issues in the project planning. The majority of respondents agreed (75.5% either agreed or partially agreed). In addition, 22.3% showed a possibility in the favour. Generally, all the organisational positions surveyed, agreed with the statement.

b. As identified earlier from the first phase of data collection, the site staff are under tremendous pressure to complete the projects within somewhat unrealistically tight schedules. This results in a significantly reduced time available for the project planning. The questionnaire survey results also agree. 80.9% of the survey respondents either agreed or partially agreed that the project schedules are somewhat unrealistic. The main group which supported the statement were the Health and Safety Managers, with 69.4% in total agreement. Interestingly, 34.8% of the Project Managers did not repose clearly and chose a possibility option.

c. It was maintained during the case studies that sometimes the clients are not fully prepared before the project commencement. Their continuously changing requirements make the project planning even more difficult. As the survey results show, the agreement on this aspect is not as much as with the previous statements "a" and "b". Only 25.4% of the respondents fully agreed. However, the results suggest a general favour with the statement, as

30.9% partially agreed and a significant 31.5% of the respondents showed a possibility.

d. Mainly, the project staff suggested that a possible cause of the current difficulties in project planning may be within the organisations. The segregated functional structure within a contractor organisation, where planning is carried out without properly consulting all the concerned parties, creates problems for successful project planning. However, a spilt verdict has been returned on this aspect in the survey. In total, 35.1% of the respondents either agreed or partially agreed, while 24.5% either disagreed or partially disagreed. Interestingly, a majority (40.4%) took the middle ground selecting the possibility option. The results suggest that the organisational functional ineffectiveness is not among the major problems in the project planning.

8.4.17. Integrated Project Management Plan

(Q17) statement: *The Project Management Plan (PMP) is a key document for IMS. It should satisfy the requirements of Construction Phase Health & Safety Plan in addition to Quality, Environment and other project aspects such as Commercial, Sub-Contractors, Suppliers etc.*

For the successful integration of management systems, it was strongly suggested during the case studies that the different project plans should be integrated. This would remove the duplication, streamlining the documentation on projects. As a contributory factor to the project planning, an integrated project management plan will attain the necessary importance on the project site. An overwhelming majority of the survey respondents agreed (71.8% agreed and 14.3% partially agreed) with this view point.

There is a clear support in all management positions for the statement. Notably, all the Site Supervisor (100% agreed) taking part in the questionnaire survey approved the importance of an integrated project management plan on the sites.

8.4.18. Different Integration Methods

(Q18) statement: *Integration of management systems should start with:*

a. *Integrating Quality and Environmental, keeping H & S separate at the moment.*
b. *Integrated policies for Quality, Environment, H& S and other business objectives.*
c. *Integrated Quality, Environment and H & S Management Manual*

It is evident in the previous chapter that no particular pattern or model is available for the implementation of integrated management systems. Each organisation is devising its own way to achieve it. Numerous approaches and methods have been suggested for the integrated systems. This survey statement identified some important integration elements and sought to assess their relative importance. The survey results are as follows.

a. Some contractor originations as discovered in the case studies, are keeping the Health and Safety system separate from the integrated management systems at the moment. The Health and Safety is considered too important and sensitive to be muddled. However, the majority of survey respondents disagree with the practice (54.7% either disagreed or partially disagreed). Even, most of the Health and Safety Managers (46.9%) disagreed completely. The Environment Managers were the largest group in opposition (54.8% disagreed) to this approach.

b. In the organisations with integrated systems in place, the policy requirements for Quality, Health and Safety and Environment management systems were found to be in an integrated form. It was maintained that the integrated policy gives a clear direction to the implementation of integrated management systems. The majority of questionnaire survey respondents also supported (70.6% either agreed or partially agreed) this practice.

c. Similar to the approach b, organisations with integrated systems have streamlined and consolidated the Quality, Health and Safety and Environment management systems in a single comprehensive management systems manual. The analysis of the questionnaire survey shows that a majority of the respondents also favoured the approach (64.3% either agreed or partially agreed). The main groups in agreement were the Site Supervisors (60% agreed) and the Health and Safety Managers (64.7% either agreed or partially agreed).

8.4.19. Process Model for Integrated Management Systems

(Q19) statement: *The IMS should be a process model covering processes already in the organisation including Finance & HR etc. It may be cross-referenced to relevant standards and the legislation.*

The latest ISO 9000:2000 stipulates a process model for the implementation of Quality management system. In addition, it has also been recognised that a major reason behind disappointment with the management systems is the practice of moulding the organisational systems around the systems requirements, instead of establishing a process model based on the existing organisational processes. The advanced integrated organisations have process models in practice. The majority of the survey respondents also agreed (72.9% either agreed or partially agreed) with the adoption of process models. The Quality Managers strongly favoured with 59.5% in agreement with the statement.

8.4.20. Conflict in Management Systems Implementation Approaches

(Q20) statement: *The process model would resolve the conflicts in the approaches of standards; Quality (Process Model), Environment (PDCA) and Health & Safety (PDCA/Process Model).*

In continuation to the previous statement, the respondents were further probed on the significance of a process model. The management systems for Quality, Health and Safety and Environment have come out at different intervals in time with different approaches stipulated for their implementation. However, by establishing a process model, the different approaches can be harmonised. 61.5% of the survey respondents approved (either agreed or partially agreed) this advantage of adopting a process model. However, a substantial 33.3% showed a possibility. A likely reason behind this high possibility option may be the relative unawareness of the different approaches or the technical jargon contained in the statement, as the Quality Managers were comparatively clearer in their response.

8.4.21. European Business Excellence Model

(Q21) statement: *European Business Excellence Model can be adopted as an umbrella concept for IMS.*

Some organisations showed their interest in following a TQM route for the integration of management systems, during the case studies. The European

Business Excellent Model (EFQM) is considered the best way to achieve that goal. Interestingly, in absence of any major disagreement, no clear agreement (36.9% either agreed or partially agreed) has appeared in the survey supporting the suggestion. The majority (55.9%) selected the possibility option (70% of the Site Supervisors chose this option). Notably, 39.5% of the Quality Managers agreed with the statement. The survey response pattern probably reflects the lack of understanding of the European Business Excellence Model.

8.4.22. Business Development/Improvement Structure

(Q22) statement: *It is feasible to have a Business Development/Improvement Department to be the owner of IMS, working as an interface between the concerned departments.*

The practice of establishing a Business Improvement/Development management structure has been identified from the case organisations. The Business Improvement/Development department works as an interface between the concerned parties in the integrated management systems. 46.1% of the survey respondents either agreed or partially agreed with this practice. However, a good 35.8% took the middle ground by showing possibility. Interestingly, 36.8% of the Quality Managers supported and 44.4% of the Health and Safety Managers regarded it to be possible.

8.4.23. Single Management Structure for IMS

(Q23) statement: *In the IMS it is possible to have a single management structure for Quality, Environment and Health & Safety management systems.*

The merging of management structures for Quality, Health and Safety and Environment, was also one of the contentious issues in the case studies. Generally, there was a mixed reaction; however, the Health and Safety managers strongly opposed the idea. Nevertheless, in the questionnaire survey, the majority of respondents favoured the statement (73.7% either agreed or partially agreed). Surprisingly, 52.8% of the Health and Safety Managers also agreed, who were the staunch opponents in the case studies phase. The group favouring the idea most, were the Quality Managers, with 71.1% in agreement.

8.4.24. Integrated Audits

(Q24) statement: *The integrated Quality and Environment (and possibly Health and Safety) audits are possible on projects, saving staff time and resources.*

The integrated site audits generated significant support among the organisations with separate systems. The organisations with integrated systems are actively in process of adopting the integrated audits. The survey also showed an overwhelming support for the suggestion. 78.7% of the respondents either agreed or partially agreed. There was some negative attitude towards the integrated audits among the Health and Safety Managers during the case studies; however, no such pattern has emerged from the survey. Nevertheless, some comments are made that the integrated audits should not include Health and Safety as it is a different discipline. Not surprisingly, 71.1% of the Quality Managers agreed with the statement.

8.4.25. Role of IMS Managers

(Q25) statement: *An IMS manager should be appointed to look after the integrated systems for Quality, Environment and Health and Safety, especially on big projects.*

Some organisations with integrated systems have established the position of IMS managers to look after the systems specifically. They are mainly deployed on the large projects; nevertheless they also support the individual business units. The majority of the survey respondents supported (70.5% either agreed or partially agreed in addition to 15.6% who selected a possibility option) the role of an IMS Manager. Understandably, a majority of the Project Managers (60.9%) agreed to the establishment of this position.

8.4.26. Paperwork at Supervisory Level

(Q26) statement: *The paperwork for management systems at the project supervisor level is overly descriptive, repetitive and laborious. It can be streamlined, standardised, computerised, made user friendly and colour coded with a check (tick) list style.*

The paperwork issue has been already covered in the section 8.4.1. However, the documentation is more problematic at the end user level. Most of the Site Supervisors, approached during the case studies, pointed to this issue as given in the statement. In the questionnaire survey, a good majority of the respondents agreed with the statement (50.7% agreed and 26.4% partially agreed). Not surprisingly, 90% of the Site Supervisors favoured the statement. The Project Managers also showed strong support with the statement.

8.4.27. Certification of Health and Safety Management System

(Q27) statement: *In the IMS it is useful to have the Health & Safety management system structured around any standard (OHSAS 18001 or BS 8800) and preferably certified. It facilitates the checks on the system and the independent assessment.*

In many organisations with integrated systems, Health and Safety is certified to OHSAS 18001:1999. However, some argued in the previous phase of the data collection, that the registration to any standard does not bring real benefits to the Health and Safety management, but it is just another marketing tool. On the contrary, the majority of the survey respondents (59.9% agreed and 17.7% partially agreed) favoured the certification of Health and Safety management systems. Almost all the management groups agreed, however, the Health and Safety Mangers led the support with 75.0% in agreement of the certification.

8.4.28. Role of IT in IMS

(Q28) statement: *Successful IMS require effective use of IT. Systems manual, documentation and any further information should be computerised in a document management system. It should be easily accessible on company intranet with good search facility.*

One of the advanced contractor organisations has made an extensive use of IT for its integrated management systems, as appeared in the case studies. Further more, it has been suggested that one of the success factors for the integrated systems would be the use of IT making access to the integrated systems easy. A comprehensive management systems manual on a computer database loaded on an organisational intranet would be more flexible and user-friendly to comply with than in a hardcopy form. The survey response also showed an overwhelming support to the use of IT for the integrated management systems. 90.1% of the respondent either agreed or partially agreed with the statement.

8.4.29. Customer (Client) Awareness

(Q29) statement: *Customer awareness is necessary for IMS. Still some clients are not used to looking at an integrated Quality, Environment and Health & Safety policy and systems.*

As one of the issues with the implementation of integrated management systems, it was pointed by the organisations having integrated systems that some customers (clients) are still finding it difficult to understand the integrated systems. They try to look for the specific verbatim Quality, Health and Safety and Environment elements. The issue needs addressing. The majority of respondent groups agreed (weighted average of 66.0% in agreement) with the need of more customer awareness with the integrated management systems. A total of 96.1% of the staff surveyed agreed, partially agreed or showed possibility in the favour of statement.

8.4.30. Disadvantages of IMS

(Q30) statement: *The IMS may be less flexible and slow in reaction to any new legislation or directive. In the IMS, effects of any new documentation need assessment not only for any particular system but for all the departments and the systems.*

Some disadvantages of the integrated management systems were also identified in the previous chapter. It is perceived, that the integrated systems would be inflexible and overly complicated to handle. Interestingly, no such views were held in the organisations with integrated systems. However, the questionnaire survey responses showed that the majority of respondents agree with the statement (64% either agreed or partially agreed). The Health and Safety Managers were the biggest supportive group of the statement with 61.8% agreeing. This response suggests that successful integrated management systems have to be designed taking into account the perceived disadvantages. In addition, the existing integration strategies of the organisations with the integrated systems worth looking more closely, where staff seemed to be quite satisfied with the systems.

8.5. CHAPTER SUMMARY

In the previous chapter, different themes and patterns related to the integration of Quality, Health and Safety and Environment management systems were identified from the analysis of case studies data collection phase. This chapter presented the outcome of the second phase of data collection i.e. the questionnaire survey. In the beginning, a need for the survey was justified. The questionnaire survey further investigated, validated and authenticated the patterns and themes that emerged from the case studies data analysis. The chapter also provided details of the questionnaire survey, touching upon the question format used in the survey, the number of the contractor organisations involved and the management positions within each organisation whom the questionnaire was sent. A thorough breakdown of the survey returns was also included. The method used for the analysis of survey data was explained. Major part of the chapter was presentation of analysis of the questionnaire survey. The analysis suggested that the most of themes and pattern emerged from the case studies are valid and are generally agreed by the majority in UK contractor organisations. However, some suggestions do not seem to hold much ground. The negative attitude of the Health and Safety Managers to; integrated management systems in general, integrated audits and merging of management structure was not supported by the questionnaire respondents. Contrary to the case studies findings, the suggested reactive and intimidating style of the Health and Safety auditors, too much auditing on the sites and inadequacy of the Health and Safety inductions did not gather enough agreement either. In certain areas, such as, the Construction Skill Certification Scheme, similarities in the management systems, planning issues on the projects and different methods adopted for the integrated systems, the survey analysis provided more clarification and further understanding. In the next chapter, a framework for the application of integrated management systems is developed for the application of contractor organisations, based on the analysis of the literature review, case studies and the questionnaire survey.

Chapter 9

IMS Framework Development

9.1. AIMS OF THE CHAPTER

This is one of the principal chapters in the thesis. In the previous chapter, analysis of the questionnaire survey was presented. This chapter takes into account the issues, themes and patterns which emerged from the literature review, case studies and the questionnaire survey. Based on the analysis of the secondary research (literature review) and the primary research (case studies and the questionnaire survey) findings, the chapter presents a framework for integrated management systems for the application by contractor organisations. The concept, structure and management of the framework have been elaborated in details. The different implementation phases and the success factors for the framework are also included. The chapter concludes with a summary of the chapter.

9.2. RESEARCH PHASE OF THE FRAMEWORK DEVELOPMENT

The research project employed both the primary and secondary research methods of data collection. The secondary research was conducted through an extensive literature review. Following the issues identified from the literature review, case studies were conducted as one of the primary research methods. Five major UK contractor organisations co-operated as case studies for the project. The detailed and in-depth interviews were conducted at six different levels (Top Management, Quality Manager, Health and Safety Manager, Environmental Managers, Project Managers and Site Supervisor) in the participating organisations. The case studies data were analysed using qualitative research analysis techniques. Interesting themes and pattern emerged from the case studies. As a second source of primary data collection, a questionnaire was designed, which re-grouped and further explored the themes that emerged from the case studies analysis. The questionnaire survey was conducted in 90 top UK contractor organisations. The questionnaire was sent out at five different levels (Quality Manager, Health and Safety Manager, Environmental Manager, Project Manager and Site Supervisor) in each organisation. The data from the survey was analysed using quantitative research techniques. Based on the analysis of data from all the sources (primary and secondary), a framework for the integrated management systems (IMS) has been developed as a best practice guide for UK contractor organisations. The framework is presented in the following sections of the chapter.

9.3. INTRODUCTION TO THE FRAMEWORK

This framework for integrated management systems recognises that;

a) Construction contractor organisations in the UK are at varying levels of development, from very basic to advance, in integrating their management systems for Quality, Health and Safety and Environment.

b) There are no specific guidelines available in the industry for the integration of management systems. Organisations, progressing with the integration, have primarily followed their own ways and structure by taking leads from the standards, CIRIA report (C509) on integration and some British Standards Institute publications.

c) This framework is a best practice guide for integration of management systems based on the research conducted in UK contractor organisations. It is each organisation's internal decision whether to integrate their management systems.

In addition, it is assumed that the contractor organisations, potentially adopting this framework, have the management systems in place for Quality (preferably certified to ISO 9001: 2000), Environment (preferably certified to ISO 14001: 1996) and Health and Safety (at least a management structure in place).

9.4. INTEGRATED MANAGEMENT SYSTEMS FRAMEWORK

In this framework, the integrated systems for Quality, Health and Safety and Environmental management, are referred as the **"Business Management Systems".** The management of Quality and Health and Safety do not only fulfil the certification and regulatory requirements but in the ever evolving business environment, any contactor organisation's Quality and Safety performances are among main factors in winning the work, especially in the long term partnering framework agreements and PFI projects. The systems for Quality, Health and Safety and Environment should be considered among the core systems, in any contracting organisation. These systems in a proactive organisation drive the business forward and contribute in very survival and sustainable profitability of the business.

The framework for the integrated management systems for Quality, Health and Safety and Environment has been divided into three parts, as follows;

1. Integrated Management Systems Concept
2. Integrated Management Systems Structure
3. Integrated Management Systems Management

9.5. INTEGRATED MANAGEMENT SYSTEMS CONCEPT

For achieving the true integration of management systems for Quality, Health and Safety and Environment, a process based model is suggested. Figure 9.1., illustrates the broader conceptual background of the framework. European Foundation for Quality Management (EFQM) Excellence Model is taken as an umbrella concept for integrated management systems. Main components of the conceptual part of the framework are elaborated as follows.

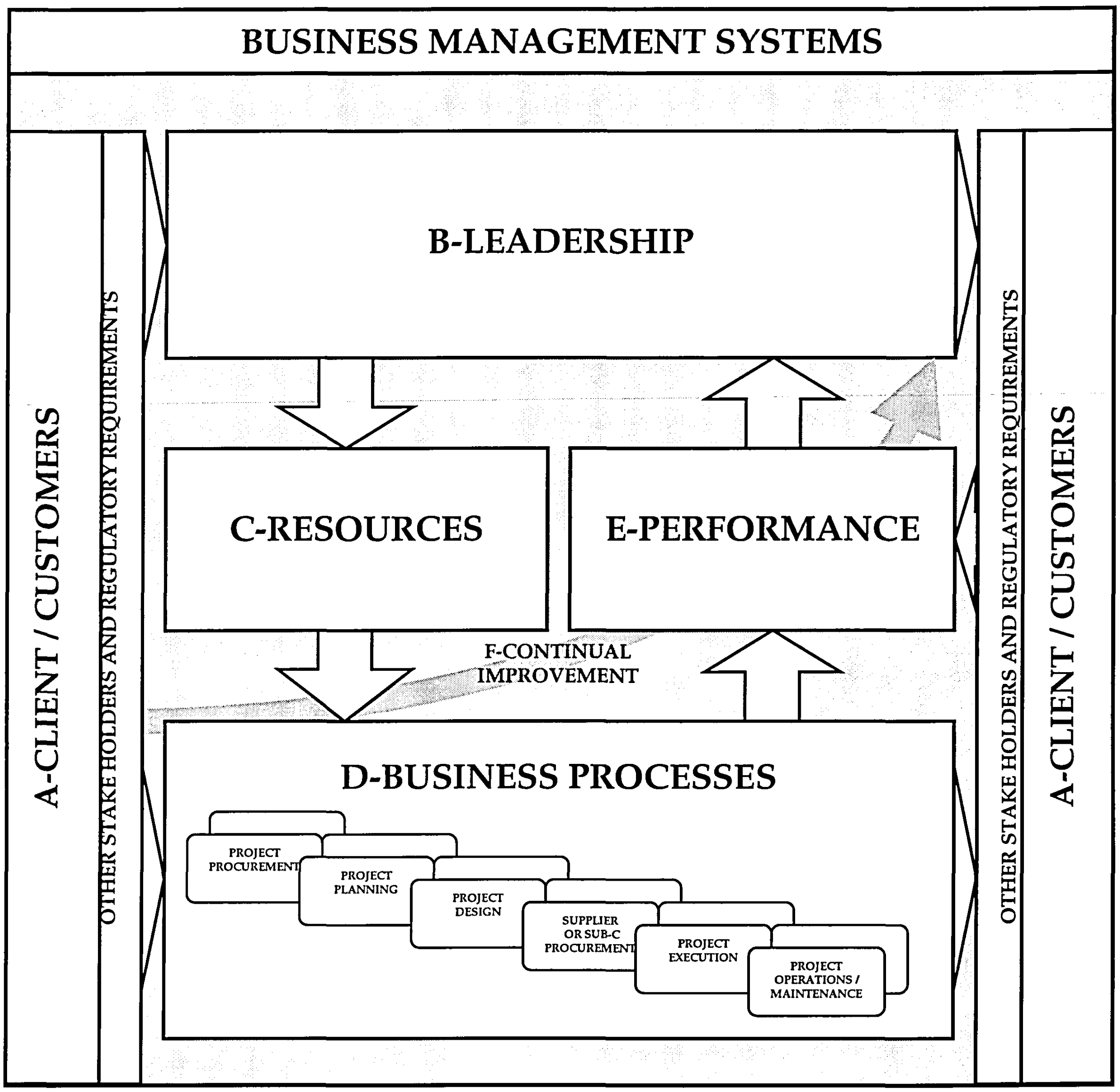
A) Client (Customer)

This is a major component of the framework concept. In organisational business management systems, client satisfaction is of paramount importance for the success of the business and the systems. The client requirements run through and have influence at every stage and process in the organisation. The revised Quality Management System, ISO 9001:2000 focuses heavily, on the organisation fulfilling the customer (client) requirements and resulting satisfaction. It must be noted that in addition to direct client (customer), wider stakeholder concerns are to be considered under this section. It includes the regulatory requirements related to Health and Safety, Environment and product specific.

B) Leadership

The leadership provides the strategic direction to the organisation. Top management provides the commitment and resources for the business management systems and reinforces the organisational client (customer) focus. This component in the framework concept should cover and exceed the relevant requirements of the systems for Quality, Health and Safety and Environment and should endeavour to achieve excellence envisaged in EFQM model.

Figure 9.1, Framework Concept for Integrated Management Systems



C) Resources

The leadership provides resources for the business management systems to be run effectively and successfully. The framework considers people to be the major resource in any organisation. Provision of appropriate training and ensuring competency for the smooth running of business management systems and other business process come under the heading along with other resource requirements like finance, plant and equipment, work environment and space etc.

D) Business Processes

The framework envisages a process model for the business management systems. Organisation should map out its business processes, clearly identifying the process input and output, resources, interfaces, showing the interaction between different processes. The process mapping needs incorporating the Quality, Health and Safety and Environmental systems requirements for each process, in order to reduce the overlapping, duplication and facilitating timely and joint involvement of the concerned departments and teams in the each process.

E) Performance

This is also one of the main components of the framework concept. Organisation should develop internal and external performance measurement mechanisms like Key Performance Indicators and Benchmarking, to assess the effectiveness of the business management systems, identifying the areas for improvement, review, update and further progress. It should be noted that performance in the framework (fig 9.1) links and loops with the client (customers) component and the performance results feedback to the leadership. In addition to key business systems performance, people, customer and society performance, based on the EFQM

Model can also be incorporated in the organisations aiming to achieve excellence.

F) Continual Improvement

As envisaged in the ISO 9001:2000 Quality Management System and EFQM Model, the concept for integrated management systems framework is a dynamic one. Interlinking all the components, it envisages a continual business systems improvement through internal, external, customer (client), performance-feedback loops.

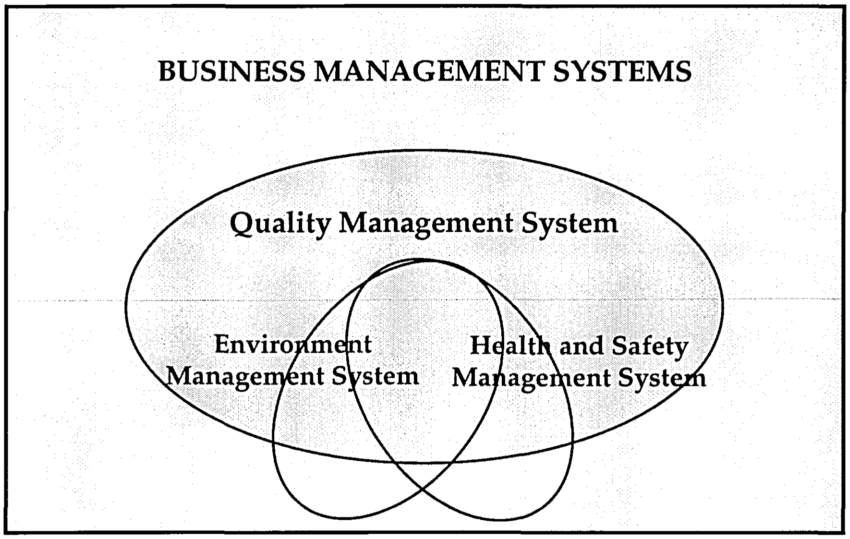
9.6. INTEGRATED MANAGEMENT SYSTEMS STRUCTURE

The following sections explain the structural elements of the integrated management systems framework.

a) Structure of Integrated Management Systems

The integrated management systems are suggested to be structured using Quality Management Systems as a base system. The Quality Management System based on latest ISO 9001:2000 is broad in scope and in a changing business environment it is increasingly seen more as a business improvement and business development system than merely addressing the quality certification requirement. The Quality Management System if taken in its broader sense would cover the Health and Safety and Environmental Management Systems requirements, keeping the specific requirements intact. Appendix E, "links between management systems" gives the clause by clause links between systems for Quality (ISO 9001:2000), Health and Safety (OHSAS 18001:1999) and Environment (ISO 14001:1996), taking Quality as a base system. Based on those links, fig 9.2 explains the schematic boundaries of the integrated management systems, where integrated Quality, Health and Safety and Environment are shown as a part of the bigger business management systems structure.

Figure 9.2, Schematic Diagram of Integrated Management Systems



b) Extent of Management Systems Implementation

For achieving the integrated management systems the organisation has to implement the systems for Quality, Health and Safety and Environment throughout the organisation. Scope of Health and Safety and Environment systems already covers the whole organisation and all its activities. However, Quality systems can be limited to certain departments in the organisation. For the integrated systems to be effective it is essential that Quality System also covers the whole organisation as far as practically possible.

c) Health and Safety Management System Certification

The integrated management systems framework requires the organisation to have a defined management system in place for Health and Safety, along with Quality and Environment (based on the OHSAS 18001 or BS 8800 and preferably certified).

9.7. INTEGRATED MANAGEMENT SYSTEMS MANAGEMENT

The diagram given in fig 9.3 illustrates the management (documentation) components of integrated management systems framework. The main components for the framework management are briefly explained as follows.

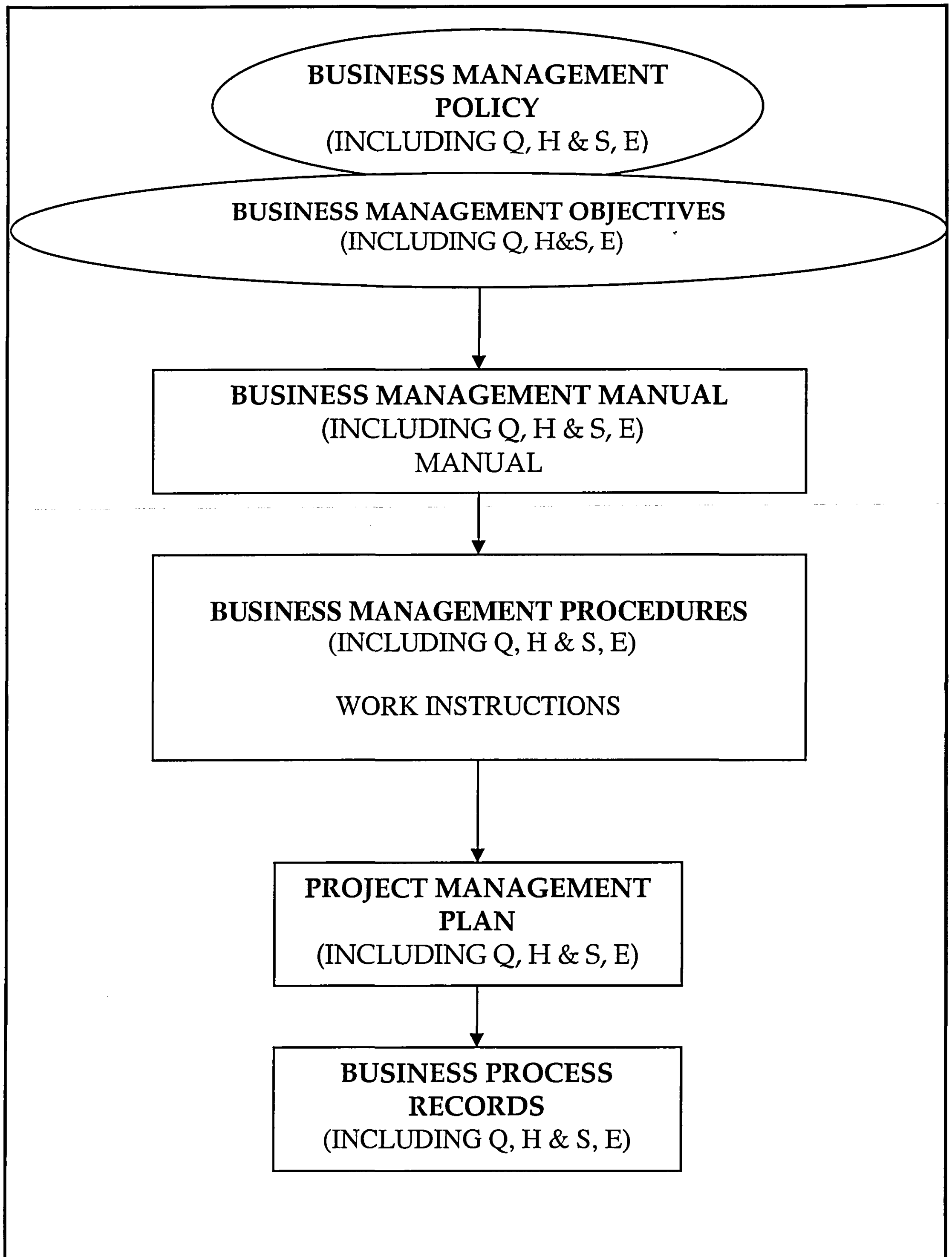
a) Policy

The framework suggests the development of an in integrated Quality, Health and Safety and Environmental Management Policy, which may be called a **"Business Management Policy"**. The policy does not only demonstrate the commitment, responsibilities and arrangements for Quality, Health and Safety and Environment but outlines the other organisational ethos and ethics, making the policy to cover the business not just systems management.

b) Objectives

To implement the business policy, clear set of business management objectives should be set out for Quality, Health and Safety and Environmental aspects (including on-site project activities) and other business management activities.

Figure 9.3-Integrated Management Systems Documentation



Q, H & S, E: Quality, Health and Safety and Environment

c) Organisational Process Map

The integrated management systems are to be based on a process model in the organisation as envisaged in the framework concept. As explained earlier in section 9.5.B, under the Business Processes, the organisation needs to develop a process map of all its activities. A typical process map for a construction contractor organisation is given in fig 9.5 for illustration. The organisational process map should identify all the relevant references to the Quality, Health and Safety and Environmental Management Systems.

d) Business Management Manual

The business management manual works as a comprehensive reference document for Business Management Policy, Business Management Objectives, Organisational Business Processes, details of all Procedures, Quality, Health and Safety and Environmental systems specific requirements. Ideally, the manual is suggested to be IT based, available on organisational intranet to everyone concerned. As being very comprehensive, a computer based manual will facilitate easy access, moderation, updates, reviews and procedural and document control.

e) Work Procedures and Instructions

With reference to the organisational processes and the business management manual, detailed process procedures and work instructions should be established, incorporating the integrated Quality, Health and Safety and Environment Management systems along with other business processes.

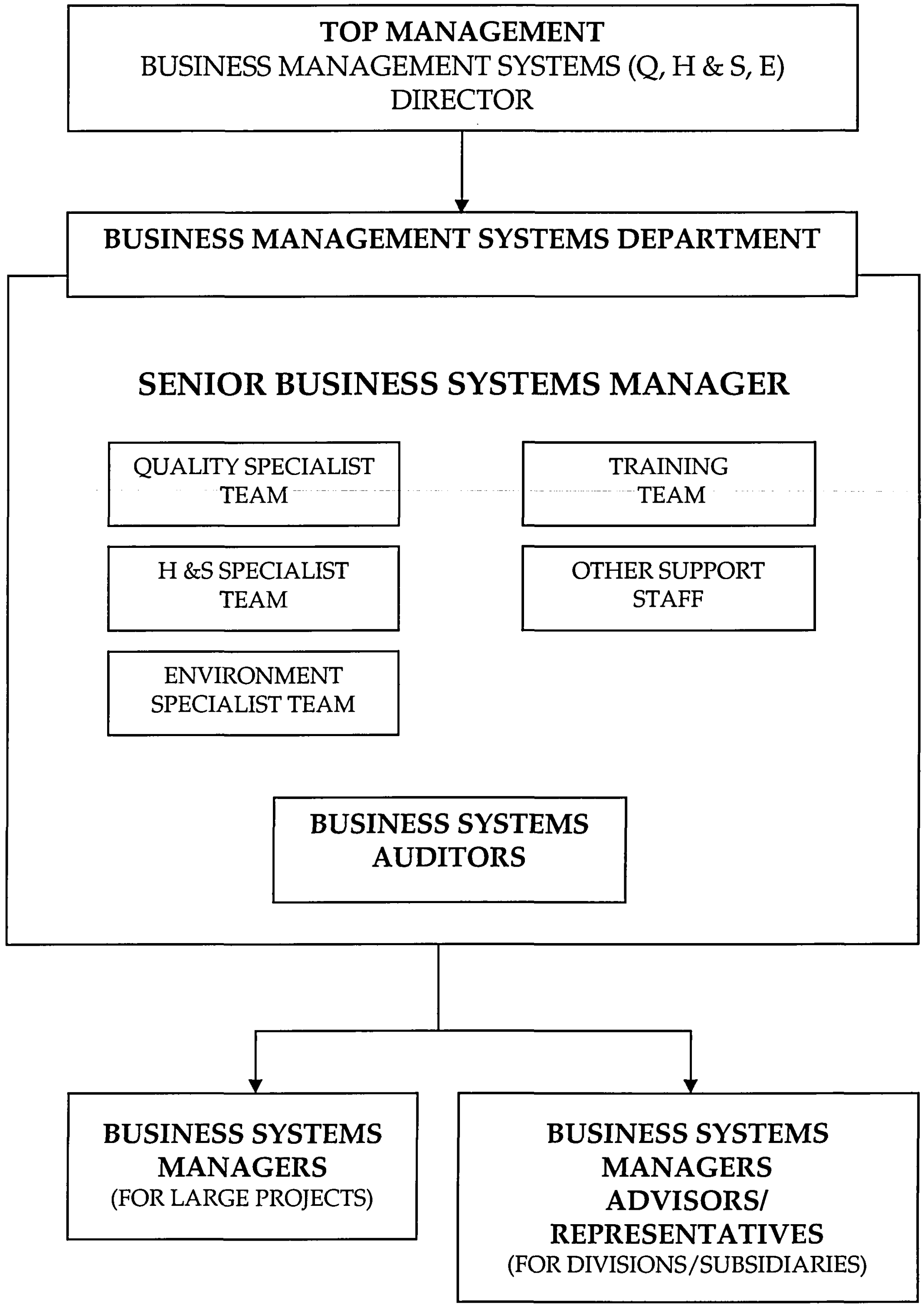
f) Business Management Systems Department

The organisation is suggested to establish a business management systems (Business Improvement) department in a central and interfacing role to take care of the business management systems (Quality, Health and Safety and Environment). The departmental structure is explained in fig 9.4. The department may have specialist teams/groups/individuals to cater for the technical and specific requirements of relevant Quality, Health and Safety and Environment systems. Training is a key element in the business management systems implementation. It is also the essential part of business management systems development and the continuous improvement. Hence, it is strongly recommended that the training section of the business is aligned or brought under Business Management Systems Department. The department should be supported by Business Management Systems Auditors and Business Management Systems Managers.

g) Organisation of Business Management Systems Department

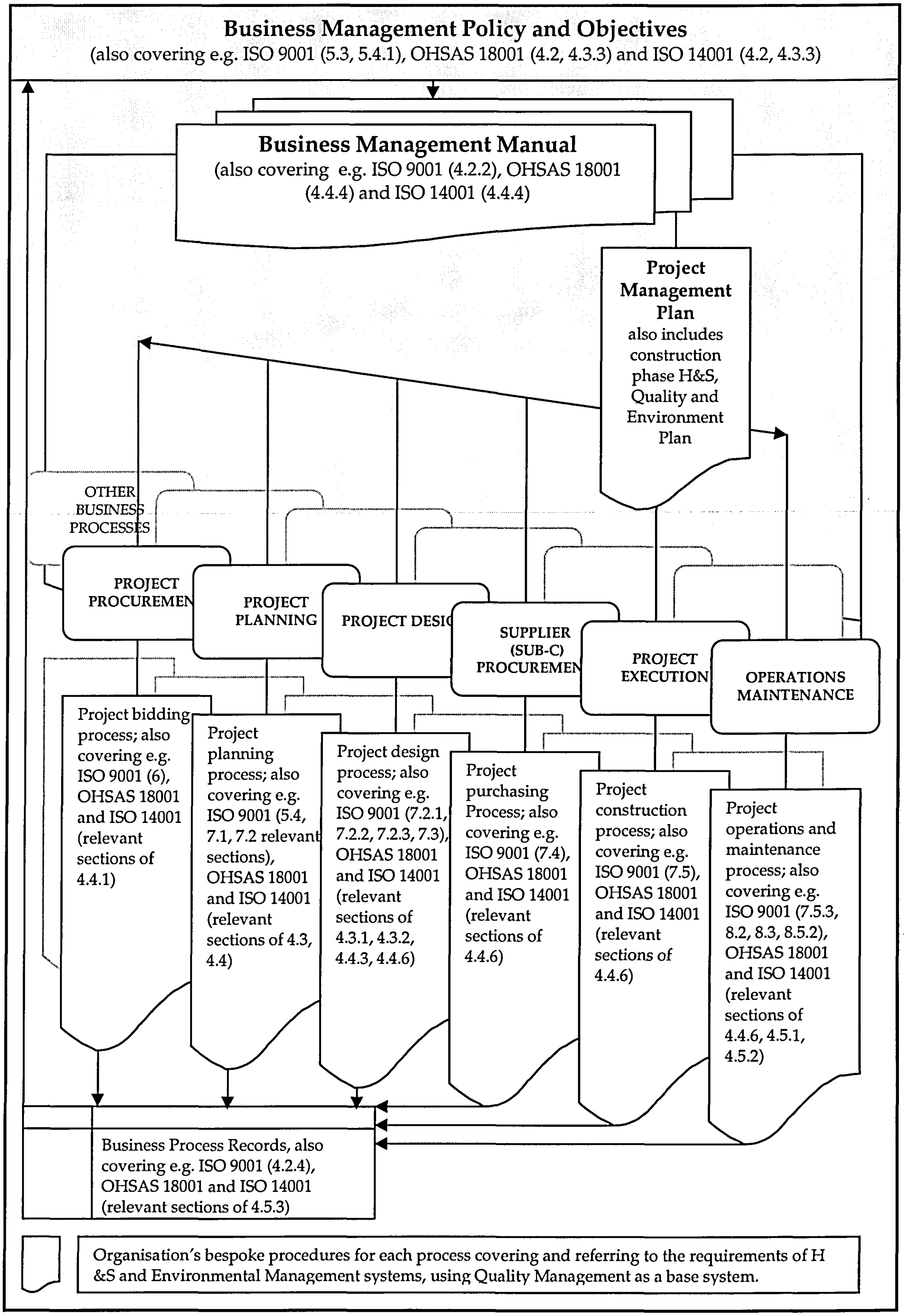
As given earlier in section 9.6, the integrated management systems framework suggests the implementation of Quality, Health and Safety and Environmental management system around the whole organisation. Hence, the organisational structure for the business management department should reflect the same strategy. The business management systems department may be established at group (plc) level and branched out to different divisions and subsidiaries or it may be established at each independent division or subsidiary, looked after by an integrated systems organisational structure at a head office or group level.

Figure 9.4-Management Structure for Integrated Management Systems



Q, H & S, E: Quality, Health and Safety and Environment

Figure 9.5-Typical Contractor Processes Incorporating Systems Requirements



h) Organisational Intranet

As referred to earlier, organisation may establish an organisation-wide computer based document management system to facilitate the business management manual and its associated documentation. It is suggested that instead of issuing hard copies, the business management manual may only be made available and accessible through organisational intranet. On remotely located projects, the manual may be loaded on laptop computers, which are then regularly updated.

i) Project Management Plan

The Project Management Plan forms a key document for the implementation of integrated management systems by contractor organisations. The framework envisages a single **"Project Management Plan (PMP)"**, containing the requirements of Quality, Health and Safety (construction phase Health and Safety Plan), Environment and other project management related information. It should be a live document, regularly updated as the project progresses. The PMP need not to be a very big document, as the frequent relevant references should be made to the Business Management Manual, which would be easily and readily available on the organisational intranet.

j) Business Process Records

To fulfil the Quality, Health and Safety and Environmental systems and other organisational and regulatory requirements, business process records are to be maintained in a suitable medium. The records should be stored in a process sequence as a single set, not categorised in the specific Quality, Health and Safety or Environmental sections.

k) External Audits

The business management systems are to be audited externally for gaining or maintaining certification for Quality (ISO 9001:2000), Health and Safety (OHSAS 18001: 1999) and Environment (ISO 14001: 1996) systems. However, instead of separate assessment or surveillance visits, the framework recommends integrated audits of the business management systems against relevant Quality, Health and Safety and Environment standards. In the business management systems, separate management systems structure and documentation for Quality, Health and Safety and Environment may not be clearly visible. Nevertheless, the integrated business processes incorporating Quality, Health and Safety and Environment aspects would fulfil the requirements of the relevant standards.

l) Business Systems Auditors

The framework strongly suggests the Management Systems Internal Auditors; trained to conduct internal audits for integrated Quality, Health and Safety and Environment systems. It is recognised that this will require high level of skills, competency and training. However, when all business management processes incorporate the integrated Quality, Health and Safety and Environmental aspects, the task should become less compartmented and more a general audit of compliance with the business processes. The attitude of the management systems auditors should strictly be proactive and advisory for successful implementation of the business management systems.

m) Business Systems Managers

The business management systems may be supported by Business Management Systems Managers, who should be capable to manage the integrated Quality, Health and Safety and Environmental management systems. They are suggested to be deployed on larger projects to support the business management systems implementation and documentation requirements.

n) Integrated Product (Project) Approach

This aspect re-emphasises the importance of an integrated approach for a construction project from a construction contractor perspective. It is strongly recommended to clearly map out the business processes including the project related and identify and ensure the involvement of all relevant parties and staff (e.g. Quality, Health and Safety and Environment related) at very early stages in the project associated processes.

o) Documentation at Supervisor Level

It is recommended to keep the documentation at the project operative, foremen or supervisory level at bear minimum. Long lengthy reports should be avoided as far as possible and instead replaced with simple check/tick style information sheets with possible colour coding copying. This will be easier for the staff at sharp end to comply with the systems requirements and make them successful.

p) Sub Contractor Training

The majority of traditionally small to medium size construction sub-contractors are not fully trained in the understanding and compliance with Quality, Health and Safety and Environmental systems. Hence, in the supplier (sub-contractor) procurement processes, organisations must insure the inclusion and compliance with the appropriate evaluation mechanisms. However, the partnership agreements and development of long term relationships with the supply chain should be aimed with a view of making it fully par with the business management systems. As a short term measure, making the Construction Skill Certification Card necessary for all staff working on the site might be helpful especially from a Health and Safety and to some extent Environmental perspective.

9.8. FRAMEWORK IMPLEMENTATION

The implementation of the framework for integrated management systems depends on the level where the organisation is in terms of the management systems for Quality, Health and Safety and Environment and above all the top management commitment to integrated management systems. Achievement of integrated business management systems suggested in the framework would be a gradual process. For guidance, following steps are suggested for the implementation of the framework for integrated management systems.

Phase 1: Organisation maps out all its business processes incorporating the Quality, Health and Safety and Environmental systems requirements. Business Management policy, objectives and manual are established and procedures and work instructions set out.

Phase 2: Policy and objectives are communicated to the whole organisation and business management manual made accessible to everyone concerned, ideally on a computer based organisational intranet.

Phase 3: Based on the business management processes, integrated management systems are implemented for Quality, Health and Safety and Environment systems around whole organisation. Integrated internal audits are put in practice. Certification is obtained against relevant Quality, Health and Safety and Environmental Management standards (depending on organisational business requirements).

Phase 4: Business management systems department is established, making the organisational structure homogenous and consistent. Integrated external audits and surveillance visits are sought. Through regular reviews of internal and external performance feedback, business management systems are improved and a culture of continual organisational improvement is established.

Phase 5: Organisation gradually endeavours to achieve excellence based on the framework concept and further towards EFQM Model.

9.9. SUCCESS FACTORS FOR INTEGRATED MANAGEMENT SYSTEMS

The framework recognises that each contracting organisation is different in its structure, management style and the business. However, all organisations share some standards systems and processes. Keeping that in view, few factors among potentially many have been identifies as follows, which may contribute in the success of the framework for integrated management systems.

a) Organisational Culture

It is important that the top management demonstrates the commitment for the business management systems. A trust building, proactive, co-operative and transparent organisational culture, driven by the top management will play a very important role in the success of this framework.

b) Communication and Involvement

It cannot be emphasised more, that the lack of effective communication will render the framework for integrated management systems merely a paper system. It is important that all the concerned parties, including the supply chain and partner organisations are involved while establishing the processes to ensure the early feedback and development of a commitment to the integrated management systems. At any subsequent change, upgrade, review or improvements stage all parties from the staff at the sharp end to the supply chain must be involved and outcome, actions or changes readily communicated. An IT based systems would be more helpful for effective communication and involvement.

c) Documentation

While establishing processes, procedures and work instructions, it is also important to keep the systems and required documentation less prescriptive and bureaucratic, allowing some flexibility. More standard and generic documentation may be used, which can be adapted to broader situations and different projects.

d) Resources

The implementation and success of business management systems also depend on the availability of appropriate resources especially for projects. The main resource is the staff that must be appropriately trained and skilled in the use of business management systems (integrated management systems) and the communication (IT training). The thorough training, both in systems and in computers need investment, however, yields high returns. The resource (staff) also includes the other people working on the project sites e.g. suppliers and sub-contractors.

e) Project Procurement Methods

The way an organisation wins the work will also have an effect on the successful implementation of the business management systems. Traditional competitive tendering does not leave enough room for the availability of appropriate resources and also forces the organisation into accepting somewhat unrealistic project schedules. For success of the business management systems the organisation should endeavour for more partnerships, long-term framework agreements and PFI type projects.

9.10. CHAPTER SUMMARY

Chapter nine was one of the key chapters of the research project. It presented the outcome of the research conducted in UK contactor organisations employing the secondary (extensive literature review) and the primary (case studies and the questionnaire survey) methods of research. Both qualitative and quantitative research techniques were employed to authenticate the ideas, patterns and themes emerging in the project. The chapter presents a best practice framework developed from those ideas, pattern and themes, for the implementation of integrated Quality, Health and Safety and Environmental Management Systems in contracting organisations. The framework was elaborated in three detailed conceptual, structural and management sections. Interestingly, the chapter considered the integrated management systems for Quality, Health and Safety and Environment as core business management systems and suggested the integrated systems with addition of other core business management requirements and processes to be called **Business Management Systems.** The different implementation phases were also outlined, facilitating the gradual establishment of the framework. The chapter outlined in the end the different success factors identified from the best practice and suggestions collected from the research work. The next chapter covers the industry validation of the framework for integrated management systems.

Chapter 10

IMS Framework Validation

10.1. AIMS OF THE CHAPTER

In the previous chapter, the framework for integrated management systems developed in this research project was presented. The process adopted for the industry validation of the framework is reported in this chapter. In the beginning, the route taken for the validation and its justification are outlined. The response received from the industry to the framework is then presented. Each feedback is followed by the analysis of the comments/suggestions made and any follow up actions taken. The feedback section is followed by the sum up of the validation process, summarising the views of Quality, Health and Safety and Environmental management systems practitioners on the framework for integrated management systems developed in this research project. The chapter concludes with a chapter summary.

10.2. IMS FRAMEWORK VALIDATION PROCESS

To validate the integrated management systems framework, presented in the previous chapter, it was decided to approach the most proactive managers from the case organisations (organisations details given in chapter 7). The option of an external validation (outside Construction Industry) was regarded to be invalid and outside the scope of research work as the framework has been developed for construction contractor organisations. However, within the industry the integrated management system is a relatively new initiative. To identify the individual expertise and involvement with integrated systems, necessary to assess the validity of the framework is difficult. Nevertheless, some organisations who took part as case studies are highly advanced and at a leading edge of integrated management systems in the construction industry. Those organisations were also aware of the contextual background of the research project. From the in-depth interviews conducted during the case studies, the individual level of awareness and involvement with integrated management systems has been assessed already. The feedback on the framework from the leading edge managers who are deeply involved in developing and establishing the integrated management systems in the organisations that are pioneers in the application of integrated systems, provides a strong validation of the framework, given the scope of the research project. Five managers were selected to validate the framework from the case organisations. Four managers returned with the feedback, with the response rate of 80%. The team providing feedback on the framework included the Group Integrated Management Systems Manager in Organisation B5, Business Improvement Manager in Organisation B4, Quality & Environment Manager (joint position) in Organisation A2 and the Quality Manager in Organisation A1. Each manager was provided a copy of the framework. They were asked to assess the framework for its practicality, validity, for moderation, or any identifiable improvement requirements.

10.3. FEEDBACK

Very positive and encouraging feedback was received on the framework of integrated management systems. Nevertheless, some suggestions were made to further moderate and improve the framework. The suggestions from each manager and the follow up actions and response are presented as follows.

1. Group Integrated Management Systems Manager (Organisation B5)

-The proposed system is written for large companies, this does not have to be so, smaller companies can develop a system which is less complicated but follows the same frame work

- You suggest a department for the management of the system across all parts of the business, you don't necessarily need that, some parts of a big organisation vary so much that they need different system, maybe the same framework but not necessary the same system. We recently devolved from a central department to individual businesses.

-The success of the system does not depend on the form of subcontract or procurement method. It should cater for all existing procurement routes.

- I could not find anywhere in the report a heading for the benefits of the system, this is very important. Integrated systems reduce costs in auditing, managing and maintaining compared to individual systems, improvement to one process leads to improvement in QHS&E. There are a lot of other benefits you could mention.

Feedback analysis:

- The framework has been developed for the organisation having management systems in place for Quality, Health and Safety and Environment and preferably certified. The majority of the small contractor organisations are not at that level of systems implementation. The establishment of Quality, Health and Safety and Environment management systems has huge cost implications, deterring the small organisations. However, as suggested in the feedback the best practice elements of the framework can be equally adopted by the small organisations.

- The Business Management Systems department suggested in the framework for integrated management systems is meant to work merely as a co-ordinating department. It should not be any hindrance to decentralisation process. Each organisation may adopt the organisational structure according to its own complexity and requirements.

- The framework of integrated systems does not recommend any specific procurement route. However, during the research, the traditional competitive tendering was identified as a cause of resource shortage for systems implementation because of marginal profits. The framework is not designed to differentiate between the project procurement routes as long as appropriate resources are available for effective systems management.

- The benefits of the integrated management systems are given in chapter three, four, five and seven. The vast list of benefits of integrated systems given earlier in the thesis is in line with the ones identified in the feedback.

2. Business Improvement Manager (Organisation B4)

I concur with your success factors and particularly like the framework you have proposed - especially as I see a lot of what I have already done to bring an integrated BMS (Business Management Systems) *into xxxxxxx* (organisation name)*! In fact the only element that we haven't already got in place is the integrated systems team, but then from our starting point, we were integrated in all but name anyway.*

3. Quality and Environment Manager (Organisation A2)

-I've read your report and it is a good summary of the steps someone with knowledge of management systems would have to follow to develop the structure of an IMS.

-You've undertaken a difficult task in producing this guidance. Different companies have different reasons for doing things and objectives. Different individuals have different levels of knowledge. Different companies have very different structures.

-I like your diagrams; they are clear with perhaps the exception of figure 9.5. What is generic information (from a manual and procedures) and what is project specific (from plans)? This differentiation of what is generic and what is specific I think is the key.

-For example, we have partially integrated Q&E and are now thinking about how we complete the process. I have knowledge of 9001 and 14001 and the theoretical system side, but the key will be to consider how we integrate the practical side of Q&E on site (by our staff and subcontractors) and then to work this back through the stages of the system (site inspections, Q&E plans, method statements, pre-start meetings, subcontractor orders, enquiries, risk registers etc.).

-Your diagrams in the main refer to a large contractor (an IMS department) and the problems caused by competitive tendering. True, large contractors have this luxury and many are structured as you describe, and yes larger projects under frameworks agreements and PFI have an improved chance of system success on site. However, successful IMS operation does not depend on these approaches - as we are demonstrating (although slower than I would like). Achieve the practical, project specific end of the system then recording and formalising the IMS becomes a clearer and easier process.

Feedback analysis:

- The framework for integrated management systems is a best practice guide. Drawing from the prevalent good practices in the construction and other industries it provides a structural framework to guide the integration process in contractor organisations. Still, integration is a complex process, and the successful implementation depends on various factors. As discussed earlier, it is each organisation's own decision, whether to integrate the systems and if yes, how and up to what extent.

- In the figure 9.5, given in the previous chapter, a typical generic model of construction contractor processes has been illustrated. Each organisation is envisaged to develop the process model based on its specific processes and activities. However, most contractor organisations share many common and generic higher level processes. Moreover, as identified in the recommendations for the future research work, there is more work needed to study the different procedures and documents related to Quality, Health and Safety and Environment systems to cover the operational side of integrated management systems.

- The issues of large contractor organisations and the effects of procurement methods have already been covered in the feedback from Group Integrated Management Systems Manager (Organisation B5).

4. Quality Manager (Organisation A1)

I have read the document and my comments are:-

1) *Good effort for which I congratulate you.*
2) *Training for Integration does not seem to be covered!*
3) *Perhaps you need to address the advantages & disadvantages?*

4) *What about IT. ?*

5) *What about the future?*

Feedback analysis:

- Sufficient training on the management systems Quality, Health and Safety and Environment has been identified as one of the success factors of the integrated management systems framework. However, the research does not support the need for specific training on integration. The training to deal with integrated management set-up and documentation would be needed; nonetheless, the scope of Quality, Health and Safety and Environment issues is different. Mixing the training might overcomplicate the systems.

- Advantages and disadvantages have been covered in the chapter seven (important to note that only the copy of the framework was sent out for validation not the whole thesis).

- The framework strongly recommends the extensive use of IT systems especially the establishment of a comprehensive document management system for the management systems manual. It is suggested in the framework that the manual and the related documentation be made available on a company intranet. It should be accessible across an organisation and on projects through the use of laptop computers (wherever applicable).

10.4. SUM UP OF IMS FRAMEWORK VALIDATION

A number of other alternative options were discussed before approaching the most proactive managers in the case organisations for the validation of the framework for integrated management systems. Some possible alternate options included the trial application of the framework, approaching the industry professional bodies and the standard organisations and approaching the independent industry practitioners etc. However, after assessing the scope and the limitations of the research project, the decision to approach the proactive managers in the case organisations was finalised. Overall, a very positive and encouraging feedback has been received from the industry practitioners who are at the leading edge in developing the integrated management systems in the UK construction industry. Some managers have commented on the application of the framework restricted to the large organisations. However, as discussed earlier, the framework is aimed at organisations preferably having the certified systems in place for Quality, Health and Safety and Environment management systems. Some recommendations, for example the establishment of a Business Management Systems department, are the best practices and taken from the suggestions made during the research. Organisations, benefiting from the framework are envisaged to adopt the process and structure for integrated management systems according to their own requirements, size, flexibility and complexity. Moreover, the success of the integrated management systems does not depend upon the outright removal of traditional tendering procurement route. The alternative procurement routes have only been recommended in the framework to improve the resource availably for the systems implementation. It is important to emphasise, that the integration of management systems is a relatively new and complicated management exercise. More work is needed (as identified in the next chapter) to cover the operational side of the systems implementation, the detailed documentation streamlining, and the development of an IT based document management system for the effective implementation of integrated management systems in construction contractor organisations.

10.5. CHAPTER SUMMARY

This chapter reported the industry validation of the framework for integrated management systems developed in the previous chapter. In the beginning of the chapter, the process adopted for the validation and the justification of the chosen option was elaborated. The external validity outside the construction industry was not relevant owing to the focus of the framework on contractor organisations. Nevertheless, this chapter described that the proactive managers in some of the pioneering and leading edge contractor organisations with respect to integrated management systems were approached to validate the framework. In the feedback section, the outcome of the validation process was outlined. The framework generally returned a very positive and encouraging feedback. Furthermore, the details of some suggestions made and follow up analysis of each suggestion was provided. Since, only the copy of the framework was sent out for validation due to logistical reasons, issues like, benefits, advantages and disadvantages from the framework were raised, which are already covered elsewhere in the thesis. The validation process was summarised in the sum up section. This section outlined some of the alternative options discussed for the validation. However, due to the limited research scope, the route to approach the proactive managers in the case organisations was finalised. The sum up section also outlined and explained some main suggestions/comments from the feedback received from the industry on the framework. The next chapter concludes the thesis, presenting the conclusions of this research work.

Chapter 11

Conclusions

11.1. AIMS OF THE CHAPTER

This is the final chapter of the thesis. Mainly, it reports the conclusions drawn from this research work. The conclusions cover all the main research phases including the literature review, case studies and questionnaire survey. It is followed by a summary of the conclusions, which outlines the outcome of this research work. The integration of Quality, Health and Safety and Environment management systems is a vast, complicated and relatively new research area. This thesis is evident that no single research project can encompass all the issues surrounding the integrated management systems. Therefore, the limitations to this research work are explained. In continuation to the limitations, the chapter also identifies the areas in the integration of management systems, where future research is recommended. The chapter concludes with a chapter summary.

11.2. MAIN CONCLUSIONS

The research project was aimed at developing a framework for the integrated management systems for the application by contractor organisations. This was achieved by employing three main data sources. Firstly, a comprehensive literature review was conducted (given in chapter one to four) as a primary source of secondary data. Based on the analysis of literature review, field pilot studies were conducted to validate the findings of literature analysis and to identify any further issues (given in chapter 5). The pilot studies provided the guiding rails for the first source of the primary data collection. The case studies were completed in five major UK contractor organisations with help of in-depth interviews (22 interviews, more than 87000 words data) and the relevant document collection (details given in chapter 7). Qualitative analysis of the case studies identified a need for further research of the relevant issues. A questionnaire survey was conducted in 90 UK contactor organisations (a total 450 questionnaires were sent out), as a second source of the primary data. The survey data was quantitatively analysed (given in chapter 8). Finally, based on the analysis of the literature review, case studies, and the questionnaire survey, a framework for the integrated management systems was developed (given in chapter 9). In effect the major finding of the research project is the framework itself which incorporates all the issues, patterns and themes identified from the thorough analysis of all the data. Nevertheless, some main conclusions of the research are outlined as follows:

- Construction industry plays an important role in the UK economy. However, the industry performance on Quality issues is not very impressive. Environmentally, the industry is one of the main contributes to the depletion of natural resources. Moreover, the construction is regarded as a high risk industry from a Health and Safety perspective, with the highest rate of fatal accidents in UK and across the Europe.

- The rising environmental awareness is pressurizing the industry for a better performance. Use of policy instrument (tax and stringent regulations) by UK government is also playing its part.

- Quality, Health and Safety and Environment are important aspects for any organisation in the current business environment. A growing number of UK contractor organisations also have the Quality (ISO 9000:2000) and Environment (ISO 14001:1996) management systems in place. In addition, Health and Safety is considered a top priority. Organisational structure for Health and Safety is in place in the majority of contractor organisations.

However, certification to OHSAS 18001:1999, Health and Safety management systems is not common.

- Quality, Health and Safety and Environment management systems are driven by clients, legal requirements and improved organisational image among other factors in the contractor organisations. However, the integration of management systems is primarily an organisational decision, mainly aimed at streamlining the systems' documentation and audits.

- "Quality" is perceived on construction sites in terms of Quality Control and Quality Assurance than a broader Quality management concept.

- Following the footsteps of Chemical and Manufacturing industries and encouraged by the registration organisations, the contractor organisations are showing progress in integrating the management systems.

- Non-user-friendly bureaucratic documentation, shortage of resources, attitude of Sub-contractors, insufficient training and project planning problems are among the main discontentment factors with the implementation of Quality, Health and Safety and Environment management systems.

- Lack of timely information from concerned parties (client, engineer and architect etc.) and unrealistic project schedules hamper the effective project planning.

- The current Health and Safety audits and inspections regime on sites is somewhat formal and reactive. More proactive and advisory attitude will help project staff in the better management of Health and Safety.

- Structurally, Quality, Health and Safety and Environment management systems are considered similar and are recommended to be integrated.

- The "integrated management systems" are found difficult to define conceptually. Frequently, the integrated systems are viewed as a way to streamline the systems manuals, documentation and audits.

- No standard guidelines are available to UK construction contractor organisations for the integration of Quality, Health and Safety and Environment management systems. Different approaches and methods are being adopted and suggested taking leads from the standards, CIRIA report (C509) on integration and some British Standards Institute publications.

- The contractor organisations are at varying levels, from a very basic to advance in the integration of Quality, Health and Safety and Environment management systems.

- An integrated project management plan, fulfilling the Quality, Health and Safety and Environment requirements among other project functions, is an important element of the integrated management systems in contractor organisations.

- Scope of Quality management system is wide. It covers the majority of organisational activities and may be adopted as a foundation for the integrated management systems.

- The integrated management systems should be based on a process model (stipulated in ISO 9000:2000 also). The model encompasses the existing organisational processes identified from a process mapping exercise. The "Process Protocol" may be used as a reference point for the organisational process mapping. The process model should incorporate the relevant requirements of Quality, Health and Safety and Environment standards.

- Information technology plays a significant role in the establishment and subsequent success of the integrated management systems. The best practice suggests the development of a document management system accessible on the organisational intranet. The updated integrated manual and the relevant systems documentation easily made available on the organisational wide IT systems. Regularly updated laptop computers may be used for remote projects.

- Integrated Quality and Environmental audits on the project sites are gaining momentum. However, fully integrated Quality, Health and Safety and Environment audits are not common due to perceived legal sensitiveness of Health and Safety. Nevertheless, an integrated process audit could be a viable alternate.

- The certification of Health and Safety management to OHSAS 18001:1999 is strongly recommended for the effective implementation of integrated Quality, Health and Safety and Environment management systems.

- Some internal politics is involved in the integration of management systems. Health and Safety Department feels slightly threatened that integration would result in merging of the relevant departments, with Quality assuming a dominant role.
- Inadequately trained Sub-contractors are a hurdle in implementing the integrated management systems. Partnering and long term agreements

would develop the necessary trust and familiarity with the integrated management systems.

11.3. SUMMARY OF THE CONCLUSIONS

The development of a novel knowledge based framework for integrated management systems for application by the construction contracting organisations was the principal aim of this research work. The developed framework presented in chapter 9 has been validated for its application by the industry practitioners (details in chapter 10). The main conclusions given above correspond to the research objectives set out in chapter 1.

The integration of Quality, Health and Safety and Environment management systems is increasingly gaining momentum among construction contractor organisations. In the organisations, having the management systems for Quality, Health and Safety and Environment in place, integration helps in streamlining the systems, removing the duplication, saving the audit and surveillance costs, making it easier for staff at the sharp end to buy-in, improving the organisational performance, making the effective and efficient use of systems implementation and paving the way for greater organisational integration towards a Total Quality Management. However, there was no guidance available to direct the interested organisations. The report produced by CIRIA (C509) in 2000, helped increase the awareness of integration of management systems in construction related organisations. However, it did not cover the issues thoroughly to work as a guiding document. In addition, because of the timing of the report it did not encompass the latest version of Quality management systems ISO 9000:2000 in greater detail. This research work fills that gap. Drawing from the best practice in construction and other industrial sectors and based on the original research work carried out through extensive literature review, pilot studies, case studies and questionnaire survey, this research has produced a unique framework for the integrated Quality, Health and Safety and Environment management systems for the application by the construction contractor organisations. This novel framework has been validated by the industry practitioners. This research work and the framework enhance body of knowledge in this relatively new and complicated research area and open the avenues for other researchers to carry it forward. The novelty of the research work and contribution it makes is evident from the fact that during the case studies and the questionnaire survey, the respondents repeatedly asked for the finding of the research to be sent to them once the work is completed.

Currently, for the construction contractor organisations this framework is the only available best practice guide in the field of integrated management systems that draws on the original research work and the best practice elements in this growingly increasingly field of interest. The framework covers the major elements and issues related to IMS and will help in establishing the fundamental infrastructure and management structure in place in the organisation interested in integrating the management systems for Quality, Health and Safety and Environment.

The framework does not include the maturity time scale for the implementation of integrated management systems, owing to the fact that construction contractor organisations vary greatly in the size, complexity of operations and the structure. The time scale for implementation of integrated management systems will depend on above factors in addition to the top management support and willingness of the organisation to integrate the Quality, Health and Safety and Environmental management systems.

11.4. LIMITATIONS OF THE RESEARCH

Some limitations applicable to this research work are as follows.

- The study is confined to the UK construction contractor organisations.

- The number of UK contractor organisations is enormous. The organisation approached during the case studies and the questionnaire survey just form a representative sample.

- Only the top 100 UK contractor organisations were approached for the research. The project principally dealt with the integration of Quality, Health and Safety and Environment management systems, assuming the organisations would have implemented the relevant systems already. It is difficult for small contractor organisations to have the certified management systems in place for Quality, Health and Safety and Environment due to financial and resource constraints. During the research, the assessment of systems awareness of Sub-contractor organisations, which are mainly small to medium contractor organisations, proved the validity of the assertion.

11.5. SUGGESTION FOR FURTHER RESEARCH

As mentioned earlier in the thesis, the integration of management systems of Quality, Health and Safety and Environment is a very wide, complex and relatively new research field. The limited scope of this research project could not entirely cover the integrated systems from all facets. Hence, further research in the following areas is suggested:

- A study into the different procedures and document related to Quality, Health and Safety and Environment systems employed in the contractor organisation to identify the overlapping and duplication.

- A best practice IT based document management system for the implementation of integrated management systems.

- Links between the integrated management systems and wider sustainability issues in the construction contractor organisations.

- Benefits to small and medium size contractor organisations from the integrated Quality, Health and Safety and Environment management systems.

11.6. CHAPTER SUMMARY

This chapter concluded the thesis. In the beginning, the main conclusions from the research project were presented. It is worth noting that the analysis of literature review, case studies and the questionnaire survey (given in chapter four, seven and eight respectively) provide the research findings at each phase in details, which formed the basis for the framework development. The main conclusions of the research were followed by the summary of the conclusions. The section summed up the research findings. It explained the need for this research work, fulfilment of research aim and objectives, novelty of the work, contributions this research makes to the body of knowledge and the benefits to construction contractor organisations from the framework for integrated Quality, Health and Safety and Environment management systems. Appreciating the broadness and complexity of the research area and the restricted scope of this research project, the chapter outlined the limitations applicable to this research work. To continue this research work ahead, the areas for further research work were also identified.

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Appendix A

Typical Case Studies Interview Formats

FORMAT A1

Used in interviews with the Quality Managers in case organisations with separate management systems

QUESTIONS

A) EXISTING QUALITY MANAGEMENT SYSTEM

- How will you define the term 'Quality' from a construction perspective?
- What systems you have in the organisation for management of Quality?
- What is the scope and extent of the implementation?
- What management structure is in place for the Quality system?
- What benefits you have achieved from the implementation of Quality system?
- Are you fully satisfied with the performance of Quality system?
- What are the causes and level of dissatisfaction (if any)?
- Are you still facing any problems in the implementation of Quality system?
- Do you agree that planning is still an issue on sites for Quality management?
- How similar you think the Quality system is to other systems such as Health and Safety and Environment management systems?
- Can you specify some areas in systems (Quality, Health and Safety and Environment) which you find similar (or duplicating) and could be integrated?

B) PROGRESS TOWARDS INTEGRATION

- Have your organisation made any progress towards integrated management system?
- What is your understanding of the integration (meaning, scope, definition, terminology)?
- Why do you want to integrate management systems, main reasons?
- What advantages you anticipate from integrated systems?
- What approach for IMS you think would be appropriate for contractor organisations?
- Are there any specific reasons for that choice?
- Do you agree that organisations should start with integration of Environment, and Quality systems and leave Health and Safety on side at the moment?
- How can we bring together the Health and Safety management as it is being considered a very sensitive issue as far as integration is concerned?
- Do you see any disadvantages from integrated systems implementation?
- What would be the potential problems in implementing IMS?
- In your view what is the desirable and practical level of integration from a construction contractor perspective?
- What ways contracting organisations can achieve the true benefits from integrated systems?

C) PROPOSED IMS FRAMEWORK

- What are your views on adopting the TQM route for integration?
- Would it be effective to develop an integrated model based on a process model?

- What about using the Process Protocol as a model to represent the generic construction processes?
- Do you agree that integration should be much wider than document merging and should include other functions of the business besides Quality, Health and Safety and Environment management systems?
- How should we deal with the problem of different scope of systems, while integrating management systems?
- What would be the essential success factors for an integrated system?
- Would it be necessary for integration to have the Health and Safety system certified to OHSAS 18001 (or BS 8800)?
- How can we cut down the documentation from Health and Safety system while still complying with the legislation?
- How do you view the merging of management structures for Quality, Health and Safety and Environment?
- How best the site staff can be educated to recognise the benefits from systems.
- Do you agree that the Project Management Plan would be a key document in integrated systems on sites?
- Any suggestions on making the documentation streamlined so that the end users fill minimum number of forms without any duplication or repetition involved.
- How the integrated systems can be made easier and understandable for the site staff?
- How the early benefits from the integrated systems can be reaped to ensure its acceptability?
- How much resistance we should expect to integrated systems and how we can tackle it?

- Would you like to suggest any desirable characteristics for the framework?
- What are your views about single standard for Quality, Health and Safety and Environment specific to construction?

FORMAT 4B

Used in interviews with the Project Managers in case organisations having integrated management systems

QUESTIONS

A) EXISTING MANAGEMENT SYSTEMS

- How will you define the term 'Quality' from a construction perspective?
- What benefits you have achieved from the Quality, Health and Safety and Environment management systems on projects?
- Are you fully satisfied with the performance of management systems?
- What are the causes and level of dissatisfaction (if any)?
- Any problems you still facing in the implementation of the Quality, Health and Safety and Environment management systems?
- Do you agree that planning is still an issue on sites for Quality, Health, and Safety and Environment management systems?
- In what ways you found the systems for Quality, Health and Safety and Environment similar.

B) PROGRESS TOWARDS INTEGRATION

- How will you define integrated systems (meaning, scope, definition, terminology)?
- What were the original objectives for adopting integrated systems on projects?
- Have you achieved those objectives?
- Who owns the integrated systems on projects?
- What role IT plays in the integrated systems on projects?
- What advantages (benefits) you have from integration of systems on projects?
- How you have integrated Health and Safety management as it is being considered a very sensitive issue from a legal point?
- Are you fully satisfied with the integrated systems implementation on projects?
- Any disadvantages or even dissatisfaction from the integrated systems on projects?
- Any problems you have faced in implementing the integrated management systems on projects?
- Do you agree that systems have different scope and it is a problem for integration?
- Are you satisfied with the documentation involved with the systems. Has integration enabled reduced duplication or repetition, especially for Health and Safety systems and how?
- How site staff views integration. Do they fully accept and agree with concept of integration and understand it?

- Any specific education/training programme you have for the staff for IMS on projects?
- Any resistance you are facing (faced) to integrated systems.

C) PROPOSED IMS FRAMEWORK

- Do you agree that integration should be much wider and should include other functions of the business besides the Quality, Health and Safety and Environment management?
- What improvements or desirable/practical level of IMS you would like to see on projects?
- What is your opinion on the Project Management Plan as a key document on site in an integrated system?
- In ideal situation, what desirable characteristics or essential success factors you would like to suggest for the integrated systems?

Appendix B

Case Studies Data Analysis using NVivo

CASE STUDIES DATA ANALYSIS

The case studies generated a large (more than 87000 words) amount of data, comprising of interviews, documents and reports. All this was mainly qualitative data. As discussed in the research methodology (chapter 6), analysis of the qualitative data is not an easy task. It would have been very arduous to index, search, code and theorise this amount of data manually. Hence, a qualitative data analysis software NVivo (version 2.0.163) was used to analyse the case study data. The outcome of the data analysis is presented in chapter 7.

A brief step-by step, case study data analysis process is presented as follows:

1. The interviews recorded during the case studies data collection phase on a digital recorder (Olympus, DS-330), were downloaded on the PC using the software DSS Player 2002 [version 1.0.0 (5.0.2195 Service Pak 2)].

2. The data (interviews, reports and documents) were transcribed with the help of a DSS player and another software called Express Scribe.

3. For confidentiality reasons, the data was formatted to remove the names of the organisations, persons and any personal reference made.

4. As required by the analysis software NVivo, the data was converted into Rich Text Format (rtf).

5. The data was loaded on the software NVivo.

6. Based on the initial interview formats, the data was broadly categorised into primary nodes.

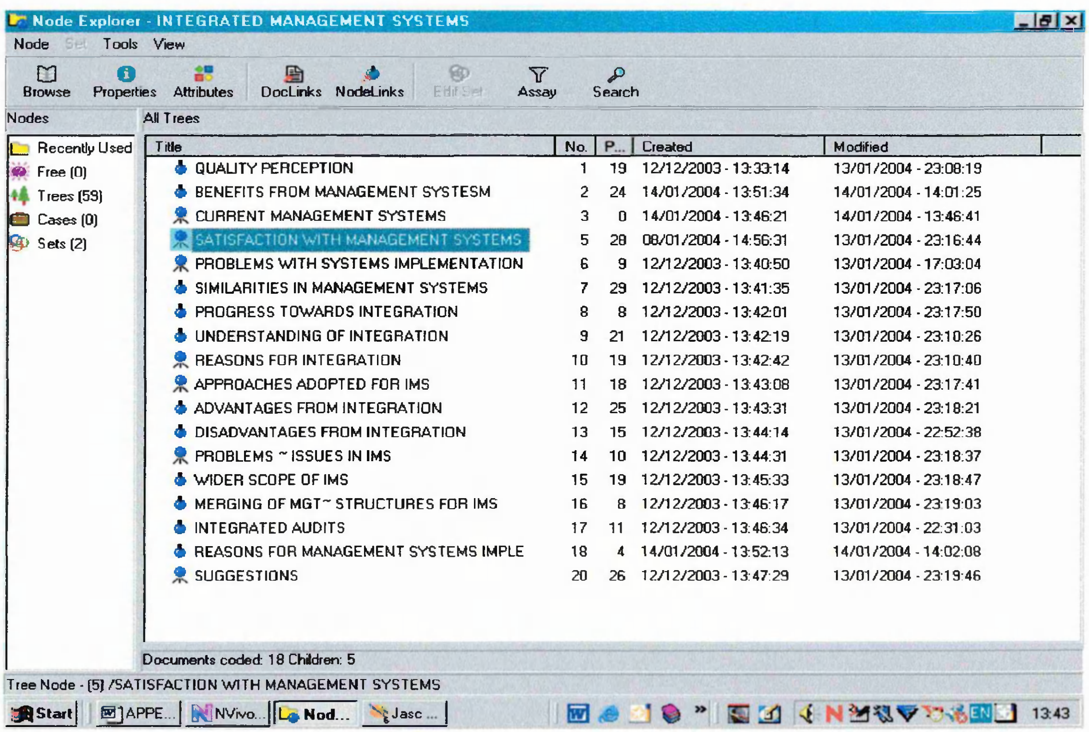
7. With the help of software, the data was searched and reviewed to code data into the primary nodes. Based on the data, nodes were amended, moderated and new ones created wherever needed.

8. Different child and sibling nodes (sub-nodes) were generated by further coding of the data from the primary nodes. This process generated different categories, themes and patterns. For illustration, the list of main nodes (primary coding) created from the case studies data is presented in figure 1. These nodes were further divided into a number of sub nodes.

9. The coded data (different categories, themes and patterns) was thoroughly and extensively analysed.

10. The analysis of the case studies data was reported under different headings and sub-headings (chapter 7).

Figure 1
Screen Display of the Primary Nodes created from the Case Studies Data



Appendix C

Survey Questionnaire

Please tick the relevant box beside each statement (question).

Statement	Agree	Partially Agree	Possibly	Partially Disagree	Disagree
1. The enormous amount of documentation is the main dissatisfaction with the management systems for Quality, Environment and Health and Safety.					
2. It is practically impossible to comply with all the procedures in the management systems because of too much paperwork and time and resource constraints.					
3. There is too much auditing on project sites. Sometimes staff get bogged down with so many audits and the paperwork to be maintained.					
4. Competitive tendering restricts the resource availability (including quality sub-contractors) necessary for successful implementation of management systems.					
5. Site inductions for Health and Safety are very basic. The projects vary greatly and 40 minutes inductions are not adequate to cover all the Health & Safety aspects.					
6. The Health and Safety inspections (Internal and from HSE) are formal and reactive. Inspectors act like policemen, finding fault with anything if they so wish. The approach should be more advisory and proactive.					
7. There is a lack of training/education in the site staff to run the management systems effectively (including the senior level staff especially on the paperwork side).					
8. The Construction Skill Certification Scheme (CS Card) can address the training needs for the management systems of Quality, Environment and Health & Safety.					
9. There is a strong indication that sub-contractors are not adequately trained and educated for Quality, Environment and Health and Safety management systems.					
10. The Health & Safety management at a group level, whereas Quality and Environment at a subsidiary/divisional level, hinders integration and results in internal politics.					
11. The Quality System is wide in scope and can be used as a Business Development System, covering Environment and Health & Safety and acting as a base for IMS.					

PLEASE TURNOVER

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree

12. Which management systems are similar in structure for integration?

All three ☐ Quality- Health & Safety ☐ Quality- Environment ☐
Environment – Health & Safety ☐ None ☐

13. Generally, the Health & Safety staff seem a bit averse to the IMS, because they feel threatened that integration will reduce the importance or influence of the department.

14. The Health and Safety auditors usually over-emphasise the legislation in covering all the activities in a reactive style, which sometimes seems more for their own benefit.

15. The projects need quality resources. Top management commitment is vital as few staff is available for Quality and Environment in comparison to Health and Safety.

16. Project planning for management systems is still problematic mainly because of:

- Lack of timely flow of information from parties (engineer, architect & client etc).
- Unrealistic project schedule, with very short project lead time.
- Ever changing client requirements.
- Incomplete Head-Office planning without consulting the project execution team.

17. The Project Management Plan (PMP) is a key document for IMS. It should satisfy the requirements of Construction Place Health & Safety Plan in addition to Quality, Environment and other project aspects such as Commercial, Sub-Contractors, Suppliers etc.

18. Integration of management systems should start with:

- Integrating Quality and Environmental, keeping Health and Safety separate at the moment.
- Integrated policies for Quality, Environment, H& S and other business objectives.
- Integrated Quality, Environment and H & S Management Manual

19. The IMS should be a process model covering processes already in the organisation including Finance & HR etc. It may be cross-referenced to relevant standards and the legislation.

20. The process model would resolve the conflicts in the approaches of standards; Quality (Process Model), Environment (PDCA) and Health & Safety (PDCA/Process Model).

PLEASE TURNOVER

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree
21. European Business Excellence Model can be adopted as an umbrella concept for IMS.					
22. It is feasible to have a Business Development/Improvement Department to be the owner of IMS, working as an interface between the concerned departments.					
23. In the IMS it is possible to have a single management structure for Quality, Environment and Health & Safety management systems.					
24. The integrated Quality and Environment (and possibly Health and Safety) audits are possible on projects, saving staff time and resources.					
25. An IMS manager should be appointed to look after the integrated systems for Quality, Environment and Health and Safety, especially on big projects.					
26. The paperwork for management systems at the project supervisor level is overly descriptive, repetitive and laborious. It can be streamlined, standardised, computerised, made user friendly and colour coded with a check (tick) list style.					
27. In the IMS it is useful to have the Health & Safety management system structured around any standard (OHSAS 18001 or BS 8800) and preferably certified. It facilitates the checks on the system and the independent assessment.					
28. Successful IMS require effective use of IT. Systems manual, documentation and any further information should be computerised in a document management system. It should be easily accessible on company intranet with good search facility.					
29. Customer awareness is necessary for IMS. Still some clients are not used to looking at an integrated Quality, Environment and Health & Safety policy and systems.					
30. The IMS may be less flexible and slow in reaction to any new legislation or directive. In the IMS, effects of any new documentation need assessment not only for any particular system but for all the departments and the systems.					

NAME (optional)	
POSITION	
ORGANISATION (optional)	

THANKS FOR YOUR CO-OPERATION

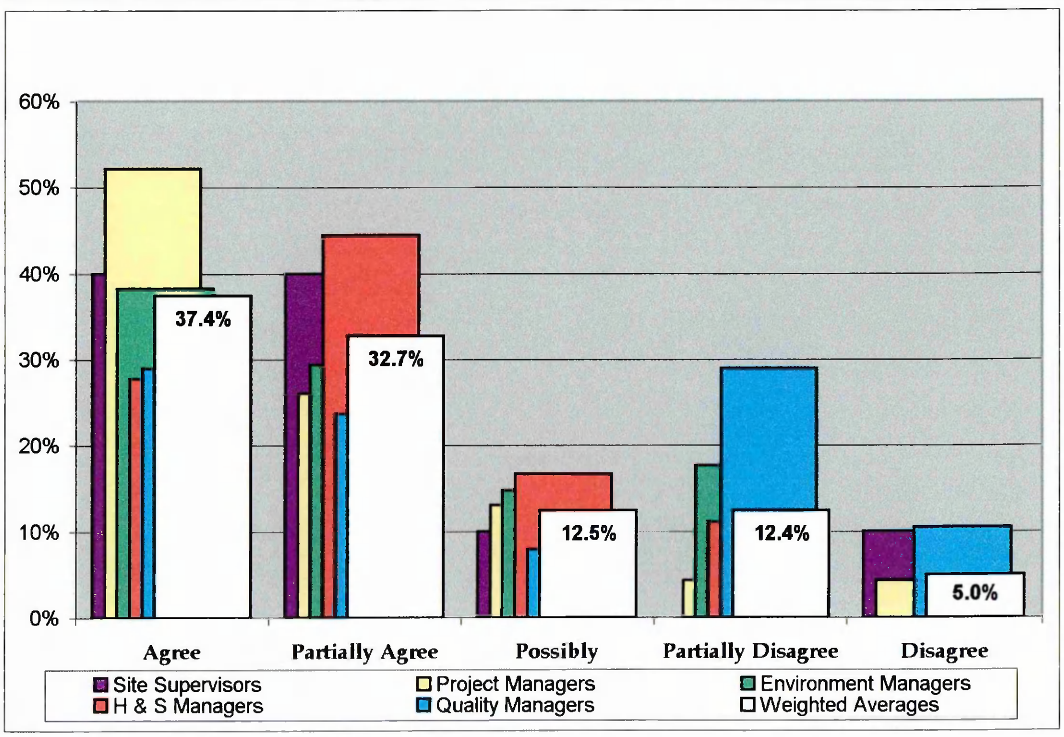
Appendix D

Questionnaire Survey Data Analysis

STATEMENT 1 (DOCUMENTATION)

The enormous amount of documentation is the main dissatisfaction with the management systems for Quality, Environment and Health and Safety.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	11	9	3	11	4	38
	28.9%	23.7%	7.9%	28.9%	10.5%	
HEALTH AND SAFETY MANAGER	10	16	6	4	0	36
	27.8%	44.4%	16.7%	11.1%	0.0%	
ENVIRONMENT MANAGER	13	10	5	6	0	34
	38.2%	29.4%	14.7%	17.6%	0.0%	
PROJECT MANAGER	12	6	3	1	1	23
	52.2%	26.1%	13.0%	4.3%	4.3%	
SITE SUPERVISOR	4	4	1	0	1	10
	40.0%	40.0%	10.0%	0.0%	10.0%	
TOTAL	50	45	18	22	6	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**37.4%**	**32.7%**	**12.5%**	**12.4%**	**5.0%**	

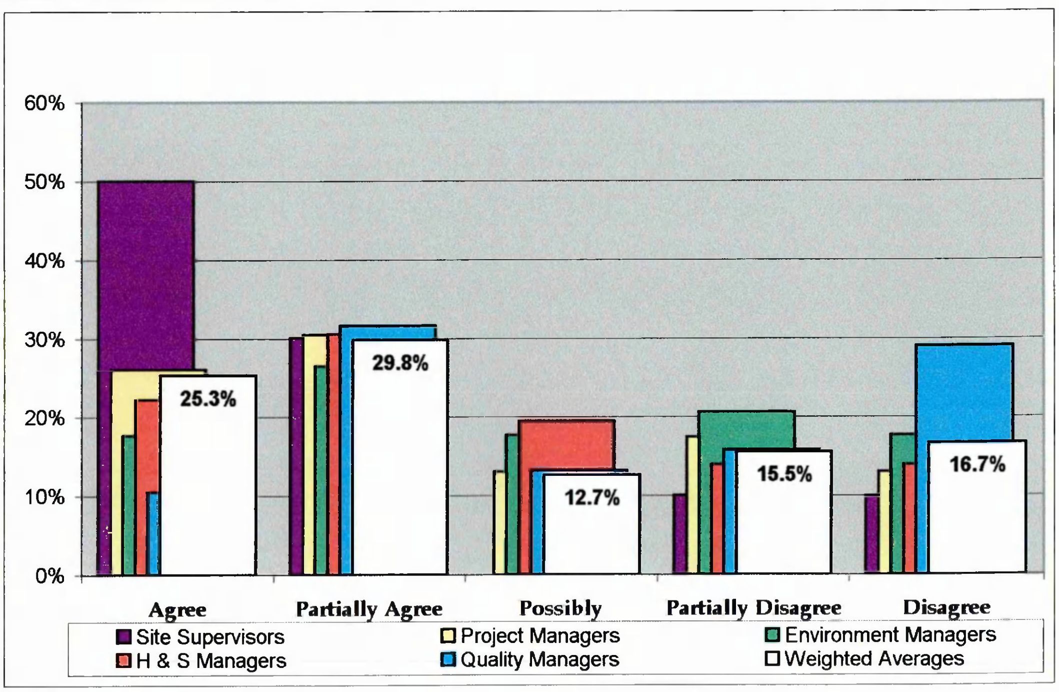


Agree+Partially Agree:70.1%
Disagree+ Partatially Disagree:17.4%

STATEMENT 2 (COMPLIANCE WITH MANAGEMENT SYSTEMS)

It is practically impossible to comply with all the procedures in the management systems because of too much paperwork and time and resource constraints.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	4	12	5	6	11	38
	10.5%	31.6%	13.2%	15.8%	28.9%	
HEALTH AND SAFETY MANAGER	8	11	7	5	5	36
	22.2%	30.6%	19.4%	13.9%	13.9%	
ENVIRONMENT MANAGER	6	9	6	7	6	34
	17.6%	26.5%	17.6%	20.6%	17.6%	
PROJECT MANAGER	6	7	3	4	3	23
	26.1%	30.4%	13.0%	17.4%	13.0%	
SITE SUPERVISOR	5	3	0	1	1	10
	50.0%	30.0%	0.0%	10.0%	10.0%	
TOTAL	29	42	21	23	26	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**25.3%**	**29.8%**	**12.7%**	**15.5%**	**16.7%**	

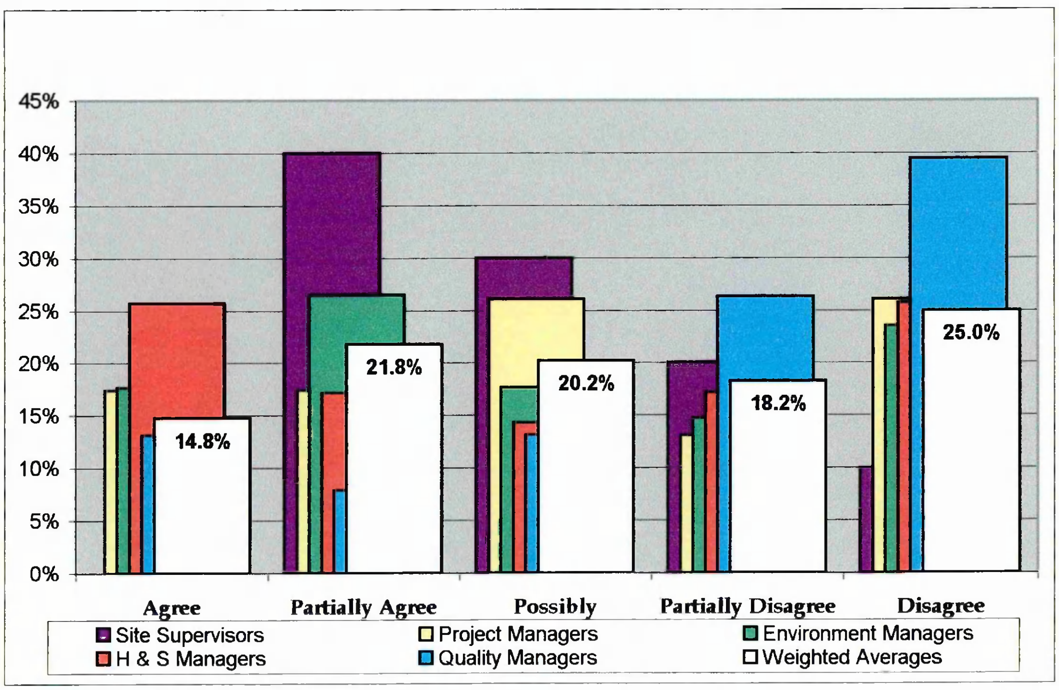


Agree+Partially Agree:55.1%
Disagree+ Partatially Disagree:32.2%

STATEMENT 3 (SITE AUDITS)

There is too much auditing on project sites. Sometimes staff get bogged down with so many audits and the paperwork to be maintained.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	5	3	5	10	15	38
	13.2%	7.9%	13.2%	26.3%	39.5%	
HEALTH AND SAFETY MANAGER	9	6	5	6	9	35
	25.7%	17.1%	14.3%	17.1%	25.7%	
ENVIRONMENT MANAGER	6	9	6	5	8	34
	17.6%	26.5%	17.6%	14.7%	23.5%	
PROJECT MANAGER	4	4	6	3	6	23
	17.4%	17.4%	26.1%	13.0%	26.1%	
SITE SUPERVISOR	0	4	3	2	1	10
	0.0%	40.0%	30.0%	20.0%	10.0%	
TOTAL	24	26	25	26	39	140
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**14.8%**	**21.8%**	**20.2%**	**18.2%**	**25.0%**	

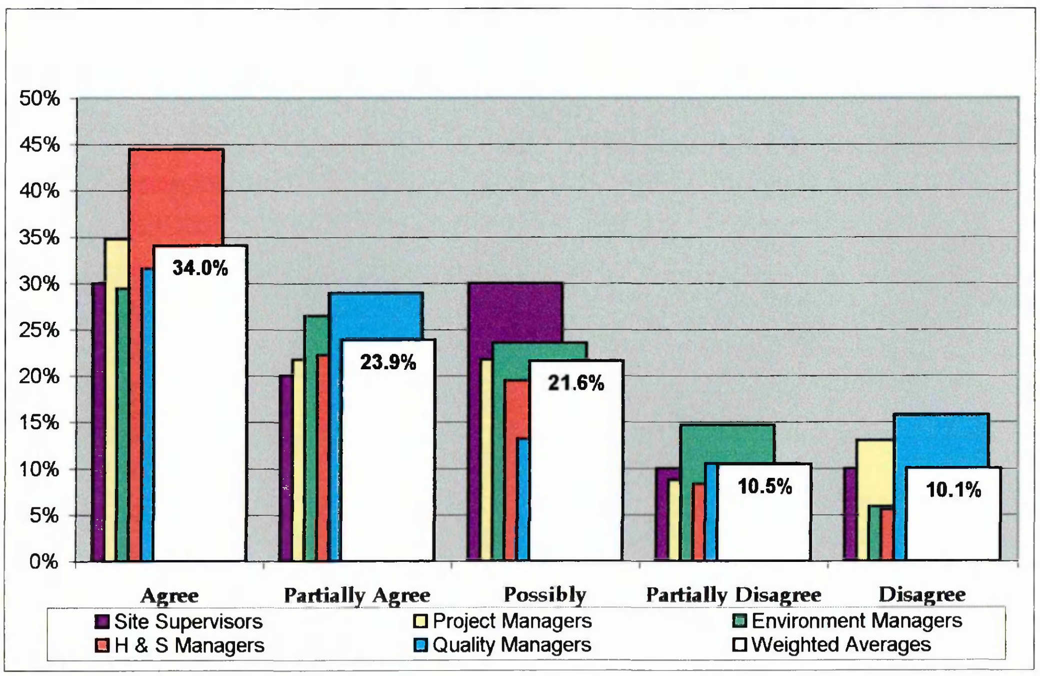


Agree+Partially Agree:36.6%
Disagree+ Partatially Disagree:43.2%

STATEMENT 4 (EFFECTS OF COMPETITIVE TENDERING ON SYSTEMS IMPLEMENTATION)

Competitive tendering restricts the resource availability (including quality sub-contractors) necessary for successful implementation of management systems.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	12	11	5	4	6	38
	31.6%	28.9%	13.2%	10.5%	15.8%	
HEALTH AND SAFETY MANAGER	16	8	7	3	2	36
	44.4%	22.2%	19.4%	8.3%	5.6%	
ENVIRONMENT MANAGER	10	9	8	5	2	34
	29.4%	26.5%	23.5%	14.7%	5.9%	
PROJECT MANAGER	8	5	5	2	3	23
	34.8%	21.7%	21.7%	8.7%	13.0%	
SITE SUPERVISOR	3	2	3	1	1	10
	30.0%	20.0%	30.0%	10.0%	10.0%	
TOTAL	49	35	28	15	14	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**34.0%**	**23.9%**	**21.6%**	**10.5%**	**10.1%**	

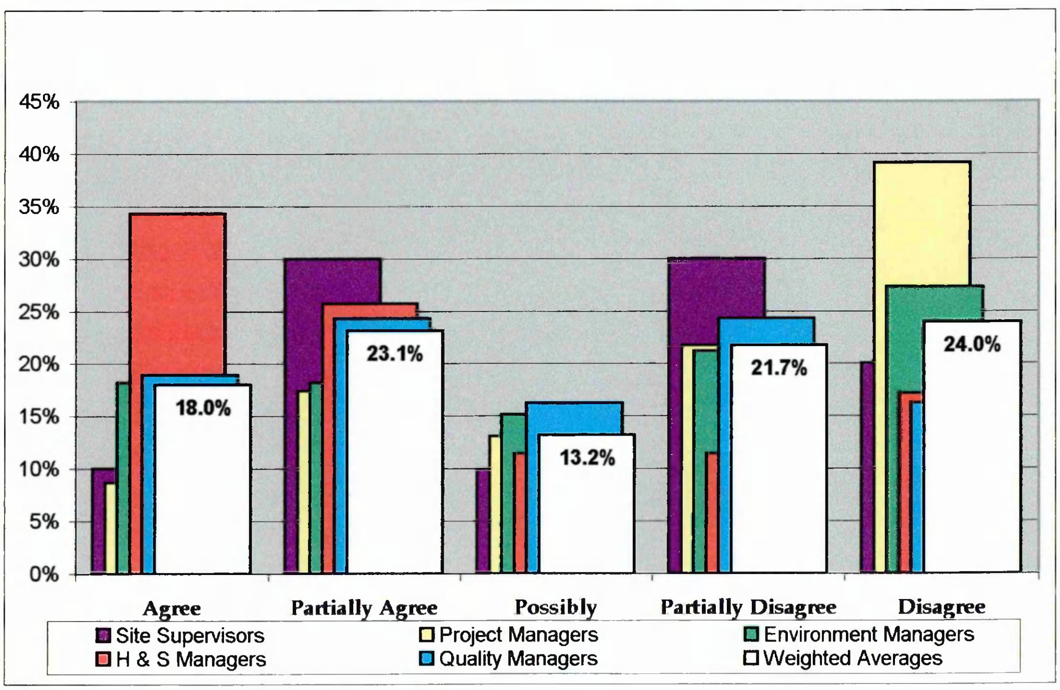


Agree+Partially Agree:57.9%
Disagree+ Partatially Disagree:20.6%

STATEMENT 5 (MANAGEMENT SYSTEMS INDUCTIONS)

Site inductions for Health and Safety are very basic. The projects vary greatly and 40 minutes inductions are not adequate to cover all the Health & Safety aspects.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	7	9	6	9	6	37
	18.9%	24.3%	16.2%	24.3%	16.2%	
HEALTH AND SAFETY MANAGER	12	9	4	4	6	35
	34.3%	25.7%	11.4%	11.4%	17.1%	
ENVIRONMENT MANAGER	6	6	5	7	9	33
	18.2%	18.2%	15.2%	21.2%	27.3%	
PROJECT MANAGER	2	4	3	5	9	23
	8.7%	17.4%	13.0%	21.7%	39.1%	
SITE SUPERVISOR	1	3	1	3	2	10
	10.0%	30.0%	10.0%	30.0%	20.0%	
TOTAL	28	31	19	28	32	138
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**18.0%**	**23.1%**	**13.2%**	**21.7%**	**24.0%**	

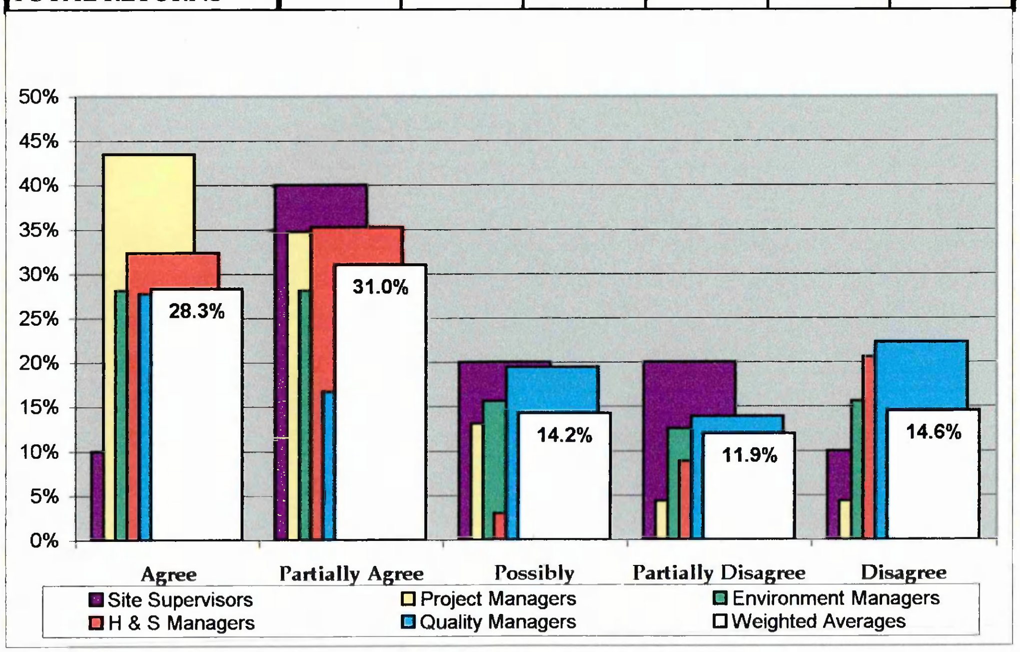


Agree+Partially Agree:41.1%
Disagree+ Partatially Disagree:45.7%

STATEMENT 6 (ENFORCEMENT OF HEALTH AND SAFETY MANAGEMENT SYSTEMS)

The Health and Safety inspections (Internal and from HSE) are formal and reactive. Inspectors act like policemen, finding fault with anything if they so wish. The approach should be more advisory and proactive.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	10	6	7	5	8	36
	27.8%	16.7%	19.4%	13.9%	22.2%	
HEALTH AND SAFETY MANAGER	11	12	1	3	7	34
	32.4%	35.3%	2.9%	8.8%	20.6%	
ENVIRONMENT MANAGER	9	9	5	4	5	32
	28.1%	28.1%	15.6%	12.5%	15.6%	
PROJECT MANAGER	10	8	3	1	1	23
	43.5%	34.8%	13.0%	4.3%	4.3%	
SITE SUPERVISOR	1	4	2	2	1	10
	10.0%	40.0%	20.0%	20.0%	10.0%	
TOTAL	41	39	18	15	22	135
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**28.3%**	**31.0%**	**14.2%**	**11.9%**	**14.6%**	

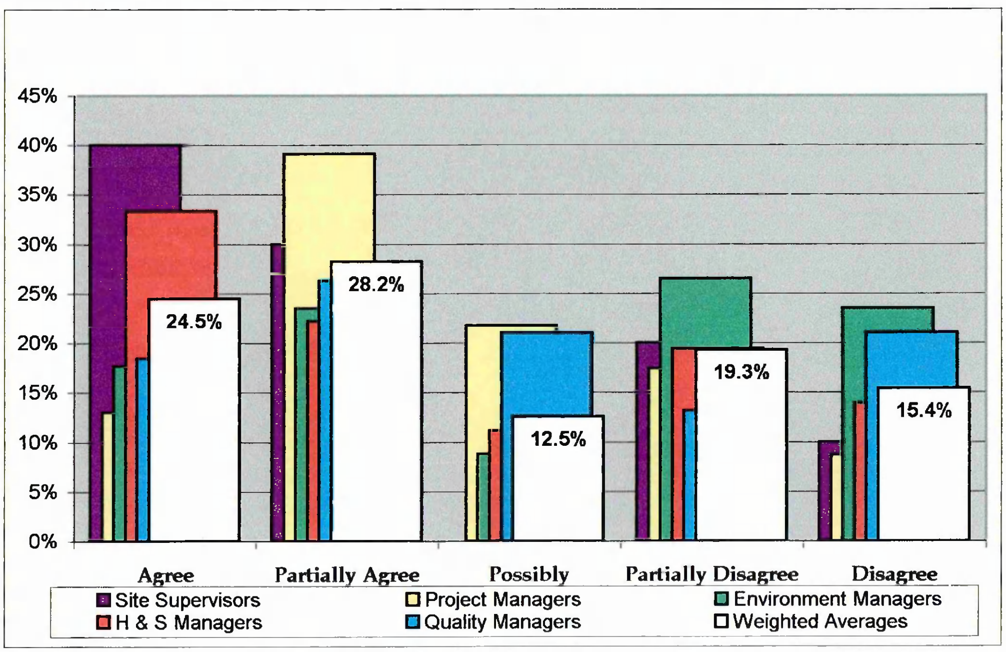


Agree+Partially Agree:59.3%
Disagree+ Partatially Disagree:26.5%

STATEMENT 7 (TRAINING AND EDUCATION)

There is a lack of training/education in the site staff to run the management systems effectively (including the senior level staff especially on the paperwork side).

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	7	10	8	5	8	38
	18.4%	26.3%	21.1%	13.2%	21.1%	
HEALTH AND SAFETY MANAGER	12	8	4	7	5	36
	33.3%	22.2%	11.1%	19.4%	13.9%	
ENVIRONMENT MANAGER	6	8	3	9	8	34
	17.6%	23.5%	8.8%	26.5%	23.5%	
PROJECT MANAGER	3	9	5	4	2	23
	13.0%	39.1%	21.7%	17.4%	8.7%	
SITE SUPERVISOR	4	3	0	2	1	10
	40.0%	30.0%	0.0%	20.0%	10.0%	
TOTAL	32	38	20	27	24	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**24.5%**	**28.2%**	**12.5%**	**19.3%**	**15.4%**	

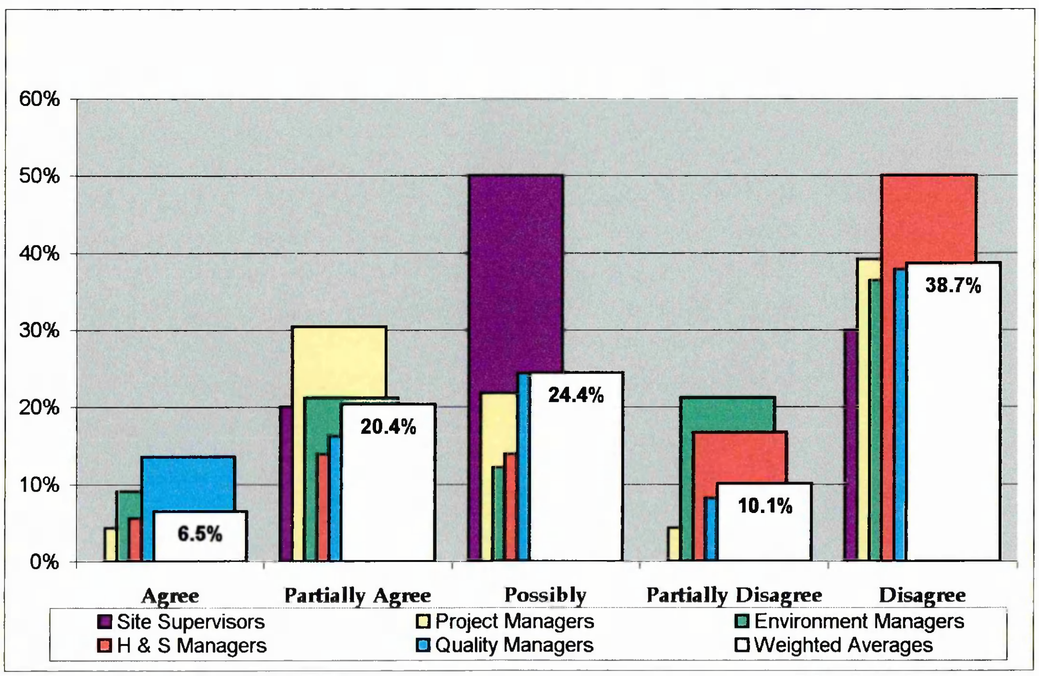


Agree+Partially Agree:52.7%
Disagree+ Partatially Disagree:34.7%

STATEMENT 8 (CONSTRUCTION SKILL CERTIFICATION SCHEME)

The Construction Skill Card Scheme (CS Card) can address the training needs for the management systems of Quality, Environment and Health & Safety.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	5	6	9	3	14	37
	13.5%	16.2%	24.3%	8.1%	37.8%	
HEALTH AND SAFETY MANAGER	2	5	5	6	18	36
	5.6%	13.9%	13.9%	16.7%	50.0%	
ENVIRONMENT MANAGER	3	7	4	7	12	33
	9.1%	21.2%	12.1%	21.2%	36.4%	
PROJECT MANAGER	1	7	5	1	9	23
	4.3%	30.4%	21.7%	4.3%	39.1%	
SITE SUPERVISOR	0	2	5	0	3	10
	0.0%	20.0%	50.0%	0.0%	30.0%	
TOTAL	11	27	28	17	56	139
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**6.5%**	**20.4%**	**24.4%**	**10.1%**	**38.7%**	

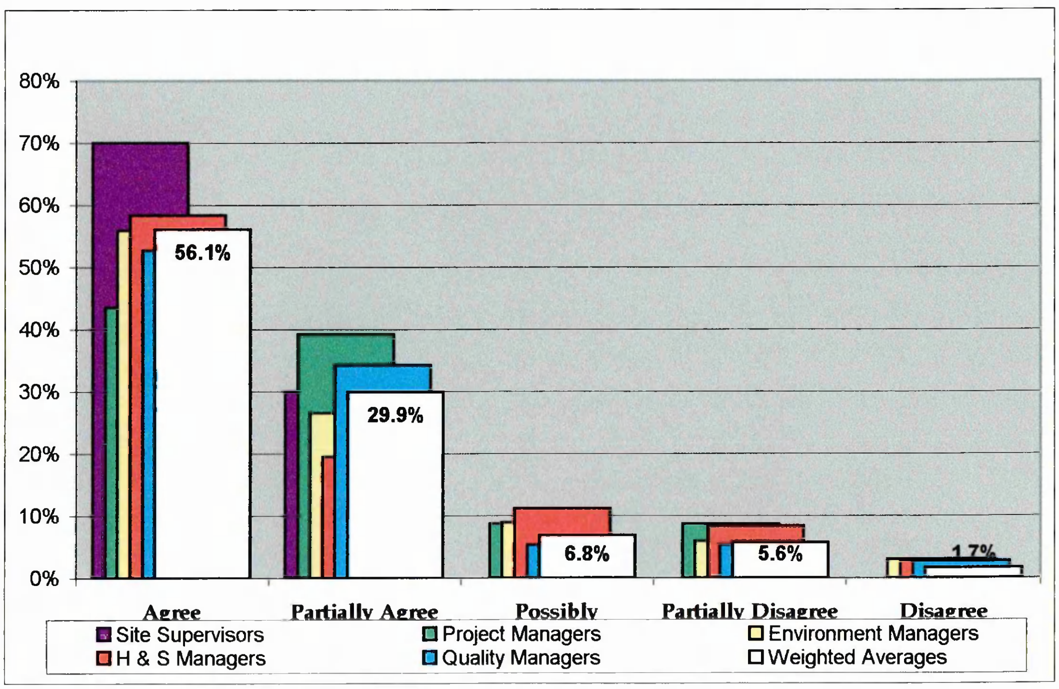


Agree+Partially Agree:26.9%
Disagree+ Partatially Disagree:48.8%

STATEMENT 9 (SUB-CONTRACTORS)

There is a strong indication that sub-contractors are not adequately trained and educated for Quality, Environment and Health and Safety management systems.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	20	13	2	2	1	38
	52.6%	34.2%	5.3%	5.3%	2.6%	
HEALTH AND SAFETY MANAGER	21	7	4	3	1	36
	58.3%	19.4%	11.1%	8.3%	2.8%	
ENVIRONMENT MANAGER	19	9	3	2	1	34
	55.9%	26.5%	8.8%	5.9%	2.9%	
PROJECT MANAGER	10	9	2	2	0	23
	43.5%	39.1%	8.7%	8.7%	0.0%	
SITE SUPERVISOR	7	3	0	0	0	10
	70.0%	30.0%	0.0%	0.0%	0.0%	
TOTAL	77	41	11	9	3	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**56.1%**	**29.9%**	**6.8%**	**5.6%**	**1.7%**	

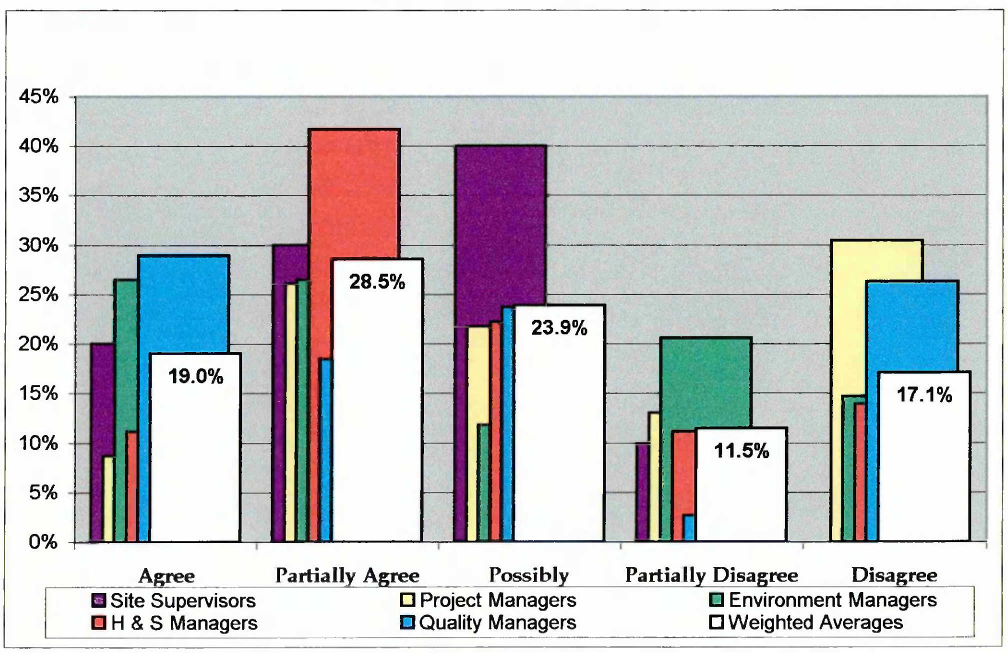


Agree+Partially Agree:86.0%
Disagree+ Partatially Disagree:7.3%

STATEMENT 10 (ORGANISATIONAL STRUCTURE FOR MANAGEMENT SYSTEMS)

The Health & Safety management at a group level, whereas Quality and Environment at a subsidiary/divisional level, hinders integration and results in internal politics.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	11	7	9	1	10	38
	28.9%	18.4%	23.7%	2.6%	26.3%	
HEALTH AND SAFETY MANAGER	4	15	8	4	5	36
	11.1%	41.7%	22.2%	11.1%	13.9%	
ENVIRONMENT MANAGER	9	9	4	7	5	34
	26.5%	26.5%	11.8%	20.6%	14.7%	
PROJECT MANAGER	2	6	5	3	7	23
	8.7%	26.1%	21.7%	13.0%	30.4%	
SITE SUPERVISOR	2	3	4	1	0	10
	20.0%	30.0%	40.0%	10.0%	0.0%	
TOTAL	28	40	30	16	27	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**19.0%**	**28.5%**	**23.9%**	**11.5%**	**17.1%**	

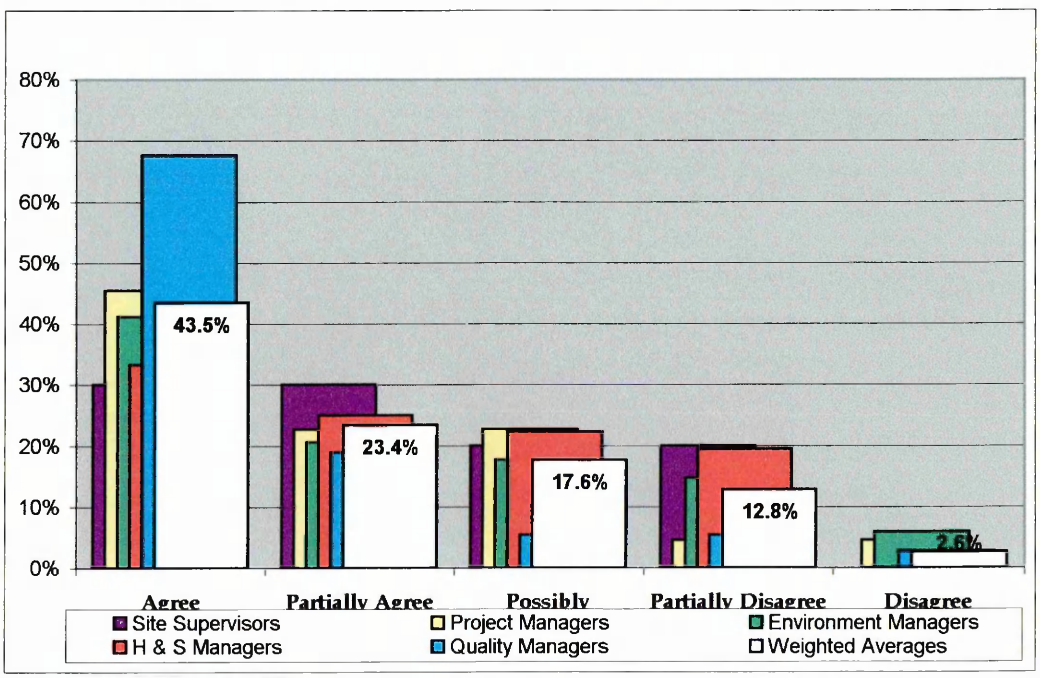


Agree+Partially Agree:47.5%
Disagree+ Partatially Disagree:28.6%

STATEMENT 11 (BROAD SCOPE OF QUALITY MANAGEMENT SYSTEM)

The Quality System is wide in scope and can be used as a Business Development System, covering Environment and Health & Safety and acting as a base for IMS.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	25	7	2	2	1	37
	67.6%	18.9%	5.4%	5.4%	2.7%	
HEALTH AND SAFETY MANAGER	12	9	8	7	0	36
	33.3%	25.0%	22.2%	19.4%	0.0%	
ENVIRONMENT MANAGER	14	7	6	5	2	34
	41.2%	20.6%	17.6%	14.7%	5.9%	
PROJECT MANAGER	10	5	5	1	1	22
	45.5%	22.7%	22.7%	4.5%	4.5%	
SITE SUPERVISOR	3	3	2	2	0	10
	30.0%	30.0%	20.0%	20.0%	0.0%	
TOTAL	64	31	23	17	4	139
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**43.5%**	**23.4%**	**17.6%**	**12.8%**	**2.6%**	

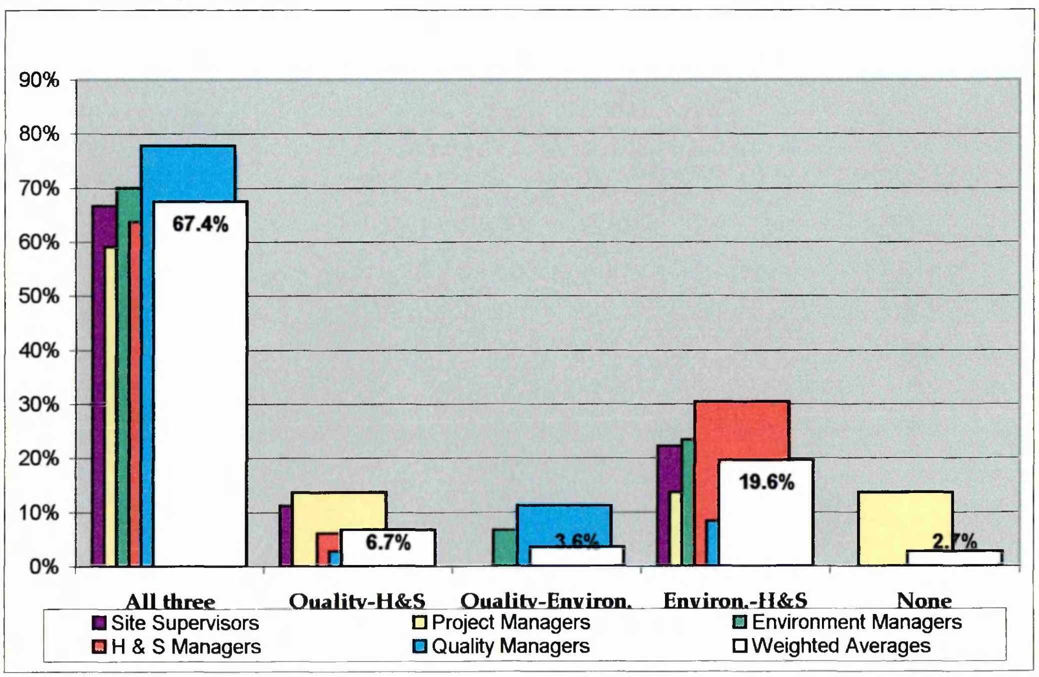


Agree+Partially Agree:66.9%
Disagree+ Partatially Disagree:15.4%

QUESTIONS 12 (SIMILARITIES IN MANAGEMENT SYSTEMS)

Which management systems are similar in structure for integration?
All three, Quality and Health & Safety, Quality and Environment, Environment and Health & Safety, None

	All three	Quality-H&S	Quality-Environ.	Environ.-H&S	None	Total
QUALITY MANAGER	28	1	4	3	0	36
	77.8%	2.8%	11.1%	8.3%	0.0%	
HEALTH AND SAFETY MANAGER	21	2	0	10	0	33
	63.6%	6.1%	0.0%	30.3%	0.0%	
ENVIRONMENT MANAGER	21	0	2	7	0	30
	70.0%	0.0%	6.7%	23.3%	0.0%	
PROJECT MANAGER	13	3	0	3	3	22
	59.1%	13.6%	0.0%	13.6%	13.6%	
SITE SUPERVISOR	6	1	0	2	0	9
	66.7%	11.1%	0.0%	22.2%	0.0%	
TOTAL	89	7	6	25	3	130
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**67.4%**	**6.7%**	**3.6%**	**19.6%**	**2.7%**	

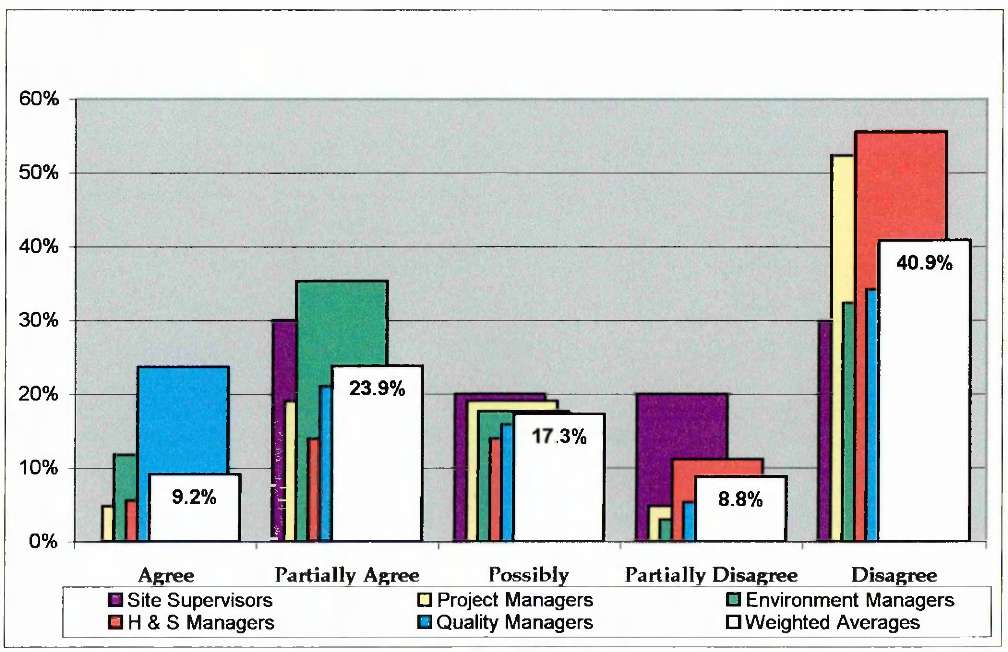


Agree+Partially Agree:74.1%
Disagree+ Partatially Disagree:22.3%

STATEMENT 13 (RESISTENCE TO INTEGRATED MANAGEMENT SYSTEMS)

Generally, the Health & Safety staff seem a bit averse to the IMS, because they feel threatened that integration will reduce the importance or influence of the department.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	9	8	6	2	13	38
	23.7%	21.1%	15.8%	5.3%	34.2%	
HEALTH AND SAFETY MANAGER	2	5	5	4	20	36
	5.6%	13.9%	13.9%	11.1%	55.6%	
ENVIRONMENT MANAGER	4	12	6	1	11	34
	11.8%	35.3%	17.6%	2.9%	32.4%	
PROJECT MANAGER	1	4	4	1	11	21
	4.8%	19.0%	19.0%	4.8%	52.4%	
SITE SUPERVISOR	0	3	2	2	3	10
	0.0%	30.0%	20.0%	20.0%	30.0%	
TOTAL	16	32	23	10	58	139
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**9.2%**	**23.9%**	**17.3%**	**8.8%**	**40.9%**	

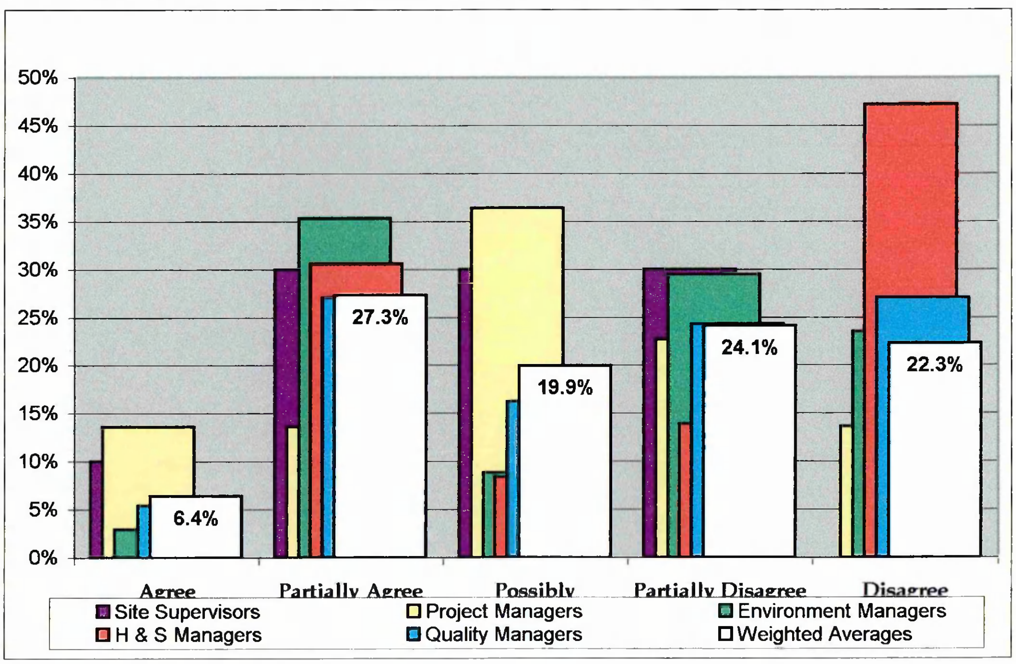


Agree+Partially Agree:33.1%
Disagree+ Partatially Disagree:49.7%

STATEMENT 14 (ATTITUDE OF HEALTH AND SAFETY AUDITORS)

The Health and Safety auditors usually over-emphasise the legislation in covering all the activities in a reactive style, which sometimes seems more for their own benefit.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	2	10	6	9	10	37
	5.4%	27.0%	16.2%	24.3%	27.0%	
HEALTH AND SAFETY MANAGER	0	11	3	5	17	36
	0.0%	30.6%	8.3%	13.9%	47.2%	
ENVIRONMENT MANAGER	1	12	3	10	8	34
	2.9%	35.3%	8.8%	29.4%	23.5%	
PROJECT MANAGER	3	3	8	5	3	22
	13.6%	13.6%	36.4%	22.7%	13.6%	
SITE SUPERVISOR	1	3	3	3	0	10
	10.0%	30.0%	30.0%	30.0%	0.0%	
TOTAL	7	39	23	32	38	139
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**6.4%**	**27.3%**	**19.9%**	**24.1%**	**22.3%**	

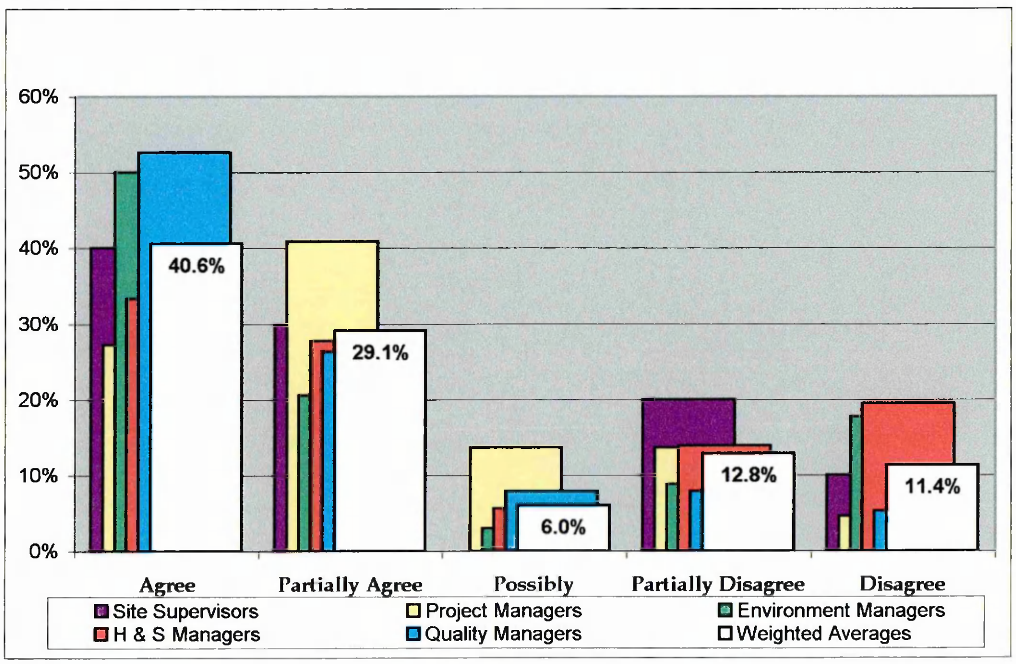


Agree+Partially Agree:33.7%
Disagree+ Partatially Disagree:46.4%

STATEMENT 15 (RESOURCES FOR MANAGEMENT SYSTEMS IMPLEMENTATION)

The projects need quality resources. Top management commitment is vital as few staff are available for Quality and Environment in comparison to Health and Safety.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	20	10	3	3	2	38
	52.6%	26.3%	7.9%	7.9%	5.3%	
HEALTH AND SAFETY MANAGER	12	10	2	5	7	36
	33.3%	27.8%	5.6%	13.9%	19.4%	
ENVIRONMENT MANAGER	17	7	1	3	6	34
	50.0%	20.6%	2.9%	8.8%	17.6%	
PROJECT MANAGER	6	9	3	3	1	22
	27.3%	40.9%	13.6%	13.6%	4.5%	
SITE SUPERVISOR	4	3	0	2	1	10
	40.0%	30.0%	0.0%	20.0%	10.0%	
TOTAL	59	39	9	16	17	140
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**40.6%**	**29.1%**	**6.0%**	**12.8%**	**11.4%**	

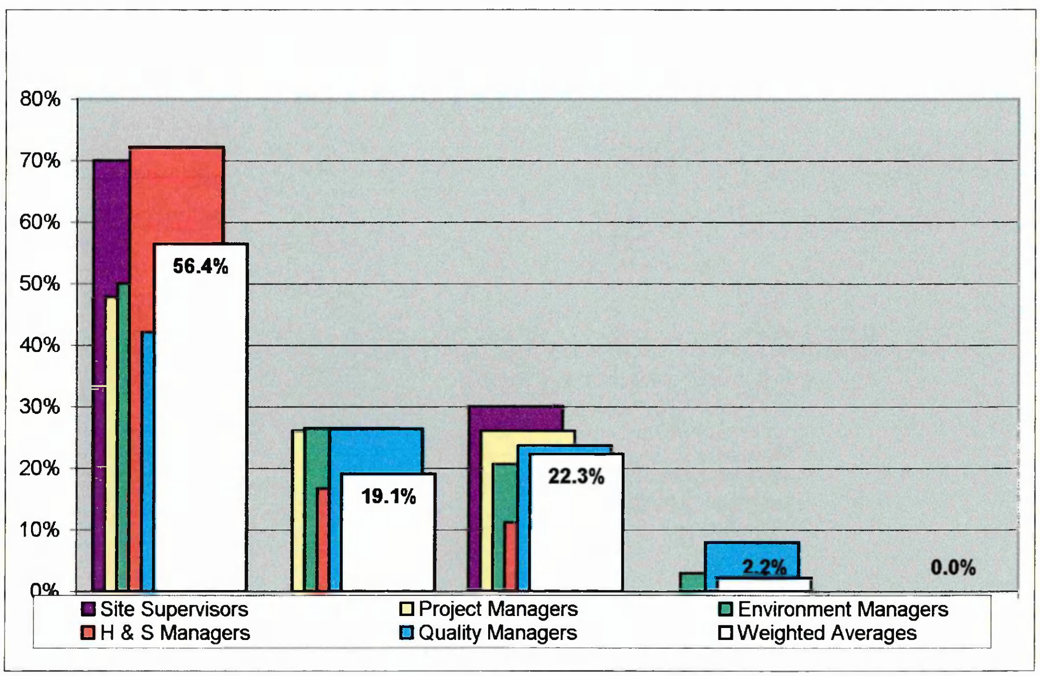


Agree+Partially Agree:69.7%
Disagree+ Partatially Disagree:24.2%

STATEMENT 16 (PROJECT PLANNING)

Project planning for management systems is still problematic mainly because of:
(16i) Lack of timely flow of information from parties (engineer, architect & client etc).

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	16	10	9	3	0	38
	42.1%	26.3%	23.7%	7.9%	0.0%	
HEALTH AND SAFETY MANAGER	26	6	4	0	0	36
	72.2%	16.7%	11.1%	0.0%	0.0%	
ENVIRONMENT MANAGER	17	9	7	1	0	34
	50.0%	26.5%	20.6%	2.9%	0.0%	
PROJECT MANAGER	11	6	6	0	0	23
	47.8%	26.1%	26.1%	0.0%	0.0%	
SITE SUPERVISOR	7	0	3	0	0	10
	70.0%	0.0%	30.0%	0.0%	0.0%	
TOTAL	77	31	29	4	0	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**56.4%**	**19.1%**	**22.3%**	**2.2%**	**0.0%**	

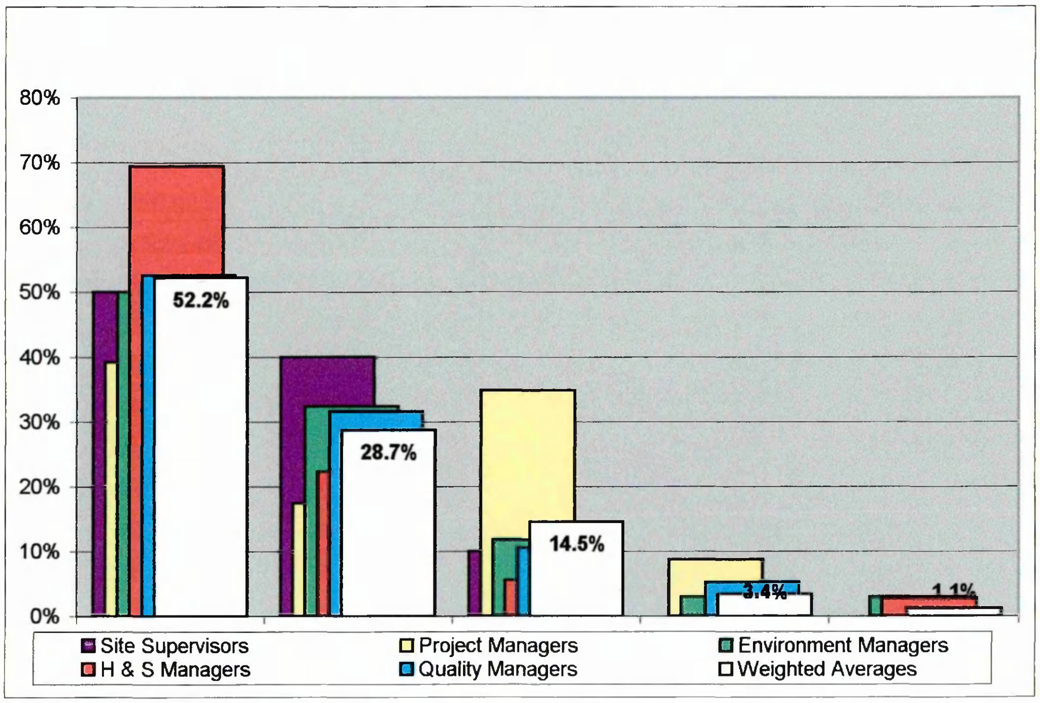


Agree+Partially Agree:75.5%
Disagree+ Partatially Disagree:2.2%

STATEMENT 16 (PROJECT PLANNING) conintue---

Project planning for management systems is still problematic mainly because of:
(16ii) Unrealistic project schedule, with very short project lead time.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	20	12	4	2	0	38
	52.6%	31.6%	10.5%	5.3%	0.0%	
HEALTH AND SAFETY MANAGER	25	8	2	0	1	36
	69.4%	22.2%	5.6%	0.0%	2.8%	
ENVIRONMENT MANAGER	17	11	4	1	1	34
	50.0%	32.4%	11.8%	2.9%	2.9%	
PROJECT MANAGER	9	4	8	2	0	23
	39.1%	17.4%	34.8%	8.7%	0.0%	
SITE SUPERVISOR	5	4	1	0	0	10
	50.0%	40.0%	10.0%	0.0%	0.0%	
TOTAL	76	39	19	5	2	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**52.2%**	**28.7%**	**14.5%**	**3.4%**	**1.1%**	

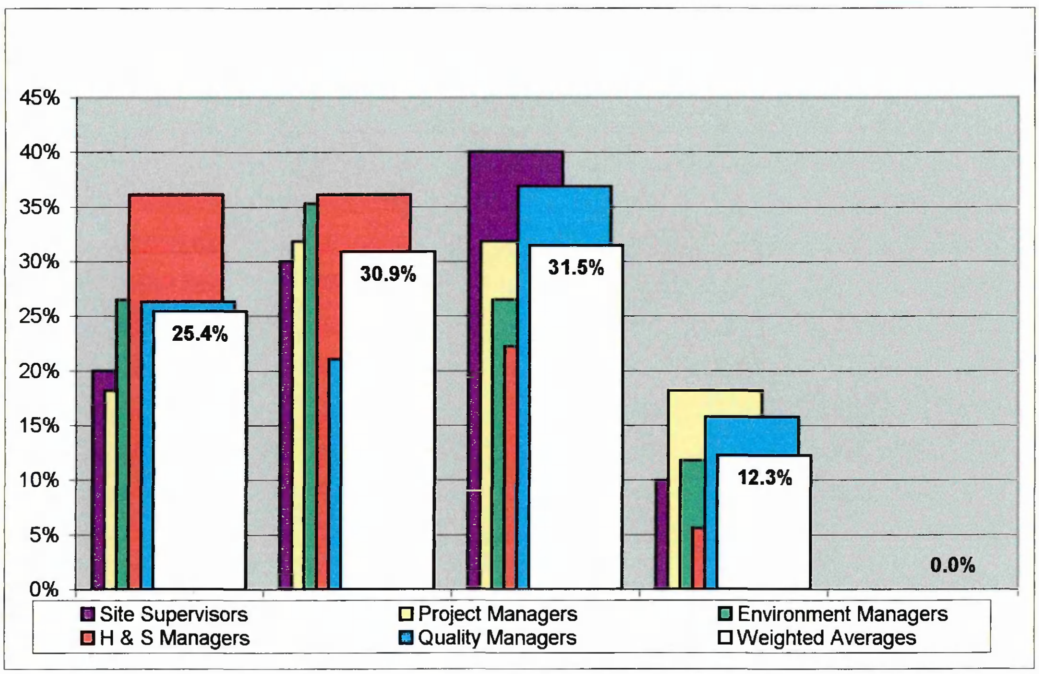


Agree+Partially Agree:80.9%
Disagree+ Partatially Disagree:4.5%

STATEMENT 16 (PROJECT PLANNING) conintue---

Project planning for management systems is still problematic mainly because of:
(16iii) Ever changing client requirements.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	10	8	14	6	0	38
	26.3%	21.1%	36.8%	15.8%	0.0%	
HEALTH AND SAFETY MANAGER	13	13	8	2	0	36
	36.1%	36.1%	22.2%	5.6%	0.0%	
ENVIRONMENT MANAGER	9	12	9	4	0	34
	26.5%	35.3%	26.5%	11.8%	0.0%	
PROJECT MANAGER	4	7	7	4	0	22
	18.2%	31.8%	31.8%	18.2%	0.0%	
SITE SUPERVISOR	2	3	4	1	0	10
	20.0%	30.0%	40.0%	10.0%	0.0%	
TOTAL	38	43	42	17	0	140
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**25.4%**	**30.9%**	**31.5%**	**12.3%**	**0.0%**	

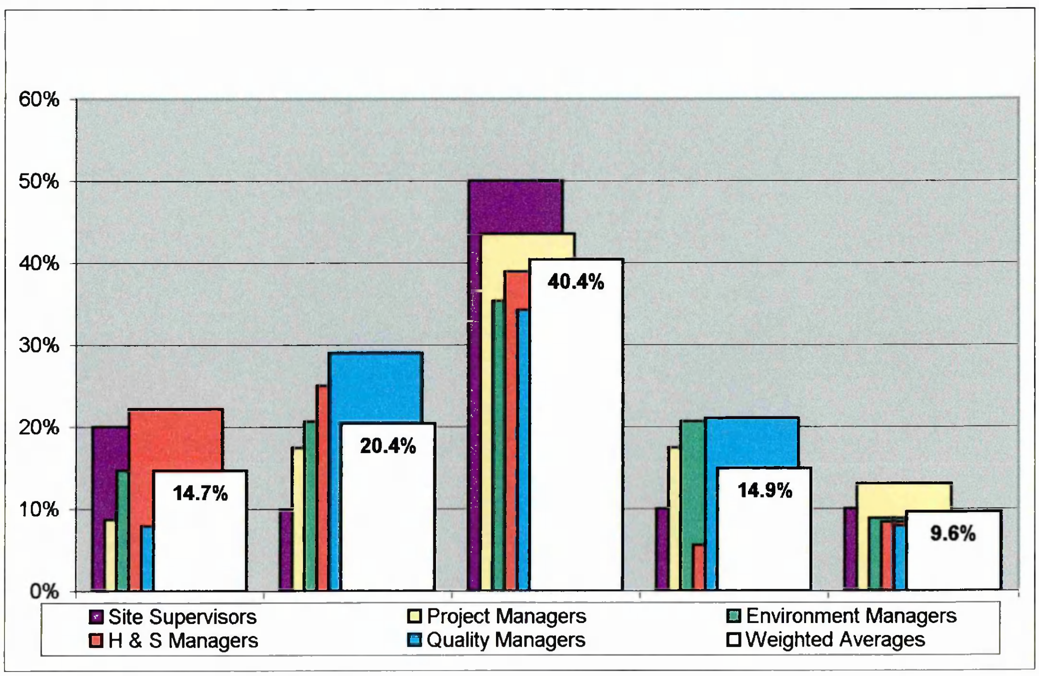


Agree+Partially Agree:56.3%
Disagree+ Partatially Disagree:12.3%

STATEMENT 16 (PROJECT PLANNING) conintue---

Project planning for management systems is still problematic mainly because of:
(16iv) Incomplete Head-Office planning without consulting the project execution team.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	3	11	13	8	3	38
	7.9%	28.9%	34.2%	21.1%	7.9%	
HEALTH AND SAFETY MANAGER	8	9	14	2	3	36
	22.2%	25.0%	38.9%	5.6%	8.3%	
ENVIRONMENT MANAGER	5	7	12	7	3	34
	14.7%	20.6%	35.3%	20.6%	8.8%	
PROJECT MANAGER	2	4	10	4	3	23
	8.7%	17.4%	43.5%	17.4%	13.0%	
SITE SUPERVISOR	2	1	5	1	1	10
	20.0%	10.0%	50.0%	10.0%	10.0%	
TOTAL	20	32	54	22	13	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**14.7%**	**20.4%**	**40.4%**	**14.9%**	**9.6%**	

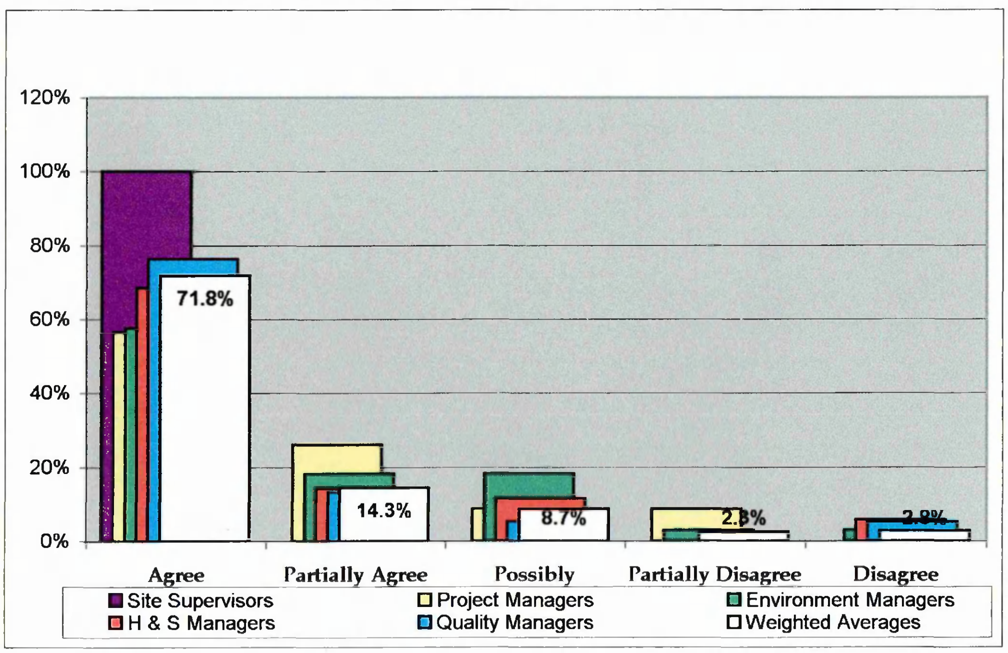


Agree+Partially Agree:35.1%
Disagree+ Partatially Disagree:24.5%

STATEMENT 17(INTEGRATED PROJECT MANAGEMENT PLAN)

The Project Management Plan (PMP) is a key document for IMS. It should satisfy the requirements of Construction Place Health & Safety Plan in addition to Quality, Environment and other project aspects such as Commercial, Sub-Contractors, Suppliers etc.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	29	5	2	0	2	38
	76.3%	13.2%	5.3%	0.0%	5.3%	
HEALTH AND SAFETY MANAGER	24	5	4	0	2	35
	68.6%	14.3%	11.4%	0.0%	5.7%	
ENVIRONMENT MANAGER	19	6	6	1	1	33
	57.6%	18.2%	18.2%	3.0%	3.0%	
PROJECT MANAGER	13	6	2	2	0	23
	56.5%	26.1%	8.7%	8.7%	0.0%	
SITE SUPERVISOR	9	0	0	0	0	9
	100.0%	0.0%	0.0%	0.0%	0.0%	
TOTAL	94	22	14	3	5	138
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**71.8%**	**14.3%**	**8.7%**	**2.3%**	**2.8%**	



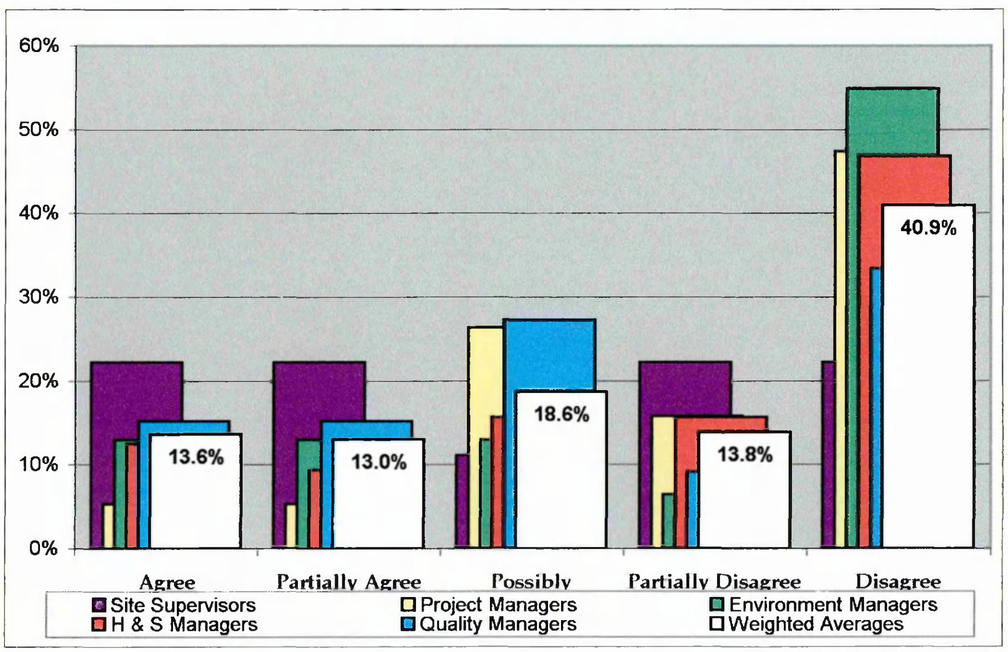
Agree+Partially Agree:86.1%
Disagree+ Partatially Disagree:5.1%

STATEMENT 18 (DIFFERENT INTEGRATION METHODS)

Integration of management systems should start with:

(18i) Integrating Quality and Environmental, keeping H & S separate at the moment.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	5	5	9	3	11	33
	15.2%	15.2%	27.3%	9.1%	33.3%	
HEALTH AND SAFETY MANAGER	4	3	5	5	15	32
	12.5%	9.4%	15.6%	15.6%	46.9%	
ENVIRONMENT MANAGER	4	4	4	2	17	31
	12.9%	12.9%	12.9%	6.5%	54.8%	
PROJECT MANAGER	1	1	5	3	9	19
	5.3%	5.3%	26.3%	15.8%	47.4%	
SITE SUPERVISOR	2	2	1	2	2	9
	22.2%	22.2%	11.1%	22.2%	22.2%	
TOTAL	16	15	24	15	54	124
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**13.6%**	**13.0%**	**18.6%**	**13.8%**	**40.9%**	



Agree+Partially Agree:26.6%

Disagree+ Partatially Disagree:54.7%

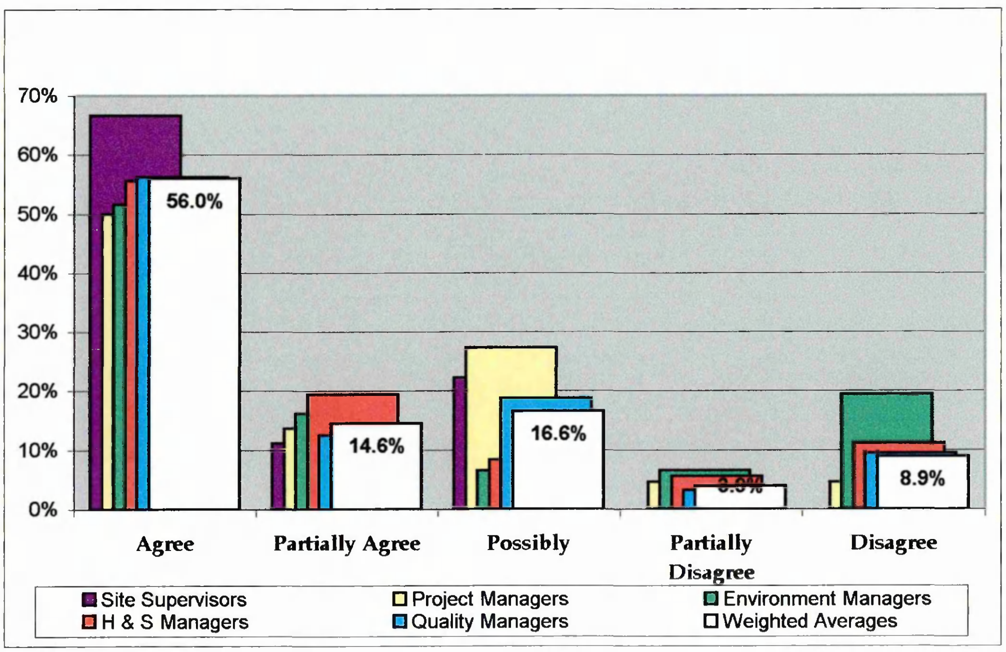
STATEMENT 18 (DIFFERENT INTEGRATION METHODS)

continue ---

Integration of management systems should start with:

(18ii) Integrated policies for Quality, Environment, H& S and other business objectives.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	18	4	6	1	3	32
	56.3%	12.5%	18.8%	3.1%	9.4%	
HEALTH AND SAFETY MANAGER	20	7	3	2	4	36
	55.6%	19.4%	8.3%	5.6%	11.1%	
ENVIRONMENT MANAGER	16	5	2	2	6	31
	51.6%	16.1%	6.5%	6.5%	19.4%	
PROJECT MANAGER	11	3	6	1	1	22
	50.0%	13.6%	27.3%	4.5%	4.5%	
SITE SUPERVISOR	6	1	2	0	0	9
	66.7%	11.1%	22.2%	0.0%	0.0%	
TOTAL	71	20	19	6	14	130
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**56.0%**	**14.6%**	**16.6%**	**3.9%**	**8.9%**	



Agree+Partially Agree:70.6%

Disagree+ Partatially Disagree:12.8%

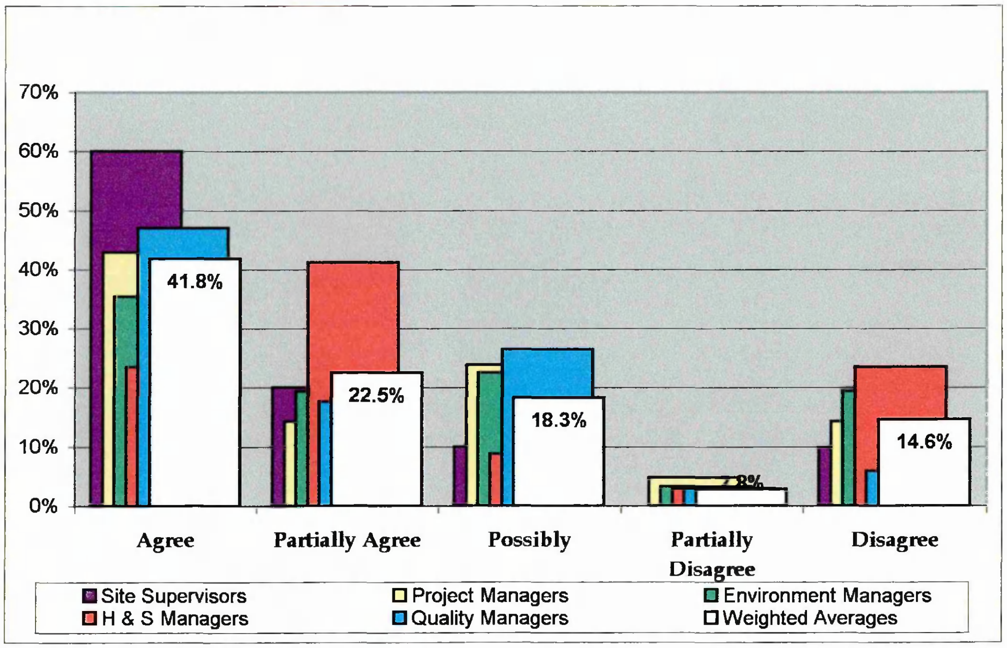
STATEMENT 18 (DIFFERENT INTEGRATION METHODS)

continue ---

Integration of management systems should start with:

(18iii) Integrated Quality, Environment and H & S Management Manual

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	16	6	9	1	2	34
	47.1%	17.6%	26.5%	2.9%	5.9%	
HEALTH AND SAFETY MANAGER	8	14	3	1	8	34
	23.5%	41.2%	8.8%	2.9%	23.5%	
ENVIRONMENT MANAGER	11	6	7	1	6	31
	35.5%	19.4%	22.6%	3.2%	19.4%	
PROJECT MANAGER	9	3	5	1	3	21
	42.9%	14.3%	23.8%	4.8%	14.3%	
SITE SUPERVISOR	6	2	1	0	1	10
	60.0%	20.0%	10.0%	0.0%	10.0%	
TOTAL	50	31	25	4	20	130
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**41.8%**	**22.5%**	**18.3%**	**2.8%**	**14.6%**	



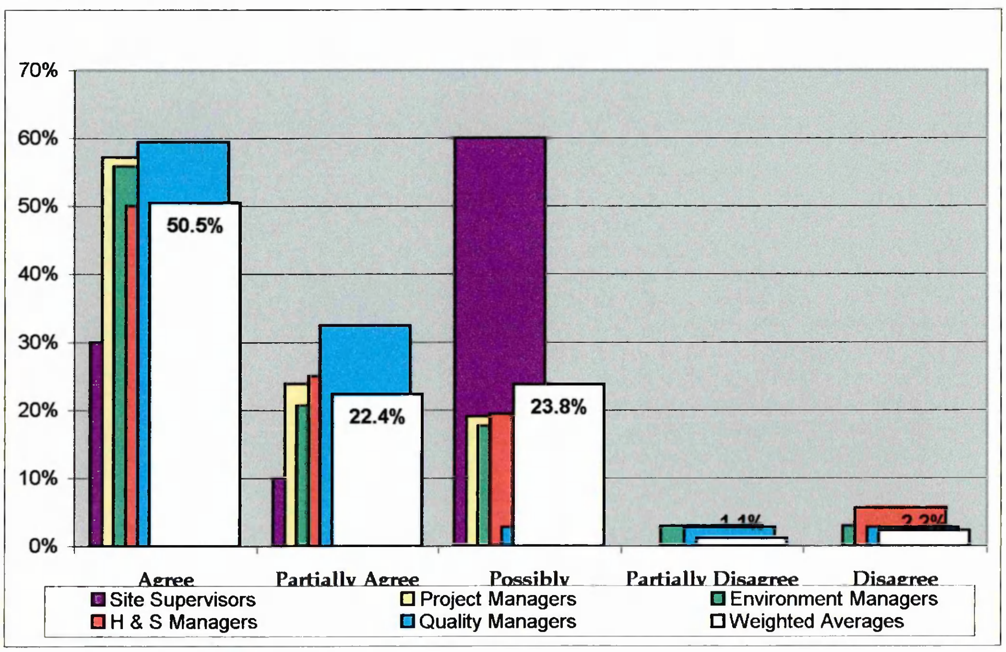
Agree+Partially Agree:64.3%

Disagree+ Partatially Disagree:17.4%

STATEMENT 19 (PROCESS MODEL FOR INTEGRATED MANAGEMENT SYSTEMS)

The IMS should be a process model covering processes already in the organisation including Finance & HR etc. It may be cross-referenced to relevant standards and the legislation.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	22	12	1	1	1	37
	59.5%	32.4%	2.7%	2.7%	2.7%	
HEALTH AND SAFETY MANAGER	18	9	7	0	2	36
	50.0%	25.0%	19.4%	0.0%	5.6%	
ENVIRONMENT MANAGER	19	7	6	1	1	34
	55.9%	20.6%	17.6%	2.9%	2.9%	
PROJECT MANAGER	12	5	4	0	0	21
	57.1%	23.8%	19.0%	0.0%	0.0%	
SITE SUPERVISOR	3	1	6	0	0	10
	30.0%	10.0%	60.0%	0.0%	0.0%	
TOTAL	74	34	24	2	4	138
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**50.5%**	**22.4%**	**23.8%**	**1.1%**	**2.2%**	

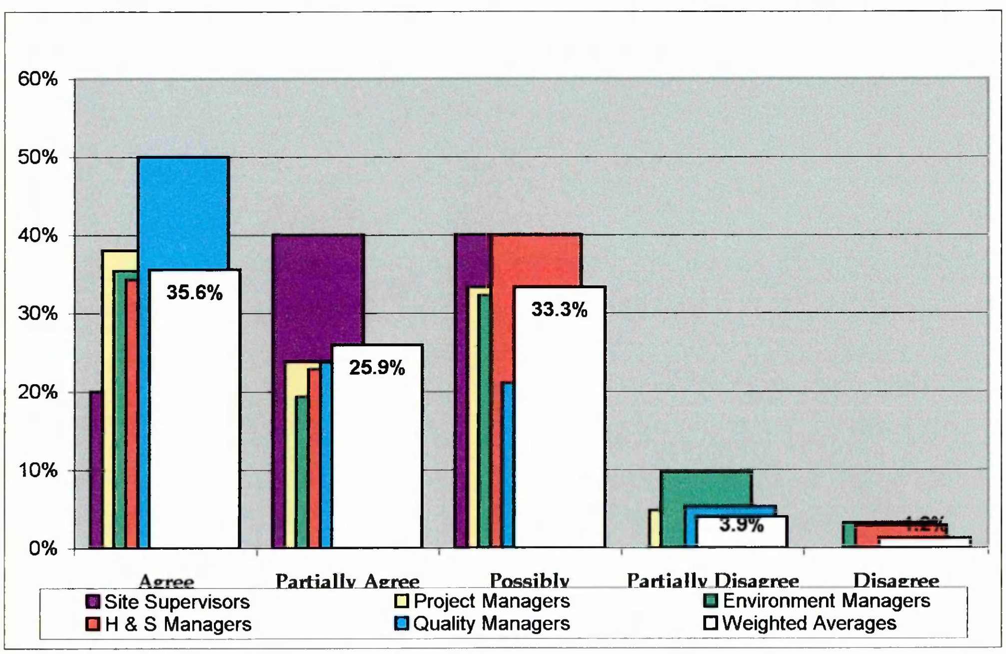


Agree+Partially Agree:72.9%
Disagree+ Partatially Disagree:3.3%

STATEMENT 20 (CONFLICT IN MANAGEMENT SYSTEMS IMPLEMENTATION APPROACHES)

The process model would resolve the conflicts in the approaches of standards; Quality (Process Model), Environment (PDCA) and Health & Safety (PDCA/Process Model).

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	19	9	8	2	0	38
	50.0%	23.7%	21.1%	5.3%	0.0%	
HEALTH AND SAFETY MANAGER	12	8	14	0	1	35
	34.3%	22.9%	40.0%	0.0%	2.9%	
ENVIRONMENT MANAGER	11	6	10	3	1	31
	35.5%	19.4%	32.3%	9.7%	3.2%	
PROJECT MANAGER	8	5	7	1	0	21
	38.1%	23.8%	33.3%	4.8%	0.0%	
SITE SUPERVISOR	2	4	4	0	0	10
	20.0%	40.0%	40.0%	0.0%	0.0%	
TOTAL	52	32	43	6	2	135
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**35.6%**	**25.9%**	**33.3%**	**3.9%**	**1.2%**	

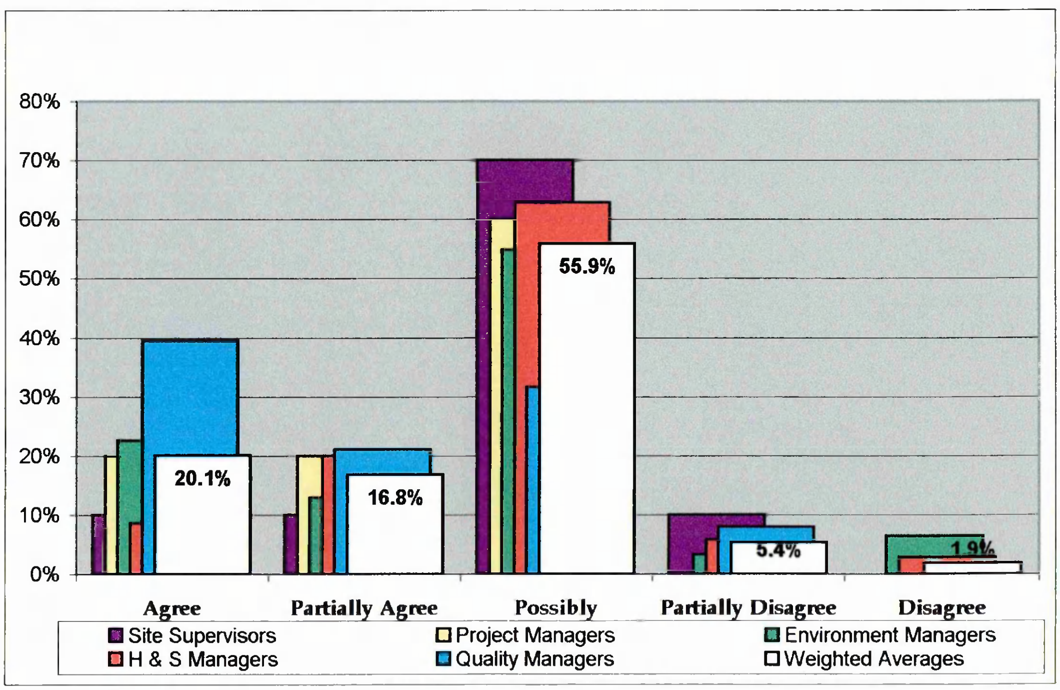


Agree+Partially Agree:61.5%
Disagree+ Partatially Disagree:5.1%

STATEMENT 21 (EUROPEAN BUSINESS EXCELLENCE MODEL)

European Business Excellence Model can be adopted as an umbrella concept for IMS.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	15	8	12	3	0	38
	39.5%	21.1%	31.6%	7.9%	0.0%	
HEALTH AND SAFETY MANAGER	3	7	22	2	1	35
	8.6%	20.0%	62.9%	5.7%	2.9%	
ENVIRONMENT MANAGER	7	4	17	1	2	31
	22.6%	12.9%	54.8%	3.2%	6.5%	
PROJECT MANAGER	4	4	12	0	0	20
	20.0%	20.0%	60.0%	0.0%	0.0%	
SITE SUPERVISOR	1	1	7	1	0	10
	10.0%	10.0%	70.0%	10.0%	0.0%	
TOTAL	30	24	70	7	3	134
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**20.1%**	**16.8%**	**55.9%**	**5.4%**	**1.9%**	

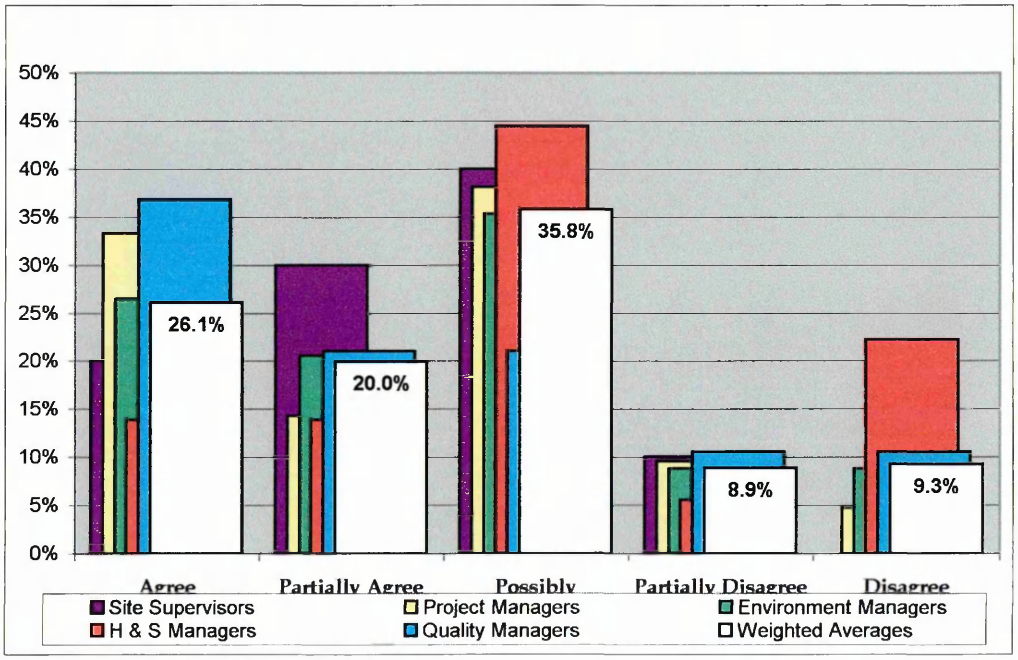


Agree+Partially Agree:36.9%
Disagree+ Partatially Disagree:7.3%

STATEMENT 22 (BUSINESS DEVELOPMENT/IMPROVEMENT STRUCTURE)

It is feasible to have a Business Development/Improvement Department to be the owner of IMS, working as an interface between the concerned departments.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	14	8	8	4	4	38
	36.8%	21.1%	21.1%	10.5%	10.5%	
HEALTH AND SAFETY MANAGER	5	5	16	2	8	36
	13.9%	13.9%	44.4%	5.6%	22.2%	
ENVIRONMENT MANAGER	9	7	12	3	3	34
	26.5%	20.6%	35.3%	8.8%	8.8%	
PROJECT MANAGER	7	3	8	2	1	21
	33.3%	14.3%	38.1%	9.5%	4.8%	
SITE SUPERVISOR	2	3	4	1	0	10
	20.0%	30.0%	40.0%	10.0%	0.0%	
TOTAL	37	26	48	12	16	139
WEIGHTED AVERAGE OF THE TOTOL RETURNS	**26.1%**	**20.0%**	**35.8%**	**8.9%**	**9.3%**	

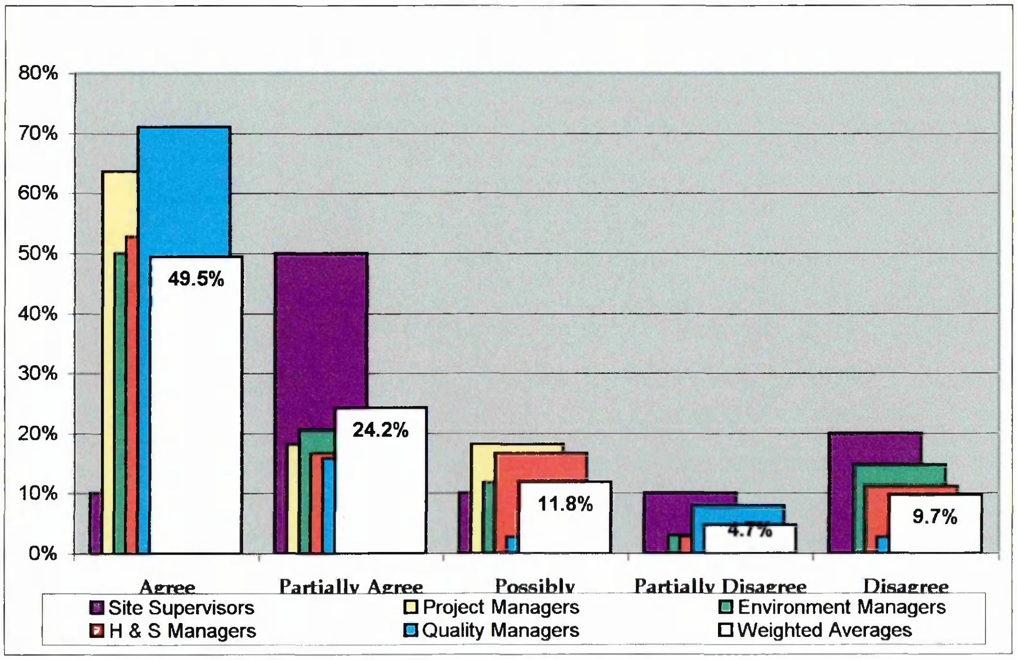


Agree+Partially Agree:46.1%
Disagree+ Partatially Disagree:18.2%

STATEMENT 23 (SINGLE MANAGEMENT STRUCTURE FOR IMS)

In the IMS it is possible to have a single management structure for Quality, Environment and Health & Safety management systems.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	27	6	1	3	1	38
	71.1%	15.8%	2.6%	7.9%	2.6%	
HEALTH AND SAFETY MANAGER	19	6	6	1	4	36
	52.8%	16.7%	16.7%	2.8%	11.1%	
ENVIRONMENT MANAGER	17	7	4	1	5	34
	50.0%	20.6%	11.8%	2.9%	14.7%	
PROJECT MANAGER	14	4	4	0	0	22
	63.6%	18.2%	18.2%	0.0%	0.0%	
SITE SUPERVISOR	1	5	1	1	2	10
	10.0%	50.0%	10.0%	10.0%	20.0%	
TOTAL	78	28	16	6	12	140
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**49.5%**	**24.2%**	**11.8%**	**4.7%**	**9.7%**	

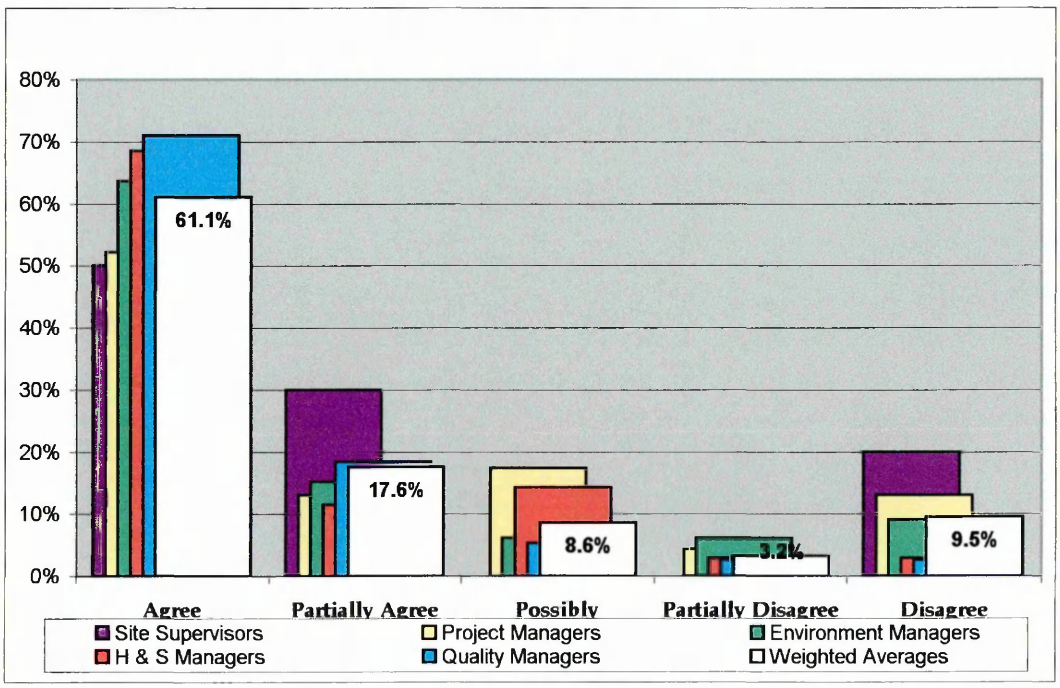


Agree+Partially Agree:73.7%
Disagree+ Partatially Disagree:14.4%

STATEMENT 24 (INTEGRATED AUDITS)

The integrated Quality and Environment (and possibly Health and Safety) audits are possible on projects, saving staff time and resources.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	27	7	2	1	1	38
	71.1%	18.4%	5.3%	2.6%	2.6%	
HEALTH AND SAFETY MANAGER	24	4	5	1	1	35
	68.6%	11.4%	14.3%	2.9%	2.9%	
ENVIRONMENT MANAGER	21	5	2	2	3	33
	63.6%	15.2%	6.1%	6.1%	9.1%	
PROJECT MANAGER	12	3	4	1	3	23
	52.2%	13.0%	17.4%	4.3%	13.0%	
SITE SUPERVISOR	5	3	0	0	2	10
	50.0%	30.0%	0.0%	0.0%	20.0%	
TOTAL	89	22	13	5	10	139
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**61.1%**	**17.6%**	**8.6%**	**3.2%**	**9.5%**	

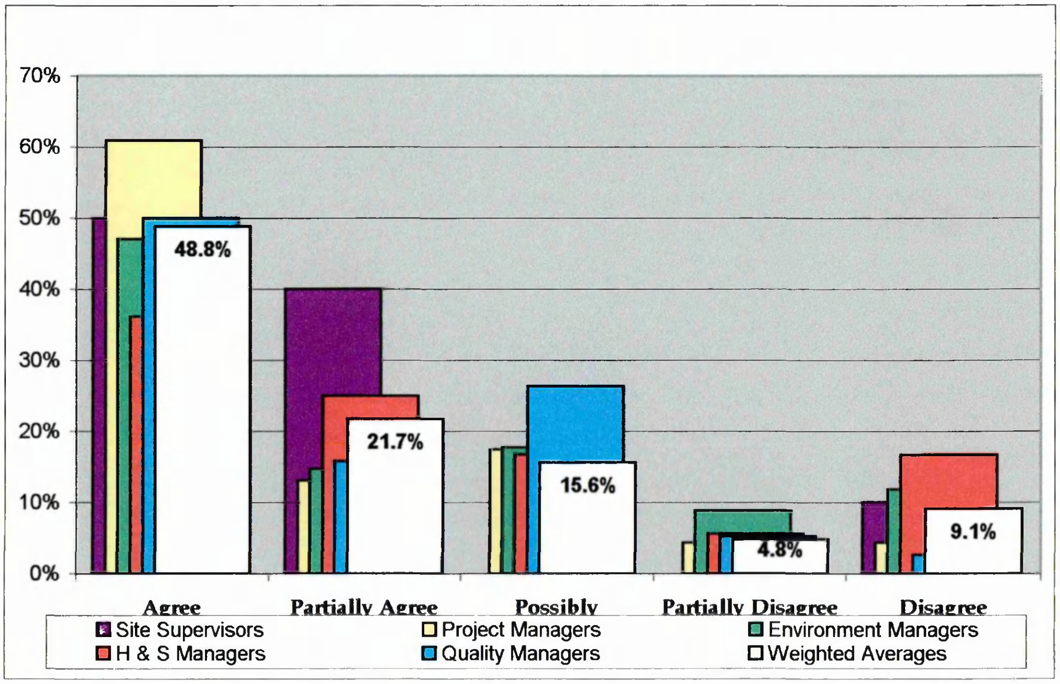


Agree+Partially Agree:78.7%
Disagree+ Partatially Disagree:12.7%

STATEMENT 25 (ROLE OF IMS MANAGERS)

An IMS manager should be appointed to look after the integrated systems for Quality, Environment and Health and Safety, especially on big projects.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	19	6	10	2	1	38
	50.0%	15.8%	26.3%	5.3%	2.6%	
HEALTH AND SAFETY MANAGER	13	9	6	2	6	36
	36.1%	25.0%	16.7%	5.6%	16.7%	
ENVIRONMENT MANAGER	16	5	6	3	4	34
	47.1%	14.7%	17.6%	8.8%	11.8%	
PROJECT MANAGER	14	3	4	1	1	23
	60.9%	13.0%	17.4%	4.3%	4.3%	
SITE SUPERVISOR	5	4	0	0	1	10
	50.0%	40.0%	0.0%	0.0%	10.0%	
TOTAL	67	27	26	8	13	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**48.8%**	**21.7%**	**15.6%**	**4.8%**	**9.1%**	

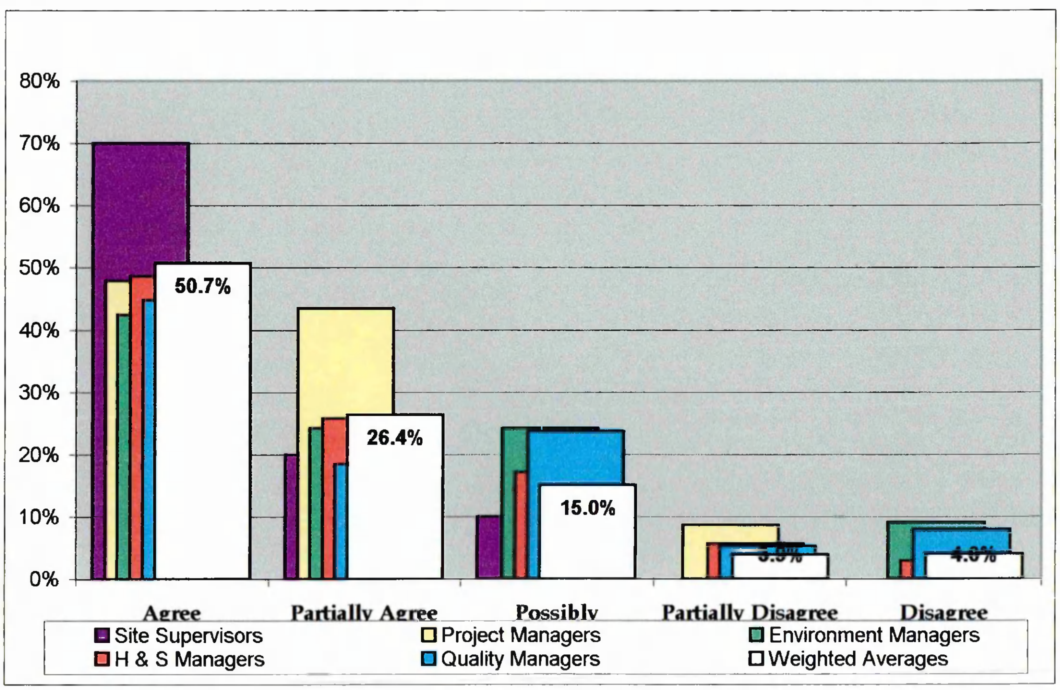


Agree+Partially Agree:70.5%
Disagree+ Partatially Disagree:13.9%

STATEMENT 26 (PAPERWORK AT SUPERVISORY LEVEL)

The paperwork for management systems at the project supervisor level is overly descriptive, repetitive and laborious. It can be streamlined, standardised, computerised, made user friendly and colour coded with a check (tick) list style.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	17	7	9	2	3	38
	44.7%	18.4%	23.7%	5.3%	7.9%	
HEALTH AND SAFETY MANAGER	17	9	6	2	1	35
	48.6%	25.7%	17.1%	5.7%	2.9%	
ENVIRONMENT MANAGER	14	8	8	0	3	33
	42.4%	24.2%	24.2%	0.0%	9.1%	
PROJECT MANAGER	11	10	0	2	0	23
	47.8%	43.5%	0.0%	8.7%	0.0%	
SITE SUPERVISOR	7	2	1	0	0	10
	70.0%	20.0%	10.0%	0.0%	0.0%	
TOTAL	66	36	24	6	7	139
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**50.7%**	**26.4%**	**15.0%**	**3.9%**	**4.0%**	

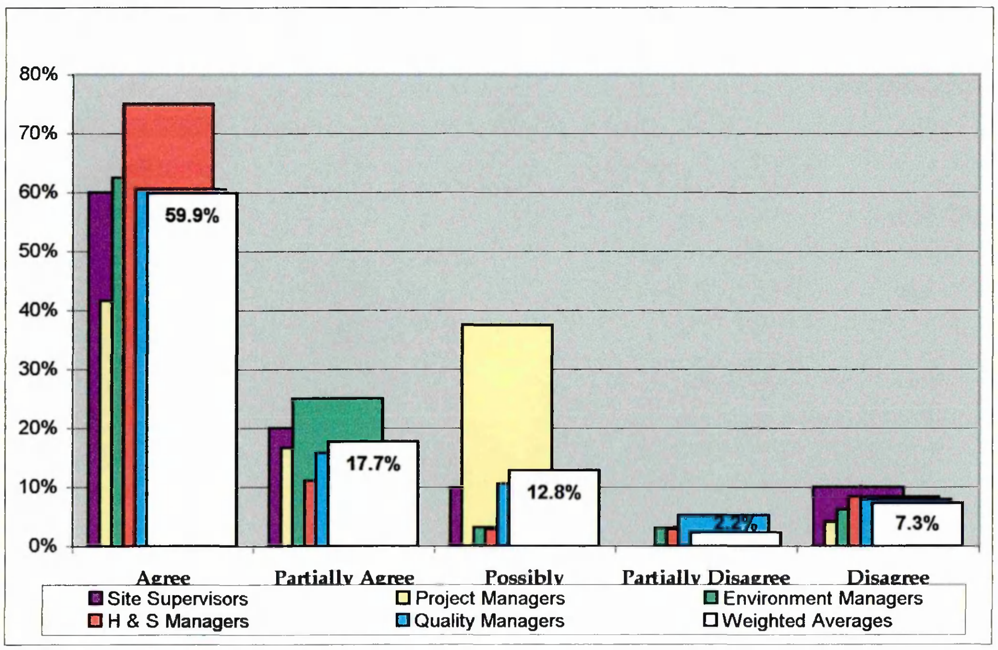


Agree+Partially Agree:77.1%
Disagree+ Partatially Disagree:7.9%

STATEMENT 27 (CERTIFICATION OF HEALTH AND SAFETY MANAGEMENT SYSTEM)

In the IMS it is useful to have the Health & Safety management system structured around any standard (OHSAS 18001 or BS 8800) and preferably certified. It facilitates the checks on the system and the independent assessment.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	23	6	4	2	3	38
	60.5%	15.8%	10.5%	5.3%	7.9%	
HEALTH AND SAFETY MANAGER	27	4	1	1	3	36
	75.0%	11.1%	2.8%	2.8%	8.3%	
ENVIRONMENT MANAGER	20	8	1	1	2	32
	62.5%	25.0%	3.1%	3.1%	6.3%	
PROJECT MANAGER	10	4	9	0	1	24
	41.7%	16.7%	37.5%	0.0%	4.2%	
SITE SUPERVISOR	6	2	1	0	1	10
	60.0%	20.0%	10.0%	0.0%	10.0%	
TOTAL	86	24	16	4	10	140
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**59.9%**	**17.7%**	**12.8%**	**2.2%**	**7.3%**	

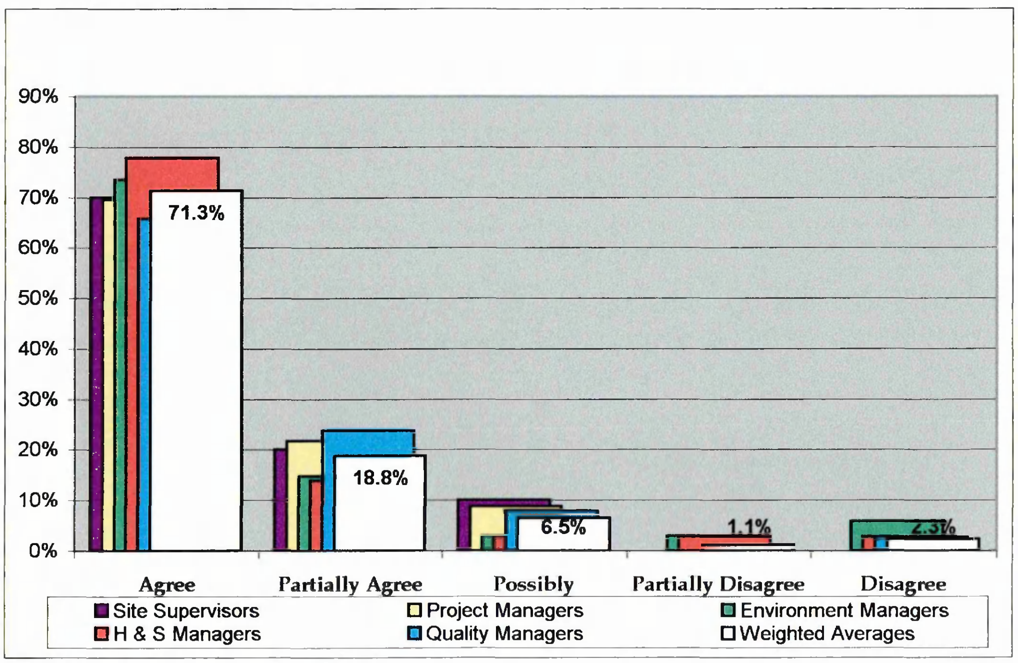


Agree+Partially Agree:77.7%
Disagree+ Partatially Disagree:9.5%

STATEMENT 28 (ROLE OF IT IN IMS)

Successful IMS require effective use of IT. Systems manual, documentation and any further information should be computerised in a document management system. It should be easily accessible on company intranet with good search facility.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	25	9	3	0	1	38
	65.8%	23.7%	7.9%	0.0%	2.6%	
HEALTH AND SAFETY MANAGER	28	5	1	1	1	36
	77.8%	13.9%	2.8%	2.8%	2.8%	
ENVIRONMENT MANAGER	25	5	1	1	2	34
	73.5%	14.7%	2.9%	2.9%	5.9%	
PROJECT MANAGER	16	5	2	0	0	23
	69.6%	21.7%	8.7%	0.0%	0.0%	
SITE SUPERVISOR	7	2	1	0	0	10
	70.0%	20.0%	10.0%	0.0%	0.0%	
TOTAL	101	26	8	2	4	141
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**71.3%**	**18.8%**	**6.5%**	**1.1%**	**2.3%**	

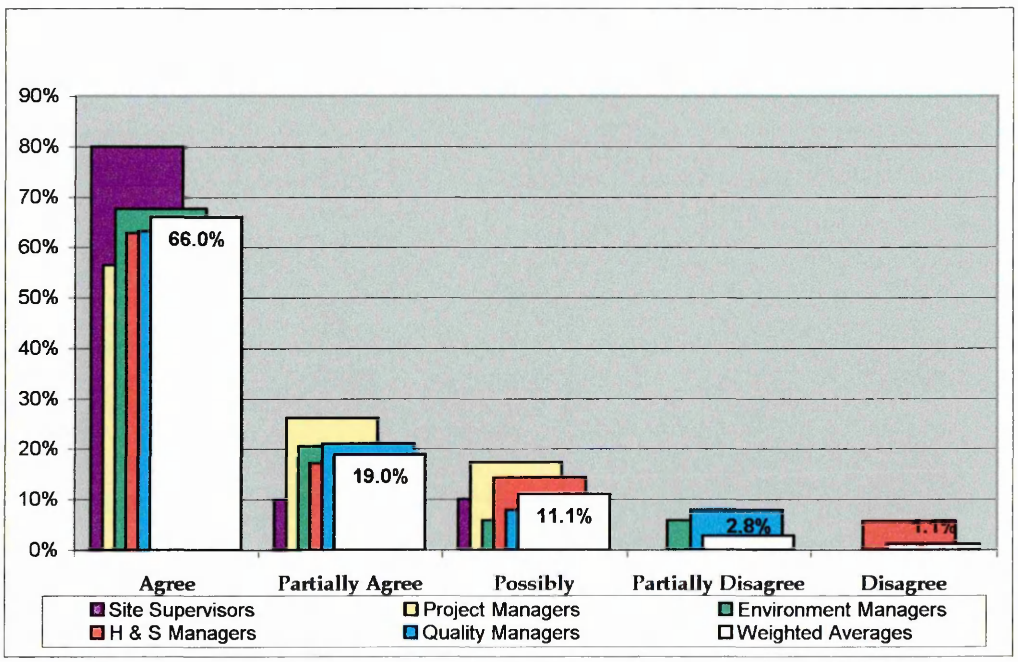


Agree+Partially Agree:90.1%
Disagree+ Partatially Disagree:3.3%

STATEMENT 29 (CUSTOMER "CLIENT" AWARENESS)

Customer awareness is necessary for IMS. Still some clients are not used to looking at an integrated Quality, Environment and Health & Safety policy and systems.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	24	8	3	3	0	38
	63.2%	21.1%	7.9%	7.9%	0.0%	
HEALTH AND SAFETY MANAGER	22	6	5	0	2	35
	62.9%	17.1%	14.3%	0.0%	5.7%	
ENVIRONMENT MANAGER	23	7	2	2	0	34
	67.6%	20.6%	5.9%	5.9%	0.0%	
PROJECT MANAGER	13	6	4	0	0	23
	56.5%	26.1%	17.4%	0.0%	0.0%	
SITE SUPERVISOR	8	1	1	0	0	10
	80.0%	10.0%	10.0%	0.0%	0.0%	
TOTAL	90	28	15	5	2	140
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**66.0%**	**19.0%**	**11.1%**	**2.8%**	**1.1%**	

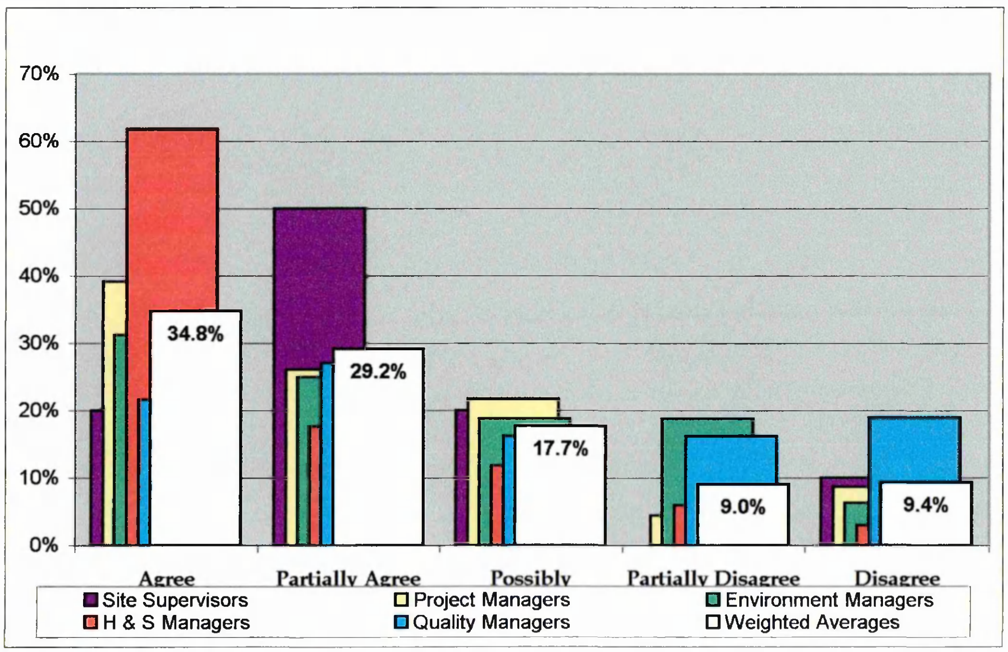


Agree+Partially Agree:85.0%
Disagree+ Partatially Disagree:3.9%

STATEMENT 30 (DISADVANTAGES OF IMS)

The IMS may be less flexible and slow in reaction to any new legislation or directive. In the IMS, effects of any new documentation need assessment not only for any particular system but for all the departments and the systems.

	Agree	Partially Agree	Possibly	Partially Disagree	Disagree	Total
QUALITY MANAGER	8	10	6	6	7	37
	21.6%	27.0%	16.2%	16.2%	18.9%	
HEALTH AND SAFETY MANAGER	21	6	4	2	1	34
	61.8%	17.6%	11.8%	5.9%	2.9%	
ENVIRONMENT MANAGER	10	8	6	6	2	32
	31.3%	25.0%	18.8%	18.8%	6.3%	
PROJECT MANAGER	9	6	5	1	2	23
	39.1%	26.1%	21.7%	4.3%	8.7%	
SITE SUPERVISOR	2	5	2	0	1	10
	20.0%	50.0%	20.0%	0.0%	10.0%	
TOTAL	50	35	23	15	13	136
WEIGHTED AVERAGE OF THE TOTAL RETURNS	**34.8%**	**29.2%**	**17.7%**	**9.0%**	**9.4%**	



Agree+Partially Agree:64.0%
Disagree+ Partatially Disagree:18.4%

Appendix E

Links between Management Systems

LINKS BETWEEN OHSAS 18001:1999[1], ISO 9001:2000[2] AND ISO 14001:1996

CLAUSE	OHSAS 18001:1999	CLAUSE	ISO 9001:2000	CLAUSE	ISO 14001:1996
--	--	0	**INTRODUCTION**		**INTRODUCTION**
		0.1	General		
		0.2	Process approach		
		0.3	Relationship with ISO 9004		
		0.4	Compatibility with other management system		
1	**SCOPE**	1	**SCOPE**	1	**SCOPE**
		1.1	General		
		1.2	Application		
2	**REFERENCE PUBLICATIONS**	2	**NORMATIVE REFERENCE**	2	**NORMATIVE REFERENCE**
3	**DEFINITIONS**	3	**TERMS AND DEFINITIONS**	3	**DEFINITIONS**
4	**OH&S MANAGEMENT SYSTEM ELEMENTS**	4	**QUALITY MANAGEMENT SYSTEM**	4	**ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS**
4.1	General Requirement	4.1	General requirements	4.1	General Requirement
		4.2	Document requirement		
4.4.4	Documentation	4.2.1	General	4.4.4	Environmental management system documentation
4.4.4	Documentation	4.2.2	Quality manual	4.4.4	Environmental management system documentation
4.4.5	Document and data control	4.2.3	Control of documents	4.4.5	Document control
4.5.3	Records and records management	4.2.4	Control of records	4.5.3	Records
4.4.1	Structure and responsibility	5	**MANAGEMENT RESPONSIBILITY**	4.4.1	Structure and responsibility
4.2 4.4.1	OH&S policy Structure and responsibility	5.1	Management commitment	4.2 4.4.1	Environmental policy Structure and responsibility
4.3.1 4.3.2	Planning for hazard identification, risk assessment and risk control Legal and other requirements	5.2	Customer focus	4.3.1 4.3.2	Environmental aspects Legal and other requirements
4.2	OH&S Policy	5.3	Quality policy	4.2	Environmental Policy

4.3	Planning	5.4	Planning	4.3	Planning
4.3.3	Objectives	5.4.1	Quality objectives	4.3.3	Objectives and targets
4.3.4	OH&S management programme(s)	5.4.2	Quality management systems planning	4.3.4	Environmental management programme(s)
4.1	General requirements	5.5	Responsibility, authority and communication	4.1	General requirements

CLAUSE	OHSAS 18001:1999	CLAUSE	ISO 9001:2000	CLAUSE	ISO 14001:1996
4.1 4.4.1	General requirements Structure and responsibility	5.5.1	Responsibility and authority	4.1 4.4.1	General requirements Structure and responsibility
4.4.1	Structure and responsibility	5.5.2	Management representative	4.4.1	Structure and responsibility
4.4.3	Consultation and communication	5.5.3	Internal communication	4.4.3	Communication
4.6	Management Review	5.6	Management review	4.6	Management Review
		5.6.1	General		
		5.6.2	Review input		
		5.6.3	Review output		
4.4.1	Structure and responsibility	**6**	**RESOURCE MANAGEMENT**	4.4.1	Structure and responsibility
		6.1	Provision of resources		
		6.2	Human resources		
		6.2.1	General		
4.4.2	Training, awareness and competence	6.2.2	Competence, awareness and training	4.4.2	Training, awareness and competence
4.4.1	Structure and responsibility	6.3	Infrastructure	4.4.1	Structure and responsibility
		6.4	Work environment		
4.4 4.4.6	Implementation and operation Operational control	**7**	**PRODUCT REALIZATION**	4.4 4.4.6	Implementation and operation Operational control
4.4 4.4.6	Implementation and operation Operational control	7.1	Planning of product realization	4.4 4.4.6	Implementation and operation Operational control
4.4.6	Operational control	7.2	Customer-related processes	4.4.6	Operational control
4.3.1 4.3.2	Planning for hazard identification, risk assessment and risk control Legal and other requirements	7.2.1	Determination of requirements related to the product	4.3.1 4.3.2	Environmental aspects Legal and other requirements

4.4.6	Operational control			4.4.6	Operational control
4.4.6 4.3.1	Operational control Planning for hazard identification, risk assessment and risk control	7.2.2	Review of requirements related to the product	4.4.6 4.3.1	Operational control Environmental aspects
4.4.3	Consultation and communications	7.2.3	Customer communications	4.4.3	Communications
4.4.6	Operational control	7.3	Design and development	4.4.6	Operational control
		7.3.1	Design and development planning		
		7.3.2	Design and development inputs		
		7.3.3	Design and development outputs		
		7.3.4	Design and development review		
		7.3.5	Design and development verification		
		7.3.6	Design and development validation		
		7.3.7	Control of design and development changes		
CLAUSE	**OHSAS 18001:1999**	**CLAUSE**	**ISO 9001:2000**	**CLAUSE**	**ISO 14001:1996**
4.4.6	Operational control	7.4	Purchasing	4.4.6	Operational control
		7.4.1	Purchasing process		
		7.4.2	Purchasing information		
		7.4.3	Verification of purchased product		
4.4.6	Operational control	7.5	Production and service provision	4.4.6	Operational control
		7.5.1	Control of production and service provision		
		7.5.2	Validation of processes for production and service provision		
		7.5.3	Identification and traceability		
		7.5.4	Customer property		
		7.5.5	Preservation of product		
4.5.1	Performance measurement and monitoring	7.6	Control of monitoring and measuring devices	4.5.1	Monitoring and measurement
4.5	Checking and corrective action	8	**MEASUREMENT, ANALYSIS AND**	4.5	Checking and corrective action

			IMPROVEMENT		
4.5.1	Performance measurement and monitoring	8.1	General	4.5.1	Monitoring and measurement
		8.2	Monitoring and measurement		
		8.2.1	Customer satisfaction		
4.5.4	Audit	8.2.2	Internal audit	4.5.4	Environmental management system audit
4.5.1	Performance measurement and monitoring	8.2.3	Monitoring and measurement of processes	4.5.1	Monitoring and measurement
		8.2.4	Monitoring and measurement of product		
4.5.2 4.4.7	Accidents, incidents, nonconformance and corrective and preventive action Emergency preparedness and response	8.3	Control of nonconforming product	4.5.2 4.4.7	Nonconformance and corrective and preventive action Emergency preparedness and response
4.5.1	Performance measurement and monitoring	8.4	Analysis of data	4.5.1	Monitoring and measurement
4.2	OH&S Policy	8.5	Improvement	4.2	Environmental Policy
4.3.4	OH&S management programme(s)	8.5.1	Continual improvement	4.3.4	Environmental management programme (s)
4.5.2	Accidents, incidents, nonconformance and corrective and preventive action	8.5.2	Corrective action	4.5.2	Nonconformance and corrective and preventive action
		8.5.3	Preventive action		

1-Table A.2, OHSAS 18001:1999 (BSI)   2-Annex A, ISO 9001:2000 (BSI)