

The Applicability of i2i as a Supply Chain Management Tool in Facilities Management

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Declaration

This thesis includes material that has been published both by the author, and written by the author for publication by the Centre for Facilities Management, and submission by the SPICE FM project. These include:

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Nelson, M. (2004). PFI in an FM Environment. In Murray M. and Langford, M. (2004). *Architect's Handbook of Construction Project Management*. London: RIBA Enterprises.

Proceedings in Refereed Conferences

Nelson, M. and Sarshar, M. (2003). Supply, Demand or Value Chain Management – The FM Dilemma. In *Proceedings of the 3rd International Conference of Postgraduate Research in the Built and Human Environment*. ESAI, Lisbon, Portugal. April.

Nelson, M. and Alexander, K. (2002). The Emergence of Supply Chain Management as a Strategic Facilities Management Tool. In *Proceedings of the EUROFM International Research Symposium in Facilities Management*. University of Salford. April.

Nelson, M. and Sarshar, M. (2002). Supply Chain Management in Facilities Management – Using the i2i Model. In *Proceedings of the 2nd International Conference of Postgraduate Research in the Built and Human Environment*, University of Salford. Pp. 13-22. April.

Nelson, M. and Baldry, D. (2000). Modelling Process Improvement in Facilities Management. In *Proceedings of Bizarre Fruit, National Conference of Postgraduate Research in the Built and Human Environment*, University of Salford. Pp. 198-209. March.

Nelson, M., Sarshar, M. and Stokes, E. (2000). Process Improvement in Facilities Management - Using the SPICE approach. In *Proceedings of the UK National Conference on Objects and Integration for Architecture, Engineering and Construction*. BRE, Watford. Pp. 65-73. March.

Nelson, M. and Sarshar, M. (2000). Towards Process Improvement in the Facilities Supply Chain. In *Proceedings of the ARCOM Doctoral Workshop*. Salford. October

Case Study Reports

Nelson, M. (2000). Report on i2i Case Study – Bolton Royal Hospitals NHS Trust. Internal report for the EPSRC SPICE FM project.

Nelson, M. (2002). Report on BA i2i Case Study. Internal report published by the Centre for Facilities Management, University of Salford. October. CFM (2002).

Nelson, M. (2003). Report on DTI i2i Case Study. Internal report published by the Centre for Facilities Management, University of Salford. March. CFM (2003).

Nelson, M. L. (2001). Supply Chain Management in Facilities Management. Report submitted to the EPSRC as part of the SPICE FM project.

Note: Reports written by the author for CFM are referenced in other publications and parts of this thesis, but not under the author's name.

Teaching Material

Nelson, M. (2001). An Introduction to Supply Chain Management. The MSc in Project Management in Construction, School of Construction and Property Management

Dissertation

Nelson, M. L. (1998). Intelligent Buildings and the Commercial Office Property Market in the United Kingdom. Final year dissertation for the award of the BSc (Honours) degree in Property Development and Asset Management, Department of Surveying, University of Salford, UK.

Abbreviations

Be	Built Environment
BIFM	British Institute of Facilities Management
CFM	Centre for Facilities Management
CSCM	Construction Supply Chain Management
DETR	Department for the Environment, Transport and Regions
DTI	Department of Trade and Industry
EBME	Electro Bio Medical Equipment
EFM	Estates Facilities Management
FM	Facilities Management
FMA	Facilities Managing (Management) Agent
HR	Human Resource
i2i	Integrate to Innovate
IFMA	International Facility Management
ITDC	Interaction Type Diagnostic Checklist
KPIs	Key Performance Indicators
NHS	National Health Service
PBBS	Product Based Business Strategy
PIDC	Partnership Interaction Type Diagnostic Checklist
PRTM	Pittiglio, Rabin, Todd, McGrath
QMF	Quality Managed Facilities
SCM	Supply Chain Management
SLAs	Service Level Agreements
TFM	Total Facilities Management

Abstract

This thesis investigated Supply Chain Management (SCM), a relatively new area of study in Facilities Management (FM) in the UK, where a research gap was identified by the researcher. This study explored SCM in other industries, relating the benefits derived to FM. It identified that SCM is fundamental to FM, as business performance (which FM supports) is influenced by supply chain performance, creating a link between FM supply chain performance and business performance. Furthermore, competitive advantage and cost savings amongst others were found to be driving forces for SCM in FM, from client and supplier perspectives.

This thesis focused on the application of models in SCM in FM. Although a comprehensive examination of available supply chain models was not undertaken, an evaluation of three identified the Integrate to Innovate (i2i) model relevant for application in FM.

The action research approach adopted by this thesis enabled the researcher gain a deeper understanding of the applicability of the model, and build on knowledge acquired throughout the period of study. To support this methodology, a philosophical stance between positivism and phenomenology, viewing 'reality as a contextual field of information', was adopted. An explanatory case study approach was employed to undertake a contextual analysis of Gestalten, and understand the real world dynamics of SCM in FM.

i2i is a five-level model and three-part framework that evaluates supply chain relationships. Three case studies were undertaken in this thesis, which applied and

evaluated the model and framework using a variety of research tools. Each was a learning process for the researcher, adding to the overall outcomes of the research.

The thesis identified that the i2i model represented a framework for 'good practice' in SCM in FM. Further development is however required to make it a robust tool, and deliver consistency in its application.

Chapter 1 Introduction

This research study aims to address issues related to the applicability of the Integrate to Innovate (i2i) model in Supply Chain Management (SCM) in Facilities Management (FM). The research questions centre on exploring SCM issues in FM with a view to applying the i2i model in improvement initiatives in industry. This grew out of a need identified whilst the researcher was working on the Structured Process Improvement for Construction Environments (SPICE FM) project.

Sexton (2003) suggested three dimensions to achieving a doctorate in philosophy (PhD) research: the axiology (why), ontology (what), and epistemology (how). In undertaking this research, I added a fourth dimension to help myself understand the purpose of my research. This dimension, 'therefore' (or as I use it personally 'so what') I believe is just as important as why I am undertaking the research, what I have done, and how I have done it. It is a part of my contribution to originality and I believe the most difficult part of the PhD journey.

This fourth dimension represents what I have achieved through this journey, which 'may' be different from what I set out to do at the start of the research process; again it may be the same. This journey represents not just my exploration of the application of a model, but my development as a researcher.

This chapter addresses the axiological aspects of this research thesis.

1.1 Background to the Research

FM has traditionally been seen as simply the management of buildings and building services. It has been defined by various authors as:

“...the planning, design, and management of occupied buildings and their associated building systems, equipment, and furniture to enable and (one hopes) to enhance the organisation’s ability to meet its business or programmatic objectives”

Becker (1990);

“An integrated approach to maintaining, improving and adapting the buildings of an organisation in order to create an environment that strongly supports the primary objectives of that organisation” Barrett (1995);

“The process by which an organisation ensures that its buildings, systems and service support core operations and processes as well as contribute to achieving its strategic objectives in changing conditions” Alexander (1996);

Other definitions however see FM more in terms of a specialist business support service as shown in the following two definitions:

“The development, co-ordination and control of the non-core specialist services necessary for an organisation to successfully achieve its principal objectives” US Library of Congress (1989);

“The process by which an organisation delivers and sustains support services in a quality environment to meet strategic needs” (CFM, 1996).

This view is further supported by the growing trend to view FM as the management of non-core company assets and activities to support and increase the efficiency of the main (core) business of the organisation, i.e. moving away from its operational role to a more strategic role.

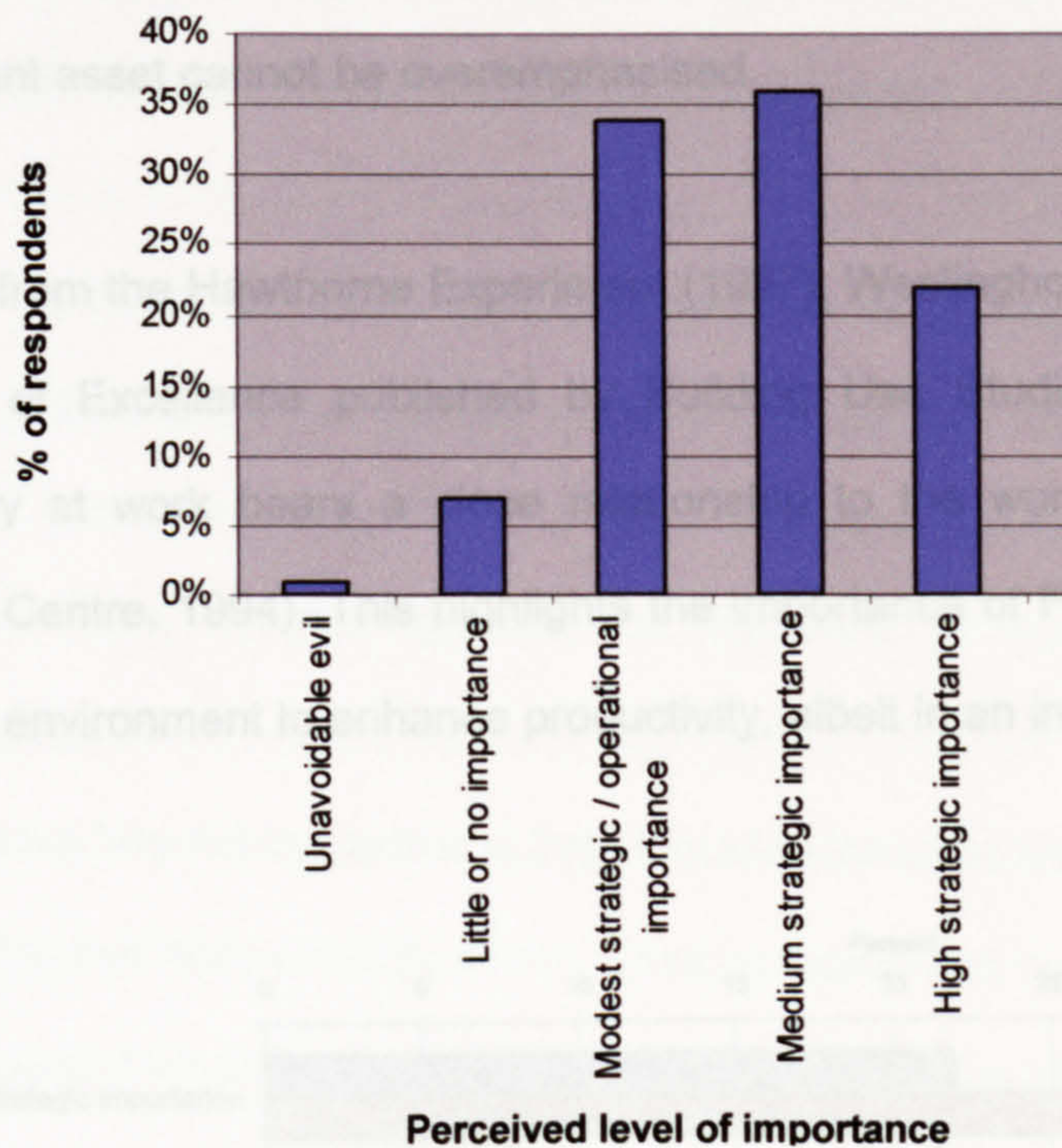


Figure 1.1 Perceived level of importance of FM by Boards of Directors (BIFM, 1999)

Although, Becker (1990) identified this growing trend over ten years ago, change has been very slow. In a 1999 British Institute for Facilities Management (BIFM) survey of its members (fig. 1.1), just over 20% believed that their board of directors (or similar) perceived FM to be of high strategic importance. 36% of respondents voted for medium strategic importance, whilst 34% voted modest strategic / operational importance. 7% voted for little or no importance, and 1% actually voted that their board of directors perceived FM to be an 'unavoidable evil' (BIFM, 1999; Price and Aklaghi, 1999).

Research has however shown that FM is of growing strategic importance to organisations. Alexander (1996) stated *“Facilities are an organisation’s second largest expense and can account for as much as 15% of turnover”* and *“they are also the largest item on the balance sheet, typically over 25% of all fixed assets”*. With figures like this, the management of the facilities function of an organisation as an important asset cannot be overemphasised.

Research from the Hawthorne Experiment (1927), Westinghouse report (1984), and Premises of Excellence published by Building Use Studies (1985), show that productivity at work bears a close relationship to the work environment (Harris Research Centre, 1994). This highlights the importance of FM as a provider of the right work environment to enhance productivity, albeit in an indirect role.

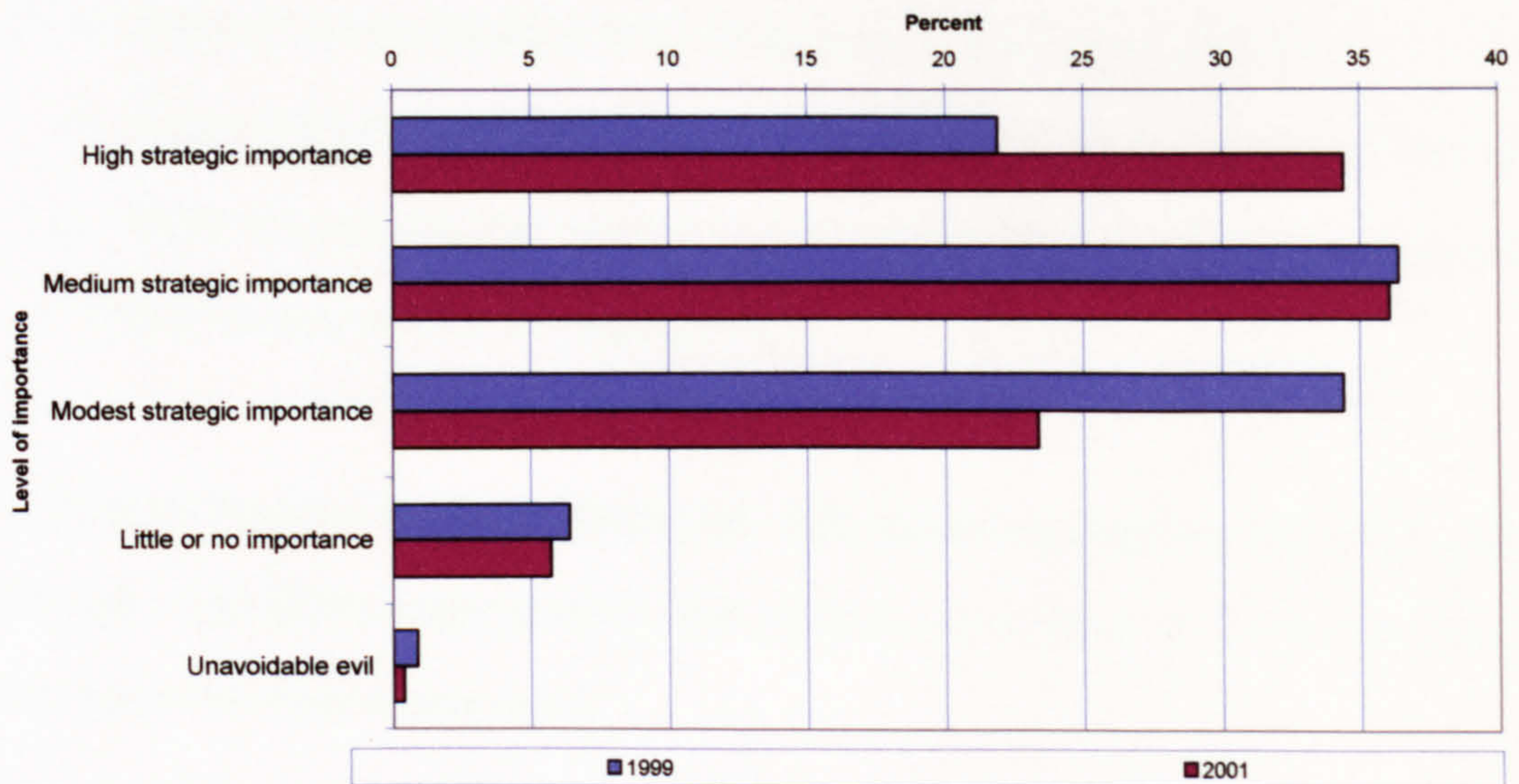


Figure 1.2 Level of strategic importance of FM to Board (BIFM, 2002)

Furthermore, the most recent BIFM (2002) survey (fig.1.2) shows a sharp increase from 1999, in the numbers of members who believed that their board of directors perceived FM as being of high strategic importance. This move from a perception of FM as an operational issue to one of strategic importance is essential for the

effective provision of FM services in its current form, and the provision of FM services to meet future changing needs.

With the redefinition of FM by such influential bodies as the International Facilities Management Association (IFMA), BIFM and Centre for Facilities Management (CFM), this strategic role is gradually been recognized.

The management of ever changing business requirements and the lead-time involved in the delivery of construction-related business projects is one of the main dilemmas currently facing FM in practice. Savage (1996) further suggested that businesses face new management and leadership challenges in the near future including how to:

- Move beyond the extreme fragmentation inherited from the industrial era;
- Maintain accountability in flat, dynamic networked organisations;
- Support focussing and co-ordination of multiple cross-functional task teams;
- Build the capacity for continual learning and quick market responsiveness into the structure of the organisation.

In order to respond to these challenges, FM will be required to take on a more strategic role within organisations and look for new ways to deliver changing services in this new environment.

The FM market is also witnessing a move from the provision of facilities services to the creation of an 'experience' identifiable to a specific organisation. Pine and Gilmore (1999) define 'experience' as a memorable occurrence that organisations use to engage an individual. Some facilities such as Chiswick Park (enjoywork.com) are already at the forefront of creating these 'experience' parks in place of business

parks. FM services are seen to provide the stage for the creation of these experiences.

FM services however are usually supplied by multiple specialists and generalists. Management of the supply chain therefore becomes imperative to service the 'experience economy'. SCM was developed in the manufacturing and retail industries and tends to be viewed as the domain of logistics management. SCM is generally seen as the *"logical customer-focused progression of physical distribution and logistics management"* (Metz, 1998), and has been defined by various authors as:

"The strategic management process, unifying the systematic planning and control of all technologies, materials and services, from identification of need by the ultimate customer" (Lord Chilver of Cranfield, 1990);

"The explicit creation and systematic management of vital knowledge through the supply chain" (Barrett & Sexton, 1998);

"A process-oriented, integrated approach to procuring, producing, and delivering products and services to customers" (MIT, 1998);

"All of those activities associated with moving goods from raw-materials stage through to the end user" (Quinn 1997);

"The management of all the activities in any of the companies involved in a supply chain to achieve two things: to provide the highest possible level of customer service at minimum cost" (NITL 2000).

The term 'supply chain' in itself has various definitions depending on the stakeholder. It can be defined as a *"complex, dynamic network or system of interconnected and interdependent individuals, groups, companies, organisations and relationships whose goal is to satisfy and add value to their particular customer"* (Brown, 2000); or simply as a *"system through which organisations deliver their products and services to their customers"* (Poirier & Reiter, 1996).

FM involves the management of a supply chain or network. Terminology however is a big issue in this area. Other terms are commonly used in place of the supply chain, namely: the 'value chain' and 'demand chain'. These terms however represent other concepts which will be discussed later in chapter 4. Very briefly however, a value chain refers to the *"sequence of activities which build to generate the mix of products and services for the whole organisation"* (Alexander, 1996). It *"disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and potential sources of differentiation"* (Porter, 1985). The demand chain on the other hand, *"represents a circular process that flows from the mind of the consumer to the market"* (Blackwell & Blackwell, 1999).

Through the research process, the researcher identified that in the field of FM, demand and value chain management were equally as important as SCM. As FM has been defined as a non-core specialist service supporting the organisation in delivering its business objectives, it is argued by some that demand chain management is even more important in FM than SCM, however, that is not the focus of this research. Although some of these issues will be explored in later chapters, the focus of this research remains the applicability of the i2i model in managing the FM supply chain.

1.2 Justification for the Research

SCM is a relatively new area of research in the facilities industry. There is some argument over whether we should be looking at supply chain or supply network management. Leaving aside the semantics, the issues to be addressed are relevant to the supply chain or where several chains are connected, to supply network management in FM.

As in quite a number of other process initiatives being undertaken in this industry, the concepts being tried and tested are management concepts borrowed from other industries such as manufacturing, IT, retail and construction. As part of previous research undertaken by the researcher, four main stimulants were identified as the drivers for change, namely: financial expectations, stakeholder expectations, market and competition, and regulations and legislation (Nelson, 2001).

Supply chain re-engineering is also a growing concept in FM. Reengineering is a borrowed concept from business process management. The supply chain is now perceived to be the *“cutting edge of contemporary reengineering and the logical progression from business process reengineering”* (Hammer, 1998). In fitting with the holistic philosophy Hammer (1998) further stated that *“improve the total system, everybody comes out ahead”*.

The importance of SCM is further emphasised by The Office of Government Commerce (OGC). The OGC's Achieving Excellence Programme for public procurement stated that *“all three procurement strategies (Prime Contracting, Design and Build, and PFI) can only achieve best value for money if they are based on the integration and management of the supply chain”* (Holti et al, 2000). As the

government is the largest procurer of construction (and hence property related facilities services), a client driven business need is perhaps the best argument for addressing SCM in FM.

Whether provided in-house or outsourced, the FM service delivery profile needs to be raised from an operational level to a strategic level. Grimshaw & Keefe (1992) stated, *“organisations must be persuaded that a link exists between their physical environment and the operational efficiency of the company”*. There is a need to create a link from service requirements capture through to process management and service delivery, in order to manage an effective and efficient supply chain (most commonly referred to as ‘management from cradle to grave’).

Over the period of this study, the researcher identified SCM to be a very important area in FM. However, no consensus was found on what the most important SCM issues in FM were. The main issues identified during the period of study in the FM industry are service specification, process management, use of technologies, consolidation or rationalisation of the supply chain and process alignment. The growth of web-based e-business was also being addressed. Consolidation and rationalisation proved by far to be the most popular of these.

Recent research undertaken at the CFM (2004) revealed that service specification and defining FM requirements for changing needs is still very much at the top of the agenda. Other issues highlighted include: flexibility of contacts and contractors, selection of service providers and staff turnover. This confirms the need for a model to support SCM in FM.

The i2i model was identified as an appropriate model to apply in FM through an evaluation with two other models used in SCM. The action research methodology

(figure 1.3) was adopted for this thesis as it enabled the researcher to bring together the various aspects of the research and reflect on the contribution made by the research to real world research in FM.

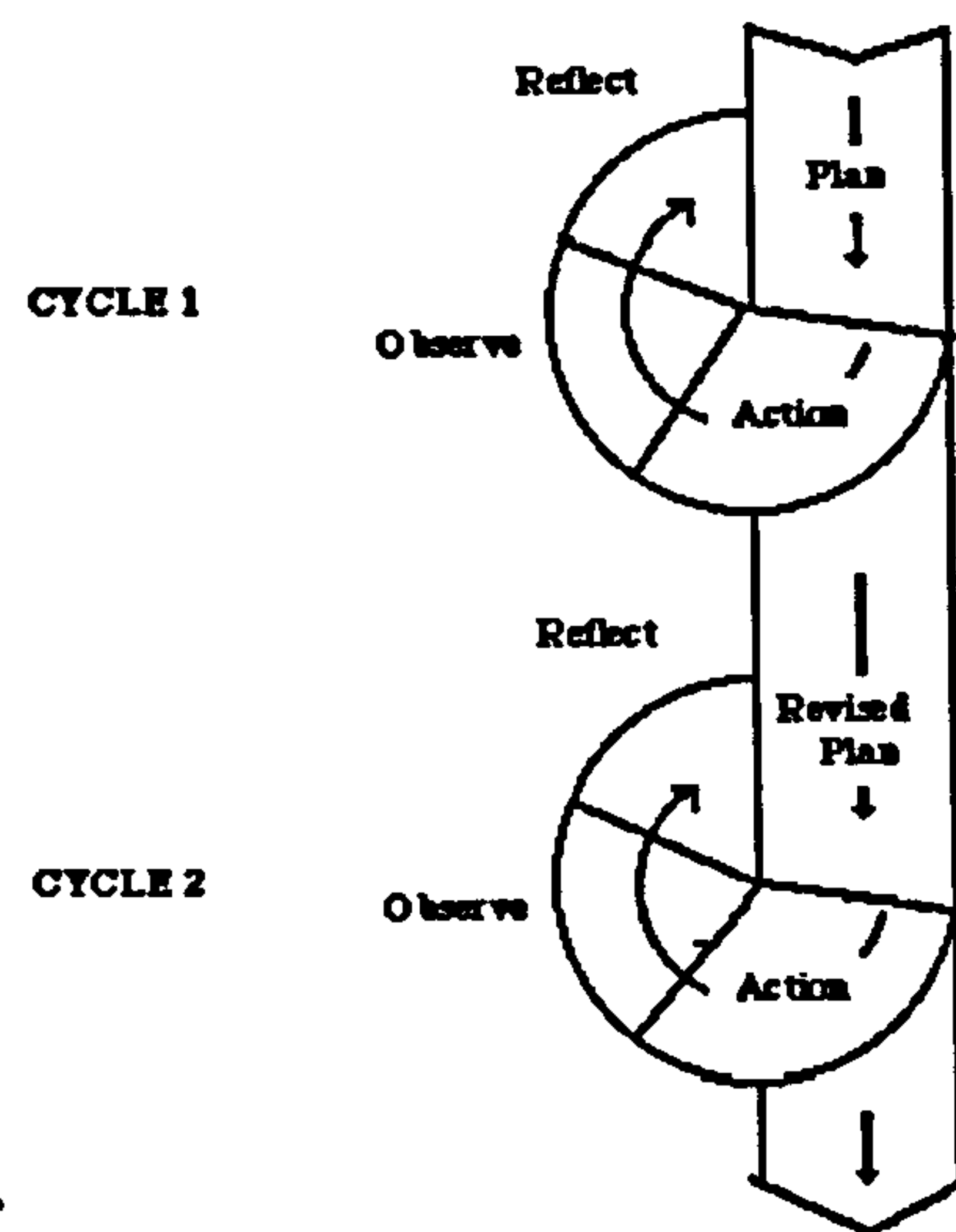


Figure 1.3 Action Research (Zuber-Skerritt, 1992)

The research thesis adopted the four stage process of action research (fig. 1.3) and undertook each case study on this basis. It went through a planning stage which involved the collation of background material and information, as well as the formulation of the case study process. The action stage involved the case studies undertaken with the three organisations. The observation stage in this thesis involved the analysis of the information gathered through the case study. The final stage reflected on the lessons learnt from the case study. This process was repeated for each case study. The same process is reflected in the composition of the thesis, as described later in section 1.6.

1.3 Scope of Research

This research seeks to address the applicability of the i2i model in SCM in FM. The scope of the research will be addressed as follows:

1.3.1 Research Questions

- Is the i2i model applicable in the FM industry?
- How can it be applied?
- What are the barriers or constraints impacting upon its application?
- What are the opportunities it presents?

These questions were derived from enquiries from industry and research regarding the need for a model to address SCM issues in FM.

1.3.2 Aim

The aim of this research thesis is to explore the applicability of the i2i model in SCM in FM in the United Kingdom.

1.3.3 Objectives

The objectives of this research thesis are to demonstrate:

- How the model can be applied;
- The relevancy in the FM industry;
- The constraints and barriers to its usage;
- The applicability of the chosen methodology to the subject studied.

1.4 Value of the Research

The UK Quality Assurance Agency (QAA) gives the criteria for doctoral work as demonstrating the creation and interpretation of new knowledge (through original research, sufficient to satisfy peer review) that extends the forefront of the discipline and merits publication (Denicolo, 2003). Phillips and Pugh (1994) compiled fifteen definitions of 'originality' in a thesis.

This research thesis hopes to demonstrate some aspects of the following definitions:

- 1) Adding to knowledge in a way that has not been done before – Through the identification of research tools to be used with the i2i model and its implementation in practice and the exploration of SCM in FM.
- 2) Being cross-disciplinary and using different methodologies – Through the adoption of a model developed for the construction industry, and developing it for FM using business management concepts and research tools.
- 3) Carrying out empirical work that has not been done before – Through the development and implementation of tools using existing research methods, to enable the application of the model.
- 4) Continuing a previously original piece of work – Through examining the current deficiencies of the i2i model developed by the team of Barrett and Sexton, and taking it further through to implementation in the field of FM.

- 5) Giving a good exposition of another's idea – Through the description and analysis of the i2i model, and a comparison with other existing models in SCM.
- 6) Looking at topics that people in this discipline have not looked at before – As mentioned previously, SCM is a relatively new area of research and implementation in FM. Very little literature has been available in this area, although a vast abundance of literature exists in other industries in this area.
- 7) Making a new interpretation of someone else's material or ideas – Through the implementation of the i2i model in FM. Based on discussions with Professor Peter Barrett, I have been able to demonstrate the use of the model in a way the original researchers had not expected or anticipated.
- 8) Making a synthesis of things that have not been put together before – Through combining concepts from other industries, and a number of various research methods and tools to enable the application of the model.
- 9) Taking a new technique and applying to a new area – Through the exploration of new techniques to determine gaps and prioritise areas for improvement in SCM in FM, which had previously not been addressed.
- 10) Testing existing knowledge in an original way – Through the use of various research methods, techniques and tools to address issues in SCM in FM which had previously not been done.

1.5 Criteria for Assessment

Although the thesis will be demonstrating some of Phillips' and Pugh's fifteen definitions of originality, the researcher does not wish to be judged on a checklist of these definitions.

By adopting a mixed research approach to this thesis, the researcher aimed not only to test the applicability of the i2i model in industry, but to learn from the case studies and develop as a researcher in the field of action research. My contribution to knowledge therefore is not only in the knowledge added to the case study organisations in the first instance, and FM secondarily, but also to 'real world' FM research.

1.6 Structure of the Thesis

The thesis is divided into eleven chapters, grouped into action research (fig.1.3) sections. The first two chapters represent the background to the study in terms of themes and methodology.

Chapter One is the introduction, which lays the foundation for the rest of the discussions which follow.

Chapter Two is the first exploration of the research methodology for this thesis. It addresses the philosophical stance of the research, as well as the research methods and tools adopted in this study.

The next three chapters represent the literature review for this subject area.

Chapter Three addresses FM in more detail, and examines what it is, what its role is within an organisation and what the drivers are for change in this field.

Chapter Four examines the concept of SCM. It looks at examples from other industries where its benefits have been demonstrated. It also examines what the Facilities supply chain represents, and takes on the issue of terminology, reviewing three concepts (Supply chain, Demand chain and Value chain management) which unfortunately are usually confused, with the terms often being used interchangeably. This chapter further defines and explores the relationships between the three concepts and FM.

Chapter Five addresses SCM issues in facilities management based on previous discussions and the results of previous and ongoing research undertaken by the researcher. It identifies the FM supply chain and provides an example of successful SCM from the FM industry.

The next four chapters are specific to the i2i model.

Chapter Six commences by examining the three selected SCM models. It describes each model, and goes on to critically analyse the three models based on the researcher's criteria. This provides the justification for the adoption of the i2i model for this study. It then explores the i2i model in more detail, along with the role of knowledge management in the development of the model. This forms the basis for the case studies which follow.

Chapter Seven presents the first of the three case studies undertaken in this thesis. It describes the pilot case study undertaken with an acute NHS hospital trust in the North West of England.

Chapter Eight presents the second case study which looks at FM procurement issues in a UK based commercial airline organisation with global operations.

Chapter Nine presents the third and final case study, which goes back to the public sector and tests the applicability of the i2i model in a central government agency's FM unit. It further highlights amendments made to the research methods employed in the pilot study.

The last two chapters represent the analysis of the results from the study and the researchers learning experience.

Chapter Ten is the reflection of the researcher not only on the applicability of the model, but on the research process as well.

Chapter Eleven presents the conclusion, recommendations to various stakeholders in the research process and future research to be undertaken.

1.7 Summary

FM, though traditionally associated with the management and maintenance of buildings, has evolved to include a much wider remit, not necessarily property based. This has created the need for new ways of working, and of responding to changing clients' requirements. The historical background to SCM (SCM) lies in

manufacturing, and in particular, logistics management. It is a relatively new area of research in FM, in which gaps have been identified some of which this research hopes to fill.

The need to address SCM issues in FM has been identified through literature and various research projects that the researcher has been involved with. Likewise, the researcher and the research have evolved through this process recognising other issues which impact on the study, and their relevance.

Justification for the research lies in the need for a model to address SCM issues in FM, identified through various research, which the researcher has been involved with. This is demonstrated by the benefits derived from addressing SCM in other industries which will be discussed later in chapter 4.

The scope for the research has by necessity been limited to explaining the applicability of the i2i model in FM, whilst recognising other issues related to SCM in FM. The limitations have also been highlighted, and will be discussed throughout the thesis where relevant.

Chapter 2 Research Methodology

Plato pointed to the heavens and represented abstract and theoretical philosophy. Aristotle gestured earthward indicating concerns with the real and practical world. Socrates looked to the inner self proposing that self-knowledge was the key to enlightenment. Each of these ancient philosophers had a major contribution to thinking and knowledge, which has lived on to the modern age.

For a modern 'philosopher' there is the need to demonstrate an understanding of the nature and essence of research and knowledge creation, in addition to generating new knowledge either through innovation or invention, or through the innovative translation of existing knowledge, which forms the essence of a PhD.

This chapter addresses the general issues related to the philosophical (epistemological) and methodological approach to this research, including the research methods and tools employed in the study.

2.1 Research Classifications

There are three traditional classifications for research namely: pure research, applied research and action research (Easterby-Smith and Lowe, 1991), distinguished by their characteristics and intended outcomes. These are also referred to as randomised or true experiment, quasi-experimental and non-experimental research respectively (Trochim, 2002). Pure research is mostly associated with scientific research. Applied research may be undertaken in both

scientific and social science research. Action research is mostly undertaken in social science research.

2.1.1 Pure research

Pure research is intended to lead to theoretical developments. Its results are openly disseminated, though mainly to an academic audience. It can take three forms – discovery, invention and reflection.

Discovery happens when a new idea or explanation emerges from empirical research, which may revolutionise thinking in that area. They are rare and unpredictable, for example the 1927 Hawthorne Effect (Harris Research Centre, 1994).

Invention occurs where a new technique, method or idea is created for a particular issue, based on the direct experiences of their inventors. Examples include Scientific Management (Taylor, 1947) and Total Quality Management (TQM) (Walton, 1989).

Reflection like the name suggests, occurs where an existing, theory, technique or group of ideas is re-examined.

2.1.2 Applied research

Applied research is undertaken when solutions to specific problems are required. It usually involves working with clients who identify the problems and are involved in

the solution. The results are reported back to the client, and also disseminated through journals and other publications, for example COGENT - a Nissan-Cranfield initiative (Evans and Foxley, 1999).

2.1.3 Action research

This deals with the view that research should lead to change, which should be incorporated into the research process itself. It operates on the basis of participation (Salford University, 1999), and stresses the importance of establishing a collaborative relationship between the researcher and the researched, a 'new paradigm' research approach (Reason and Rowan, 1981). It has been defined (Kemmiss and McTaggart, 1988) as a self-reflective approach to social science research. It is mostly useful when working with individuals or small groups (Easterby-Smith and Lowe, (1991), and most suited to situations where change is planned or imminent (Salford University, 1999). The research process itself is a part of the learning process.

Action research is believed to have developed largely from the work of Kurt Lewin and his associates; and is based on *"a collaborative problem-solving relationship between the researcher and client which aims at both solving a problem and generating new knowledge"* (Coghlan and Brannick, 2001). It is also described as being akin to experiential learning (Kolb, 1984) and reflective practice (Schon, 1983) because participants study their actions and the processes by which they go through and learn from both.

Argyris *et al* (1985) provide a summary of Lewin's concept of action research in terms of five attributes:

- Involves change experiments on real problems in social systems.
- Involves iterative cycles of identifying a problem, planning, acting and evaluating.
- Intended change typically involves re-education, i.e. changing the established patterns of thinking and action in individuals or groups.
- Challenges the status quo from a participative perspective.
- Intended to contribute simultaneously to basic knowledge in social science and to social action in everyday life.

The emphasis here is on research leading to change. Altrichter *et al* (2002) suggest two distinct parts to action research: the axiomatic and the empirical. The former represents what is meant by action research, whilst the latter relates the “*rules of thumb that collect the reflected research experiences of action researchers*”. The axiomatic part has three key aspects namely:

- People reflecting upon and improving their own practice;
- Inter-linking of reflection and action;
- Disseminating experience to people concerned by or interested in the respective practice.

This is the focus of this research thesis. Although the thesis is based on applied research undertaken with organisations in the UK, the action research approach has been adopted for the presentation of the thesis.

Two sets of actions take place in action research: the action of the researcher and the action of the organisation. Each has four self-explanatory phases:

- Planning;
- Acting;

- Observing; and
- Reflecting.

It is a continuous and iterative cyclical process (Altrichter *et al*, 2002), which involves “*research and development, intellectual inquiry and practical improvement, reflection and action*”. Once action has been taken, “the researcher’s role is then to investigate the ‘patterns of change’ and the impact of the learning process” (Alexander *et al*, 2003). This process contrasts with traditional research where the employees of the organisation are passive, and the researchers serve as experts undertaking the research and giving recommendations to the client organisation (Alexander *et al*, 2003). It has however also been described as participatory action research (Whyte *et al*, 1991), and is closely related to the concept of action learning (Revans, 1980 and 1983; Pedler, 1991; Inglis, 1994; Dilworth, 1996, Botham and Vick, 1998), which involves the development of the researcher as a reflective practitioner (Schon, 1983).

Zuber-Skerritt and Perry (2002) went on to define these phases in terms of a research thesis as follows:

- Planning and Designing the thesis:
 - Defining the research problem;
 - Thesis design and rationale;
 - Literature survey;
 - Internet search;
 - Justification and methodology.
- Action:
 - Identifying workgroup’s thematic concern;

- Planning/acting/observing/reflecting on professional and organisational practices and learning;
- Report verified by participants.
- Observation:
 - Description of research process and procedure;
 - Analysis and evaluation of results of action (content and process) in the light of the literature review.
- Reflection:
 - Analysis of reflections by the practitioners;
 - Reflections by the candidate;
 - Conclusions from the research;
 - Knowledge claims and limitations;
 - Suggestions for further research.

This research thesis will demonstrate these four phases of action research, although the researcher has taken the liberty of merging the presentation of the action with the observation phases. This is purely to preserve the smooth and logical flow of the thesis. The research approach adopted influenced the philosophical stance and methodology applied in this study.

2.2 Research Philosophy

Research is defined as *“a detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding”*, whilst philosophy refers to *“a particular system of beliefs, values and principles”* (Cambridge Dictionaries Online, 2004). The research philosophy would therefore represent the beliefs, values and

principles underlying a detailed study. Research philosophies tend to exist between two stereotypical extremities. The first philosophical viewpoint represents positivism and the second represents phenomenology. These are also sometimes represented as objectivism and subjectivism. These philosophies have to some extent been elevated into extreme stereotypes, as it has not been possible for the researcher to identify one philosopher who ascribes to all aspects of one view exclusively.

2.2.1 Positivism versus Phenomenology

Positivism is the belief that the social world exists externally, and its properties should be measured through objective methods. It is based on the idea that science is *“without theology and metaphysics, based only on facts about the physical/material world”* (Wikipedia, 2003); and that *“the goal of knowledge is simply to describe the phenomena that we experience”* (Trochim, 2002a). The assumptions are that reality is external and objective, and knowledge is only significant if based on observations of external reality. Auguste Comte, the French philosopher was the earliest and most influential proponent of this view (Knight, K, 2003). More recently, logical positivism has been proposed by the Vienna Circle (Wikipedia, 2003; Bolland and Atherton, 2002; Heineman-Pieper *et al*, 2002).

Edmund Leach (1966) defined positivism thus: *“Positivism is the view that serious scientific inquiry should not search for ultimate causes deriving from some outside source but must confine itself to the study of relations existing between facts which are directly accessible to observation”* (Wikipedia, 2003).

Positivists believe in ‘empiricism’, which is the idea that observation and measurement are at the core of scientific endeavour (Trochim, 2002a). Their key

approach is therefore experimentation (through direct manipulation and observation).

One criticism of positivism is that it asserts that *“sense experiences are the only object of human knowledge, but does not prove its assertion”* (Knight, 2003). It was suggested that it fails to demonstrate the absence of *“abstract notions, general laws, universal and necessary principles”*, nor that they cannot be known. In addition, it did not prove that *“material and corporeal things constitute the whole order of existing beings”* and that knowledge is limited to them (Knight, 2003).

‘Post-positivism’ brought forth ‘critical realism’. Though positivists were realists, critical realists recognise that observation is fallible, has error, and all theory is reversible. Critical realists therefore emphasise the need to use triangulation across multiple error sources to get a better understanding of the truth (Trochim, 2002a). As triangulation is an important aspect of validation in PhD research, it is important to note the contribution of critical realists to this notion.

Phenomenology is at the other end of the stereotypical scale, and is believed to have started from the philosophical reflections of Edmund Husserl in the mid-1890’s (Embree, 1997). It is the belief that the world and reality are not objective and exterior, but that they are socially constructed and given meaning by people (Husserl, 1946). Heidegger (1927) suggested that it is more a term for *“the method of scientific philosophy in general”*.

Different variants are closely associated with this philosophy, four of which are realistic, constitutive, existential and hermeneutical phenomenology (Embree, 1997). The first emphasises the search for the universal essences of various matters, including human actions, motives and selves. The second extends

Husserl's scope to include philosophy of the natural sciences. The third variant uses an analysis of the human being as a means to fundamental ontology beyond those described by Husserl. The last variant addresses all the issues that were added to the original agenda, but places emphasis on hermeneutics or the method of interpretation.

There are believed to be seven 'widely accepted' features of the phenomenological approach (Embree, 1997), namely phenomenologists:

1. Oppose the acceptance of unobservable matters and grand systems erected in speculative thinking;
2. Oppose naturalism (or objectivism / positivism);
3. Justify cognition (and evaluation and action) with reference to Evidenz (Edmund Husserl);
4. Believe that not only objects in the natural and cultural worlds, but also ideal objects such as numbers and conscious life can be made evident and thus known;
5. Hold that inquiry ought to focus upon 'encountering' which is directed at objects, and correlatively upon "*objects as they are encountered*". Although this terminology is not widely shared, the emphasis on dual 'problematics' and the reflective approach required is;
6. Recognise the role of description in universal, priori or 'eidetic' terms as prior to explanation by means of causes, purposes, or grounds;
7. Debate whether or not the 'transcendental phenomenological epoché' (Edmund Husserl) and reduction is useful or even possible.

The main differences between the positivist and phenomenological paradigms (Easterby-Smith *et al*, 1991) can be summarised as shown in table 2.2.1.

Table 2.2.1 Key features of positivist and phenomenological paradigms (Easterby-Smith *et al*, 1991)

	<i>Positivist paradigm</i>	<i>Phenomenological paradigm</i>
Basic beliefs	<ul style="list-style-type: none"> • The world is external and objective • Observer is independent • Science is value free 	<ul style="list-style-type: none"> • The world is socially constructed and subjective • Observer is part of what observed • Science is driven by human interests
Researcher should:	<ul style="list-style-type: none"> • Focus on facts • Look for causality and fundamental laws • Reduce phenomena to simplest elements • Formulate hypotheses and then test them 	<ul style="list-style-type: none"> • Focus on meanings • Try to understand what is happening • Look at the totality of each situation • Develop ideas through induction from data
Preferred methods include:	<ul style="list-style-type: none"> • Operationalising concepts so that they can be measured • Taking large samples 	<ul style="list-style-type: none"> • Using multiple methods to establish different views of phenomena • Small samples investigated in depth or over time

Whilst positivism takes an objective view, phenomenology takes a subjective view. This results in various approaches, which would depend on what the researcher is trying to achieve.

2.2.2 Objectivism versus Subjectivism

As already discussed, research philosophies are usually associated with either an objective or a subjective view, although both can occur in various forms within the same philosophical viewpoint.

Objectivism is believed to have grown from the philosophical work of Ayn Rand, who defined it as *“an integrated system of thought that defines the abstract principles by which a man must think and act if he is to live the life proper to man”*

(Ayn Rand Institute, 1995-1999). Rand once described the essence of objectivism as:

- Metaphysics: Objective Reality – translated into *“Nature, to be commanded, must be obeyed.”*
- Epistemology: Reason – translated into *“You can’t eat your cake and have it, too.”*
- Ethics: Self-interest – translated into *“Man is an end in himself.”*
- Politics: Capitalism – translated into *“Give me liberty or give me death.”*

In addition she identified two more principles of objectivism as human nature – man as a rational being and ‘reason’ his only means of knowledge, and Aesthetics - Art as a selective re-creation of reality according to an artist’s metaphysical value-judgments (Ayn Rand Institute, 1995-1999).

Subjectivism on the other hand is based on the notion that *“every single person experiences a different reality and that there is no way to reconcile the experiences of two different people”* (Crabtree, 2000). It is based on four precepts: philosophical epistemology, reality by consensus, perception and quantum physics (Crabtree, 2000). It is seen as a *“theory of knowledge”* which *“holds that knowledge is generated from the mind without reference to reality”* (Landauer and Rowlands, 2001), and is also seen as an extreme form of relativism (FOLDOP, 2001).

It is viewed as a *“denial of reality”*, with subjectivists evading the objective view of ethics, and believing they can behave anyway they choose without the fear of consequence (Landauer and Rowlands, 2001). Its very nature and principles give rise to its problems. The major one being that choice without consequence gives rise to the notion that because we like something; that makes it good. Subjectivism

gives “no guide on how to develop rational and wise feelings” (Routledge, Date Unknown).

In business however, as in applied or action research, decisions have to be made with the ‘fear of consequence’, i.e. risk identification and risk assessment known and weighted. Practice based research cannot therefore be undertaken with a purely subjectivist view, as accountability is essential.

In differentiating between the two views, Morgan and Smircich (1980) provide a general overview of the relationships between ontology, human nature, epistemology and methodology in contemporary social science (table. 2.2.2). They form a continuum from extreme subjective to extreme objective.

Table 2.2.2 Network of basic assumptions characterizing the Subjective – Objective debate within Social Science (Morgan and Smircich, 1980)

	Subjectivist Approaches to Social Science			Objectivist Approaches to Social Science		
Core Ontological Assumptions	← Reality as a projection of human imagination	Reality as a social construction	Reality as a realm of symbolic discourse	Reality as a contextual field of information	Reality as a concrete process	Reality as a concrete structure →
Assumptions About Human Nature	Man as pure spirit, consciousness, being	Man as a social constructor, the symbol creator	Man as an actor, the symbol user	Man as an information processor	Man as an adaptor	Man as a responder
Basic Epistemological Stance	To obtain phenomenological insight, revelation	To understand how social reality is created	To understand patterns of symbolic discourse	To map contexts	To study systems, process, change	To construct a positivist science
Some Favoured Metaphors	Transcendental	Language game, accomplishment, text	Theatre, culture	Cybernetic	Organism	Machine
Research Methods	Exploration of pure subjectivity	Hermeneutics	Symbolic analysis	Contextual analysis of Gestalten	Historical analysis	Lab experiments, surveys

This research views reality as a contextual field of information based on Morgan and Smircich’s table above. The researcher has the role of an information processor.

The research methods to be used with this ontological assumption will consider the set of elements in the study and view them as a whole. As such, the basic assumptions of the research philosophy informed the methodology adopted for the study.

2.3 Methodology

Methodology is defined as “*a system of ways of doing, teaching or studying something*” (Cambridge Dictionaries Online, 2004). It may either “*refer to the principal paradigms of an approach*” (i.e. qualitative or quantitative) or define “*an operational research technique*” (Salford University, 1999), some of which are the Delphi Approach, Questionnaire-Based Study, Case Study Technique and Semi-Structured Interviews.

There are two traditional differing research approaches to the collection and handling of data, namely the quantitative and qualitative approaches, closely related to the philosophical stance of the research and researcher. Davis (2000) went one stage further in defining psychological research methods, listing five classifications for research, namely:

- Pre-empirical Research – Undertaken before making observations. It includes the clarification of concepts used, operational definitions of variables, and methodological issues.
- Descriptive Methods – Uses quantitative methods to describe phenomena as they exist. It does not aim to manipulate or control.
- Experimental Methods – Quantitative methods which aim to manipulate and control variables in order to establish cause and effect relationships.

- Qualitative Methods – Uses primarily qualitative data especially from in-depth interviews to identify and describe the underlying themes of the experience of a phenomenon.
- Evaluation Research – Its purpose is decision-making. This type of research uses any of the previous four methods.

The quantitative approach or *scientific method* or fixed design approach (Anastas and MacDonald, 1994), is founded on the assertion that there is a single reality, which is objective. It is therefore possible and necessary (Salford University, 1999) to:

- Separate the phenomenon from the surrounding environment and make a free standing assessment;
- Maintain distance and objectivity from the research subject;
- Observe without inter-relating to what is observed (positivistic ideal);
- Assume repeatability and isolation from reality without compromising the cause and effect being researched, and the phenomenon can be measured numerically or quantitatively.

The qualitative or flexible design approach (Anastas and MacDonald, 1994) is the opposite view based on the assumption that there is no singular objective reality, and that the nature of the observed reality is in some way related to the researcher's interaction with it. It is a realistic, though complex study since it does not impose any isolating assumptions or controls on the phenomenon. This approach yields rich, complex data, and the findings focus on the qualities of the research subject, rather than their numeric measurement (Salford University, 1999). This technique is better for theory building, rather than testing.

A mixed design approach may also be used in research (Robson, 2002), which make use of two or more methods, and could yield both quantitative and qualitative data.

2.3.1 Flexible Design (qualitative) Research

Flexible design research has three influential design ‘traditions’: case studies, ethnographic studies and grounded theory studies. Robson (2002) compares these three approaches in tabular form as follows:

Table 2.3.1 Comparing research traditions in qualitative research

	Grounded Theory	Ethnography	Case Study
Focus	Developing a theory grounded in data from the field	Describing and interpreting a cultural and social group	Developing an in-depth analysis of a single case or multiple cases
Discipline origin	Sociology	Cultural anthropology, sociology	Political Science, sociology, evaluation, urban studies, many other social sciences
Data collection	Typically interviews with 20-30 individuals to ‘saturate’ categories and detail a theory	Primarily observation and interviews during extended time in the field	Multiple sources – documents, archival records, interviews, observations, physical artefacts
Data analysis	Open coding, axial coding, selective coding, conditional matrix	Description, analysis, interpretation	Description, themes, assertions
Narrative form	Theory or theoretical model	Description of the cultural behaviour of the group	In-depth study of a ‘case’ or ‘cases’

Yin (1993) adds a fourth approach called the ‘quasi-experiment’ approach. Although it can be used for theory building and testing, and uses multiple sources of data as

the previous three approaches, its data is mostly quantitative in nature. It also does not consider context as an essential part of the phenomenon being evaluated (Yin, 1993).

The nature of this research makes the case study approach the most appropriate (Cigolini *et al*, 2004). Multiple sources of data collection are employed, and an in-depth study of each case is conducted to describe and determine the application of the i2i model in supply chain management in facilities management.

2.3.2 Case Study Approach

Yin (1989) defined the case study as *“an objective, in-depth examination of a contemporary phenomenon where the investigator has little control over events”*. A case study is a detailed examination of an event (or series of related events), which the analyst believes exhibits the operation of some identified general theoretical principle (Amaratunga, 1998). It may include several research methods such as questionnaire surveys and semi-structured interviews in a mixed approach.

Stake (1995) defines a 'case' as *“a specific, a complex, functioning thing”*. He goes further to state that the real business of a case study is 'particularisation' rather than generalisation.

The case study approach has been deemed appropriate (Yin, 1993) where the researcher intends to:

- Define topics broadly and not narrowly;
- Cover contextual conditions and not just the phenomenon of the study;
- Rely on multiple and not singular sources of evidence.

Amaratunga (1998) further added that it is ideal:

- When a holistic, in-depth investigation is needed;
- Where knowledge building is in its formative stages;
- To explore those situations;
- To bring out the details from the viewpoint of the participants by using multiple sources of data;
- To explain causal link in the real life interventions;
- To investigate a contemporary phenomenon within its real life context.

Case studies may be categorised (Yin, 1994) as:

- Exploratory – usually focuses on theory development;
- Explanatory – involves hypothesis testing. This may involve demonstrating a theory's applicability under circumstances not previously investigated, or pointing out the theory's inapplicability, either in specific circumstances or in general;
- Descriptive – describe an unstudied situation.

This research is categorised as adopting the explanatory case study approach involving demonstrating the applicability of a conceptual model in a new market sector. It is however also exploratory as it is undertaken in a new research environment for facilities management and also applying the model in 'real world' studies for the first time. The research aims to create an 'understanding' rather than an 'explanation' (Stake, 1995) of the applicability of the i2i model in supply chain management in facilities management.

This understanding is to be achieved through a series of evaluative studies. Yin (1993) defines 'evaluation' studies, as *"a particular type of research intended to*

assess and explain the results of specific interventions". A case study evaluation is described (Yin, 1993) as an empirical inquiry that:

- Investigates a contemporary phenomenon within its real-life context;
- Addresses a situation in which the boundaries between phenomenon and context are not clearly evident;
- Uses multiple sources of evidence.

Four criteria have been identified for judging the case study approach to ensure rigour and validity (Yin, 1994), namely:

- Construct validity – this involves the use of multiple sources of evidence, the establishment of a chain of evidence, and a review of draft report by key informants.
- Internal validity – this includes pattern matching, explanation building and time-series analysis (applicable for explanatory or causal studies only);
- External validity – this involves the use of replication;
- Reliability – this involves the use of a case study protocol, and the development of a case study database.

Creswell (1998) on the other hand identifies eight procedures to verify and validate qualitative research studies, of which he advocates that at least two must be undertaken in any given study. These are:

- Prolonged engagement and persistent observation;
- Triangulation;
- Peer review or debriefing;
- Negative case analysis;
- Clarifying researcher bias;
- Member checks;

- Rich, thick description; and external audits.

Triangulation, peer review through publication, and member checks have been employed in this study. The former involved the use of multiple research tools in data collections, and multiple case studies to understand the phenomenon. Peer review has also been used to a certain extent as some aspects of the thesis have been published in refereed conferences. Member checks involved the validation of the case study reports by the participating organisations' representatives.

Some benefits of adopting a case study approach in research have been listed (Amaratunga, 1998; Salford University, 1999) as:

- Creation of rich insights into the issue under consideration;
- Provision of a wealth of examples;
- Permission of multiple sources of information and materials;
- Often unearths new issues, leading to a range of further research needs being identified by both industry and academia;
- Flexibility which allows the redefinition of the research focus as data emerges;
- Enables the researcher to get the 'feel' of what people really think about the subject;
- Bridging the gap between industry and academia;
- Development of a network of people encouraging long term relationships;
- Enables varying perspectives from a range of organisational personnel on selected focuses to be developed.

Difficulties are however associated with using the case study approach (Amaratunga, 1998) including:

- A tendency to be overly descriptive in the writing of cases;
- The volume of data generated for each case study. Difficulty in sieving the 'chaff' from the 'stalk';
- Research 'purists' (quantitative advocates) tend to see case studies as lacking academic rigour. Nevertheless, quantitative data can be obtained through case studies;
- Conclusions may be statistically limited in that often only a handful of cases are used to generalise about certain research questions;
- Captures the experience of an organisation only at a particular period of time;
- Caution needs to be exercised in gaining the trust and support of host organisations.

Other difficulties identified by Amaratunga (1998) include:

- Usually only reports on positive aspects;
- Generally do not seek to analyse issues.

One method of overcoming the first two difficulties, which the researcher employed, was to separate the descriptive case studies for the organisations from the analytical case studies used in this thesis. This however is only one of the many roles of a case study researcher.

Stake (1995) identified various roles and characteristics of a case study researcher as:

- Teacher – To inform, sophisticate, assist in the increase of competence and maturity, socialize and liberate.

- Advocate – Expected to carry the message and convince their readers to believe what the researcher has come to believe.
- Evaluator – Interpreter of the case's strengths and weaknesses, successes and failures. This can either be done as a measurement using outcome scales, or as a narrative description and interpretive assertion.
- Biographer – Provides a 'life history' of the case studied. This may be a phase of 'life' against changing times.
- Interpreter – Recognises and substantiates new meanings. Finds new connections and ways to make them comprehensible to others.
- Constructivist – Based on the belief that knowledge is constructed and not discovered. The case study researcher therefore is responsible for clarifying descriptions and sophisticating interpretations, providing readers with the basis for making their own generalisations.
- Relativist – Believe the value of interpretations vary, relative to their credibility and utility.

Robson (2002) further lists five qualities required by a researcher undertaking flexible design research as:

- Need for an open and enquiring mind in question asking;
- Being a good listener, using all observation and sensing;
- Adaptiveness and flexibility, and need to balance with rigour;
- Grasp of issues, and the need to interpret information rather than just record it;
- Lack of bias, including responsiveness to contradictory evidence.

It will be left to the examiners to determine how well the researcher has demonstrated these characteristics. Just as important to the case study are the methods of data collection and analysis employed.

2.3.3 Data Collection and Analysis

Miles and Huberman (1984) describe a four-phase cyclical process for qualitative research analysis, namely: data collection, data display, data reduction and conclusions (drawing and verifying). In the first phase, data collection, various types of research tools were employed in this study namely: literature review, questionnaire, interview, and workshop. Other types of data collection tools not used in this study are behavioural observation and observation of physical traces.

As mentioned earlier, triangulation is essential for validity in qualitative research. It may include the use of multiple sources of data, multiple methods of analysis or multiple case studies. Each case study in this research employed the use of the most suitable tools identified by the researcher for the nature of the study. Multiple sources of data (triangulation) contributed to the rigour employed in the study. Multiple case studies were also undertaken. The purpose of the multiple case studies however was not to test the same methods in several organisations as traditionally done. Rather they were to build on knowledge gained from one case study and implemented in another.

As well as being employed in the case study, some of the background information relating to current trends in supply chain management in facilities management and the researcher's thinking on this issue were influenced by 'focus group' workshops attended or facilitated by the researcher.

Focus group research is qualitative research that is less structured than the use of questionnaires (Edmunds, 1999). They are best used when evaluating a new concept or idea. It involves a 'brainstorming' session of a small select group of experts on a particular topic. Focus groups offer an in-depth understanding of perspectives and opinions on a particular issue, than is otherwise obtainable through surveys or telephone interviews (Edmunds, 1999).

Several focus group sessions were run by the Centre for Facilities Management over the period of this study, which influenced the researcher's perspective of supply chain management in facilities management. These have however not been included explicitly in this study, as the topics of the group sessions were not all directly related to this study.

Focus group workshops also play an important part in the background to this study, as the i2i model when developed by Barrett and Sexton (1998) was tested by a 'focus group' referred to as a panel of experts, which will be explained in further detail in chapter 6.

2.3.3.1 Data Collection

Literature Review

Literature review takes the form of books, academic and professional journals, postings on Internet websites, and newspaper articles. It also included documentation and archival records. It is used to gain background knowledge into

the subject area(s) of the study, and to identify gaps in the research study. Other uses of literature review (Hart, 1998) include identifying the:

- Key sources;
- Origins and definitions of the topic;
- Key theories, concepts and ideas surrounding the issue;
- Epistemological and ontological grounds for the discipline;
- Major issues and debates about the topic;
- Main questions and problems that have been addressed to date;
- Political standpoints on the issues;
- Knowledge on the topic; and
- Approaches to the questions and how they have increased our understanding and knowledge.

Eight dimensions have been identified in conducting literature review, namely: the search, reading, identifying existing knowledge, appraising the literature, organising the appraisal, establishing the purpose of the review, thinking and reflecting, and the analysis and synthesis (Hart, 1998; Hart, 2001, Kumar, 1995; Naoum, 1998). Relationships have also been drawn from literature to every aspect of the research project (Hart, 2001). There is also a checklist for analysing literature (University of Salford, date unknown) to ensure the reliability of its contents.

Documentation includes the organisations official documents and reports. It also either corroborates or is contradictory, and can be used to highlight areas for further investigation (Haigh, 2001). Its strengths have been defined (Ormerod, 2001) as:

- Stable;
- Unobtrusive;
- Exact;

- Having broad coverage.

However its disadvantages include irretrievability, biased selectivity, reporting bias and access which may be deliberately blocked (Ormerod, 2001). Archival records have the additional advantage of being precise and quantitative.

Questionnaire

Questionnaire surveys are a common tool in both quantitative and qualitative research in the social science field. So much so that Brown and Gilmartin (1969) were quoted as stating *“sociology is becoming the study of verbally expressed sentiments and feelings, rather than an analysis of human performance”* (Foddy, 1993).

Questionnaires may have open or closed-end questions. Open-end questions are versatile, and used in five distinct ways (Peterson, 2000), namely:

- In the early (exploratory) stages of research to generate ideas or obtain a fundamental understanding of the phenomenon or issue.
- To ensure that answers are not unduly influenced by the presence of pre-determined answers.
- Imperative for obtaining information on certain types of variables.
- To monitor trends over time.
- As a follow-up question to either a close or open-end question. These may be in the form of explanatory, probe or elaboration questions.

Closed-end questions have possible answers which are pre-determined by the researcher, and known prior to questionnaire administration (Peterson, 2000). The

responses are usually based on a scale referred to as the monadic or rating scale. Although they require less effort to administer and analyse, they do not provide the same rich or meaningful data as open-end questions.

In developing a theoretical framework for the use of verbal data, survey researchers have identified and adopted ten principal assumptions for developing questions for social research (Foddy, 1993), namely:

1. The researcher has clearly identified the topic about which the information is required;
2. Respondents have the information that the researcher requires;
3. Respondents are able to access the required information under the conditions of the research situations;
4. Respondents can understand each question as the researcher intends it to be understood;
5. Respondents are willing (or at least, can be motivated) to give the required information to the researcher;
6. The answers that respondents give to a particular question are more valid if they have not been told why the researcher is asking the question;
7. The answers that respondents give to a particular question are more valid if the researcher has not suggested them to the respondents;
8. The research situation per se does not influence the nature of the answers given by respondents;
9. The process of answering the questions per se does not change the respondents' beliefs, opinions, habits etc;
10. The answers that different respondents give to a particular question can be meaningfully compared with one another.

The seventh assumption would seem to suggest that close-end questions are lacking in validity as a method of data collection, as they are based on pre-determined or suggested answers. Both however have their strengths and weaknesses as earlier identified.

Peterson (2000) has also described three guidelines for structuring a questionnaire:

- Make it easy to administer;
- Structure to facilitate the efficient transfer of answers to a form that is easy to analyse; and
- Structure to avoid biasing answers by the order in which they are asked and answered.

However, ten problems have also been identified with the use of questions in questionnaires and interviews (Foddy, 1993). These are:

1. Factual questions sometimes elicit invalid answers;
2. The relationship between what respondents say they do and what they actually do is not always very strong;
3. Respondents attitudes, beliefs, opinions, habits, interests often seem to be extraordinarily unstable;
4. Small changes in wording sometimes produce major changes in the distribution of responses;
5. Respondents commonly misinterpret questions;
6. Answers to earlier questions can affect respondents' answers to later questions;
7. Changing the order in which response options are presented sometimes affects respondents' answers;

8. Respondents' answers are sometimes affected by the question format per se;
9. Respondents often answer questions even when it appears that they know very little about the topic;
10. The cultural context in which a question is presented often has an impact on the way respondents interpret and answer questions.

These problems can be related to the guidelines and assumptions regarding the use of questionnaires described earlier.

Interview

Interviews are an interactive method of conducting surveys. They are among the most challenging and rewarding forms of measurement; and require a personal sensitivity and adaptability, as well as the ability to stay within the bounds of the designed protocol (Trochim, 2002b). The role of the interviewer has been described as complex and multifaceted and including the following tasks (Trochim, 2002b):

- Locate and enlist co-operation of respondents;
- Motivate respondents to do a good job;
- Clarify any confusions or concerns;
- Observe quality of responses. This is important whether the interview was conducted face-to-face or on the telephone;
- Conduct a good interview. This involves ensuring a consistency in the quality of the interviews conducted.

Interview questions may be structured (closed), semi-structured or open ended. Structured interviews are geared towards receiving specific pre-selected answers.

Open ended questions have no right or wrong answers, and enable an interviewer to find out more about the respondents' thoughts and feelings on given issues. Semi-structured interviews utilise both forms of questioning, structured to get specific answers and open-ended to get a more detailed response from the respondent on the issues.

Interviews have two main strengths: they are targeted and focus directly on the case study topic; and they are insightful, and provide perceived causal inferences (Ormerod, 2001). However, the disadvantages (Ormerod, 2001) include:

- Bias due to poorly constructed questions;
- Response bias;
- Inaccuracies due to poor recall;
- Reflexivity – i.e. interviewee gives what interviewer wants to hear.

Semi-structured interviews are used in this research to determine individual position / opinion about various issues. This was very important in this study, as the frequency of issues was utilised in the analysis of the responses. These interviews involved the use of questionnaires (case studies 1 and 3) and a framework document (case study 2) intended to apply the i2i model in the former and explore the applicability of the model in the latter. Interviews were also used in identifying the issues in supply chain management in facilities management from both academic and industry practitioners.

An important aspect of interviewing is listening. It is also important to record the interview either in writing or audio (or better still both) to be transcribed at a later stage, some interviews are also recorded in video. The main drawback to recording in audio or video is that the respondent may not be as open to discuss sensitive

issues. In any case, the respondent's permission must be sought before any recording takes place.

Workshop

Workshops are highly interactive and experiential method of research data collection. They involve a number of participants sharing their experiences or views with bias or discrimination (Tritelli, 2001). In this study, workshops were used to discuss the findings from the questionnaire and interview surveys collectively and in more detail. In addition to the skills required as an interviewer, the researcher must be a good facilitator to derive good results from a workshop.

2.3.3.2 Data Analysis

Various tools exist for analysing qualitative data, including: coding, matrices, maps, charts, rich pictures, chronologies, pattern matching, theme building and causal networks (Ormerod, 2001). The primary tool for data analysis in this research study was the use of content analysis. Although questionnaires were used in the study, statistical analysis of the data was not undertaken as it was not suitable for the purpose of the study. The requirement was not only to understand the organisations and the issues they were dealing with, but also to understand the i2i model and its applicability. Matrices were therefore used as would be seen in the case studies.

Content Analysis

Content analysis can take either a quantitative or qualitative approach (Stockdale and Standing, 2002). The qualitative approach is used to determine the range of significant issues rather than a ranking of issues (Berg, 2001). The method assumes that semi-structured and open-ended interviews have been undertaken and fully recorded (Burnard, 1991). Stockdale and Standing (2002) suggest that the first step in data analysis is to formulate a research question or theory. Then the scope of the data used for analysis must be defined.

Peterson (2000) however skips these two stages, and proposes that the first stage in content analysis is to review and group the answers on the bases of some criterion. The second stage according to Peterson (2000) consists of combining answers into subgroups within each of the first-level groups. The third stage is the development of a coding scheme to categorise all answers. The researcher used an analysis grid (Gillham, 2000) to undertake the content analysis to reduce the risk of imposing the researcher's preconceived ideas on the results of the study.

Content analysis as a research method is substantially different to a basic academic literature review. Here the researcher is searching for predetermined themes and uses the material as data. There are checks within the method for validity and reliability, one of which is the iterative cycle of analysis (Stockdale and Standing, 2002).

Matrices

In quantitative research, a matrix is an ordered set of numbers or symbols set out in rectangular form to resolve mathematical problems (Cambridge online, 2004). It could however also mean the set of conditions which provide a background in which something grows or develops. Although the use of matrices was employed in this study, the researcher was unable to identify relevant literature relating to its use in qualitative studies.

2.4 Summary

Although applied research formed the basis of the research, the thesis is presented as an action research study. Action research could not be undertaken within the organisations, as the research cycle (or loop) could not be completed in each organisation for various reasons. Action research thesis has been identified to have four phases of planning, action, observation and reflection.

This informed the philosophical stance of the research leaning more towards phenomenology, viewing reality in the context of the information derived from the studies. The explanatory case study approach was identified as the most appropriate to explore and describe the applicability of the i2i model to supply chain management in facilities management. This method undertakes a contextual analysis of gestalten in line with the philosophical stance adopted.

Triangulation was introduced through the use of multiple sources of data and multiple case studies, which adds to the reliability and validity, i.e. the rigour of this study. The thesis departed from the traditional use of multiple case studies to verify the use of the same methods in different organisations, by using this method to build on knowledge in the subject area.

Chapter 3 Facilities Management

Building management or business support management, FM appears to have taken over the role of a 'jack of all trades'. Its evolution has resulted in its moving away from a technical base towards a general management base. Hence, a facility manager need not necessarily be a 'master of all', but a manager of all.

This chapter explores FM, its definitions, scope, management models, functions, the impact of changing work practices on FM, and its role in an organisation.

3.1 FM Scope

As mentioned earlier in the introduction, FM has traditionally been seen very simply as the management of buildings and building services (Tranfield and Akhlaghi, 1995; Park, 1994). However, the growing trend is to view FM as the management of non-core company assets and activities to support and increase the efficiency of the main (core) business of the organisation.

The definitions for FM over the years have evolved with its changing nature. FM is believed to have first originated in the USA in the 1960's with the growing practice of banks to outsource the processing of credit card transactions (Lord *et al*, 2002). In the 1980's, it emerged as *"the development, co-ordination and control of the non-core specialist services necessary for an organisation to successfully achieve its principal objectives"* (US Library of Congress, 1989).

A year later Becker (1990) stated that it “..refers to buildings in use, to the planning, design, and management of occupied buildings and their associated building systems, equipment, and furniture to enable and (one hopes) to enhance the organisation’s ability to meet its business or programmatic objectives”. Barrett (1995) then saw it as “an integrated approach to maintaining, improving and adapting the buildings of an organisation in order to create an environment that strongly supports the primary objectives of that organisation”.

Alexander (1996) emphasised the need for dynamism by stating that it was “the process by which an organisation ensures that its buildings, systems and service support core operations and processes as well as contribute to achieving its strategic objectives in changing conditions”; whilst Tranfield and Akhlaghi (1995) emphasised the need for integration of people, process and place. Varcoe (2000) described FM as the management and delivery of the business outputs of both real estate and construction, namely the productive use of building assets as workplaces.

More recently, the BIFM (2001) defined FM as “the integration of multi-disciplinary activities within the built environment and the management of their impact upon people and the workplace”. Most of the definitions assume that the workplace is limited to the organisations’ buildings, and make no allowances for the modern mobile worker or workspace.

IFMA (2003) quotes the 2000-2001 edition of the United States Bureau of Labour Statistics' Occupational Outlook Handbook describing a ‘facility manager’ in an occupational category as follows:

"Facility managers are assigned a wide range of tasks in planning, designing and managing facilities. They are responsible for coordinating the physical workplace with the people and work of an organization.

This task requires integrating the principles of business administration, architecture, as well as the behavioural and engineering sciences. the duties fall into several categories. They include operations and maintenance, real estate, project planning and management, communication, finance, quality assessment, facility function, and human and environmental factors. Tasks may include space and workplace planning, budgeting, the purchase and sale of real estate, lease management, renovations, or architectural planning and design.

Facility managers may suggest and oversee renovation projects for a variety of reasons, ranging from improving efficiency to ensuring that facilities meet government regulations and environmental, health and security standards. Additionally, facility managers continually monitor the facility to ensure that it remains safe, secure and well maintained. Often, the facility manager is responsible for directing staff including maintenance, grounds and custodial workers."

This description encompasses the traditional view of FM as well as incorporating the evolved remit of FM. It also emphasises the need for integration, in this case, of the principles of various specialisms.

Even more recently, CFM (2002) re-defined FM as *"A process by which an organisation plans, delivers and sustains excellent support services in a quality*

environment to meet changing strategic business objectives at best cost". Although best cost is used in this definition, the researcher adopts a best value approach to FM instead. This takes the emphasis away from the financial to the value added.

Yet many more definitions exist for FM (Tay and Ooi, 2001), or are in the process of being developed (for example by the British Standards Institute). Whatever the definition, there are three main areas most commonly associated with FM, namely: building operations and maintenance, property management (real estate), and 'soft' support services. Together however they only account for 59% of the FM market (CFM, 2002a). They include the management of buildings and building services as well as the management of other support services such as portage, cleaning, management and maintenance of equipment and furniture, communications systems etc in order to create a working environment that supports the primary objectives of the organisation. There is no definitive list (Appendix 1) to the scope of FM, and it varies from organisation to organisation (Tay and Ooi, 2001).

The general viewpoint however still remains of 'FM' as a support service to the core business of the organisation and should therefore be treated as mainly operational (Grimshaw and Cairns, 2000). Despite the growing trend to a more strategic role in achieving the organisation's business objectives, and a 10% improvement in representation of FM at board level (BIFM, 2002) over the previous study (BIFM, 1999), a lot of work still needs to be undertaken to place FM as a strategic discipline. It has been suggested that an *"acknowledgement of the need for resonance between business change and business support"*, may lead to an era of strategic FM (Hinks, 2000).

3.2 FM Models

Just as there is no one 'FM model' in terms of definition and scope (Grimshaw, 2003), likewise there is no one method of delivery of FM services. A number of FM models ranging from in-house provision to total outsourcing, operate in the UK market. Current practices indicate however that the majority of FM services are now based on contracted out services or outsourcing. This is defined as the "*buying of labour... from a source outside a company or business, usually as a means of cutting costs or to employ expertise not available within the company*" (Encarta, 2001).

There is a growing trend towards organisations concentrating on their core business activities and outsourcing all non-core activities. In some extreme cases such as Nike and Ericsson, manufacturing, generally considered a core business activity, has also been outsourced with the organisations concentrating on managing their brands. There is now a growing divergence in the ownership and use of facilities.

The case for outsourcing should be dependent largely upon the need to concentrate on core business activities and, certainly some believe that running in-house organisations for cleaning, maintenance, security etc. is likely to pose something of a distraction to an otherwise highly focused general management team (Williams, 1995). There is also an argument for the flexibility of a contracted-out option in which resources can be reduced or augmented rather more easily than with an in-house team.

This issue is common to both private and public sector organisations. Flexibility to meet changing market conditions has become fundamental to business thinking

(Barrett, 1995). To maximise the benefits of FM, it was discovered by some organisations, that the downside of inflexibility and empire building could be overcome by the external procurement of services. Furthermore, intensifying competition placed increasing pressure on organisations to reduce total operating costs and concentrate on core business functions. Contracting out apparently offered the solutions to these demands, facilitating both efficiency gains and cost effectiveness.

Various FM contracting options are described below. Two main sources have been used to describe the various models identified namely: the CFM and Bernard Williams (1995).

1) Direct Labour Organisation – minimal outsourcing

The first model, Direct Labour Organisation (fig 3.1), represents an organisation which delivers FM services predominantly with in-house, directly employed staff. These organisations only buy in specialist services such as mechanical and electrical (M&E) and lift maintenance as needed.

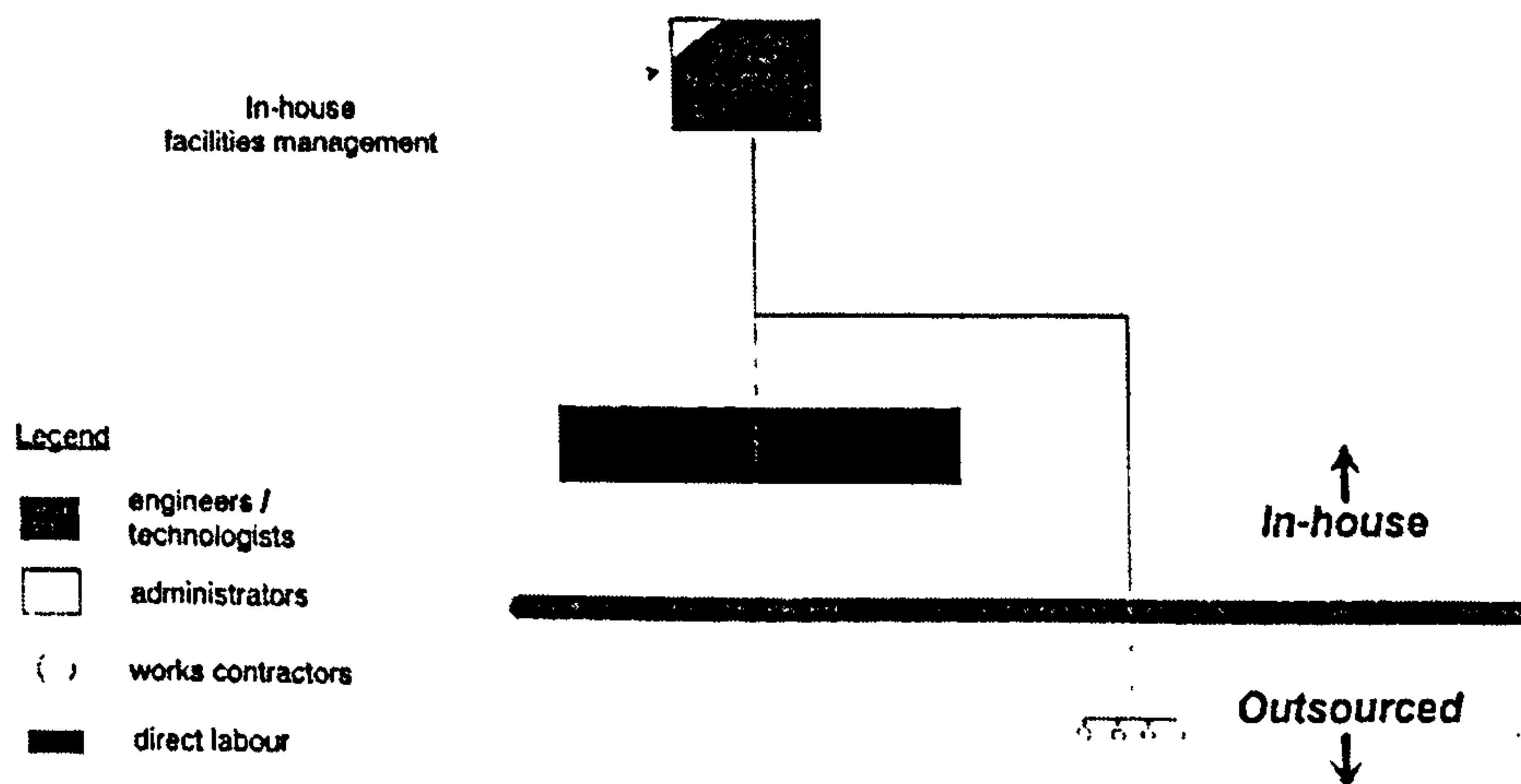


Figure 3.1 Direct Labour Organisation (Williams, 1995)

2) Partial Outsourcing of Single Service Contracts

In the partial outsourcing model (fig 3.2), FM service providers concentrate on providing one specialist service to the client e.g. cleaning, building maintenance, or lifts. The client organisation would have both an in-house team providing some FM services, and a host of single service contracts to manage.

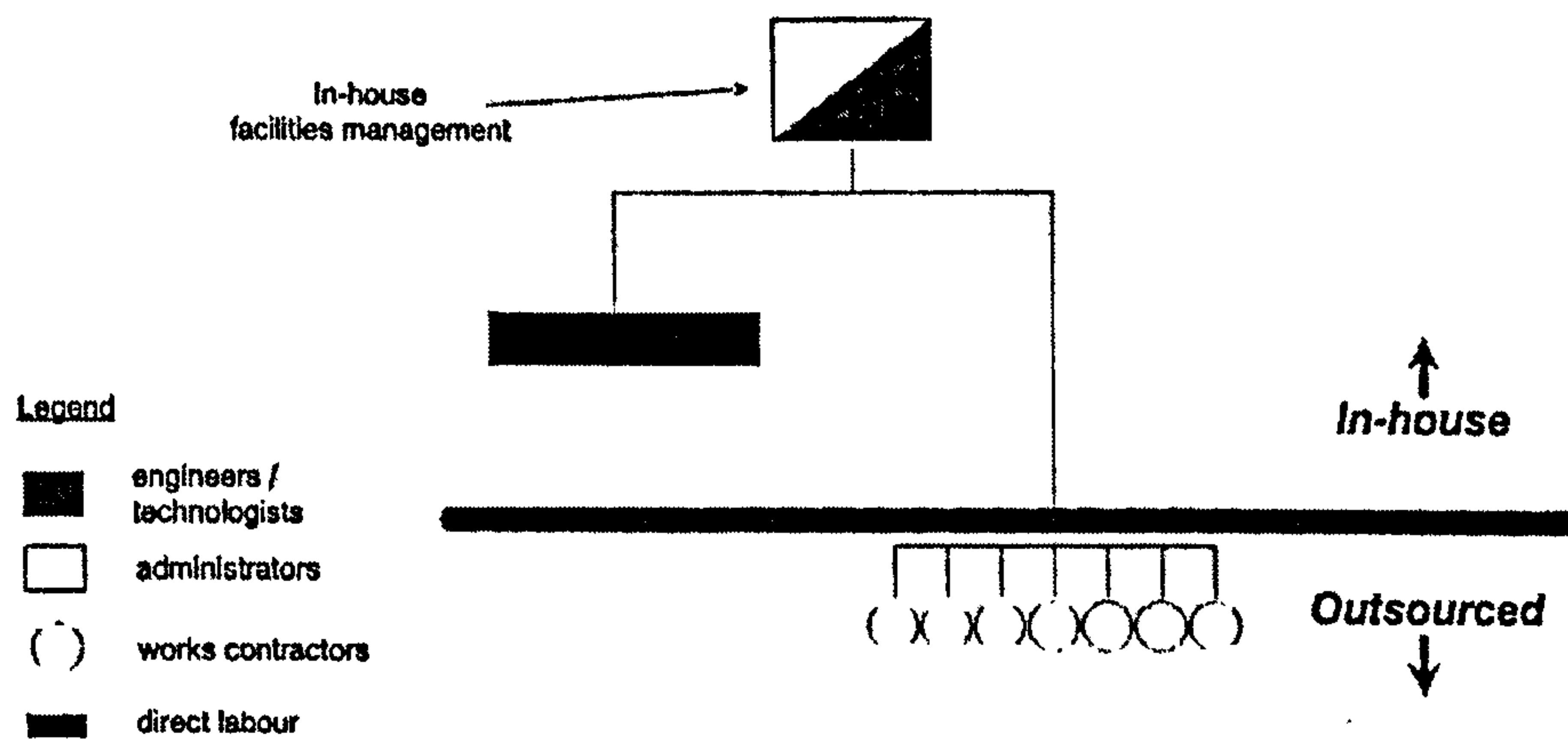


Figure 3.2 Outsourcing some of the Premises Services (Williams, 1995)

3) Outsourcing as 'Bundled' or 'Packaged' Contracts

With bundled or packaged contracts (fig 3.3), FM service providers draw together a number or range of different services to offer to clients e.g. a security company may offer manned guarding, burglar alarm maintenance and electronic entry systems.

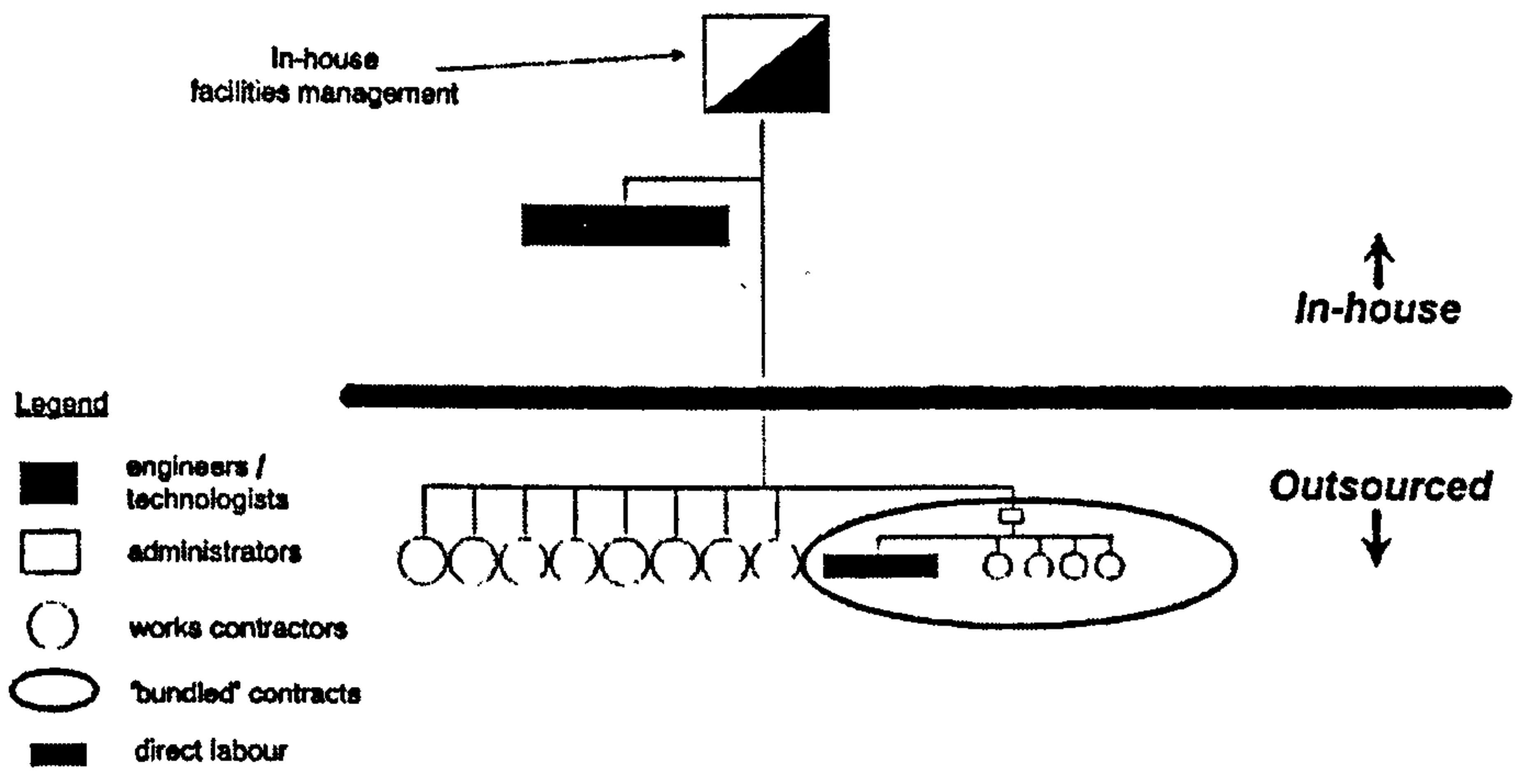


Figure 3.3 Outsourcing Premises Services on Separate or Bundled Contracts (Williams, 1995)

4) Outsourcing on a Commercial Contract or Management Contracting

These service providers provide both delivery and management functions (fig 3.4), but tend to focus on a small number of service types. The client organisation still retains overall control of management.

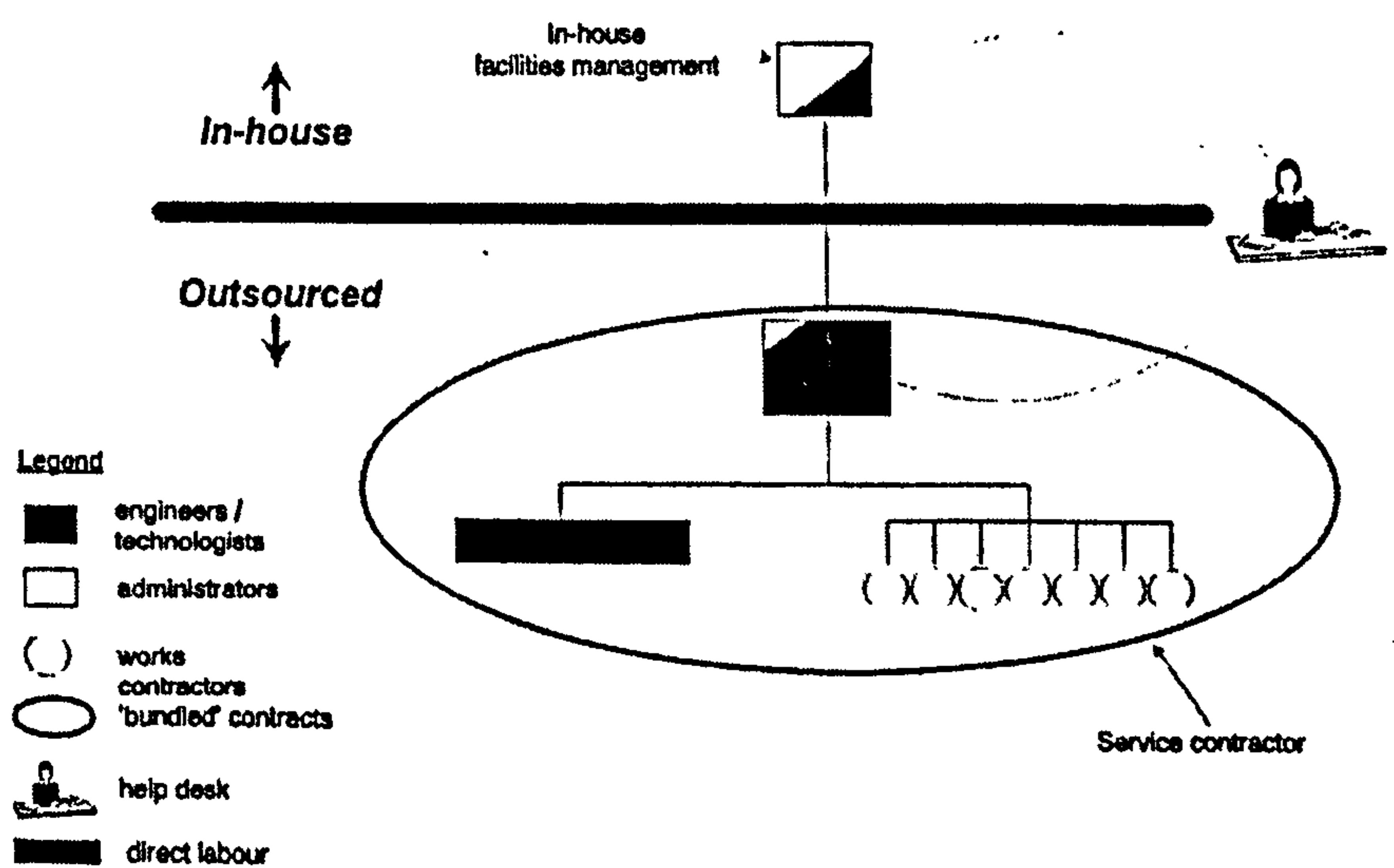


Figure 3.4 Outsourcing on a Commercial Contract (Williams, 1995)

5) Outsourcing on a Management Agent Contract

These services are usually provided by consultants who provide management-only services on behalf of their clients (fig 3.5).

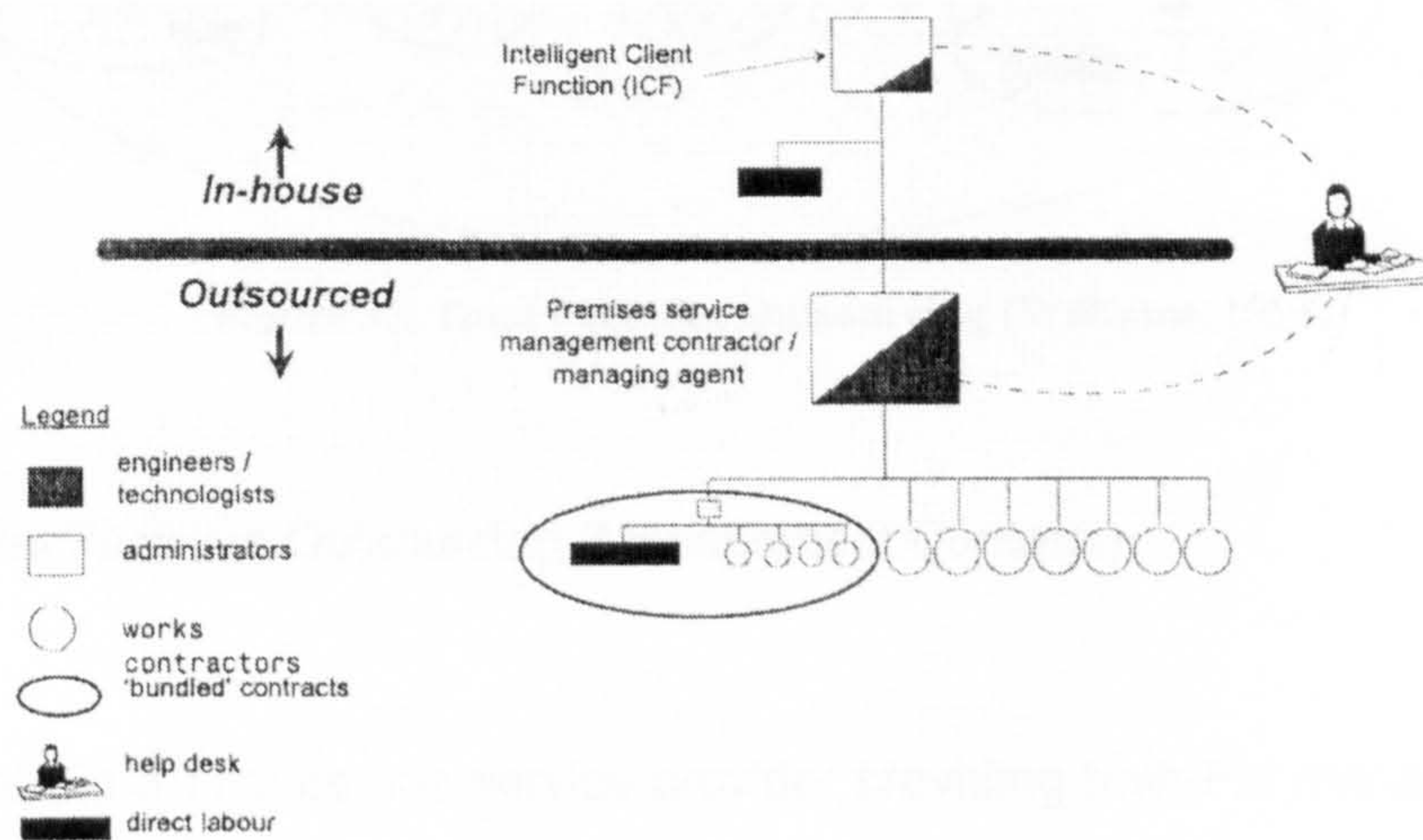


Figure 3.5 Outsourcing on a Management Contract (Williams, 1995)

6) Total Facilities Outsourcing

These service providers provide both management and delivery of facilities services to their client either through the use of direct labour or sub-contractors (fig 3.6). Here the client relinquishes the hands-on management of facilities services.

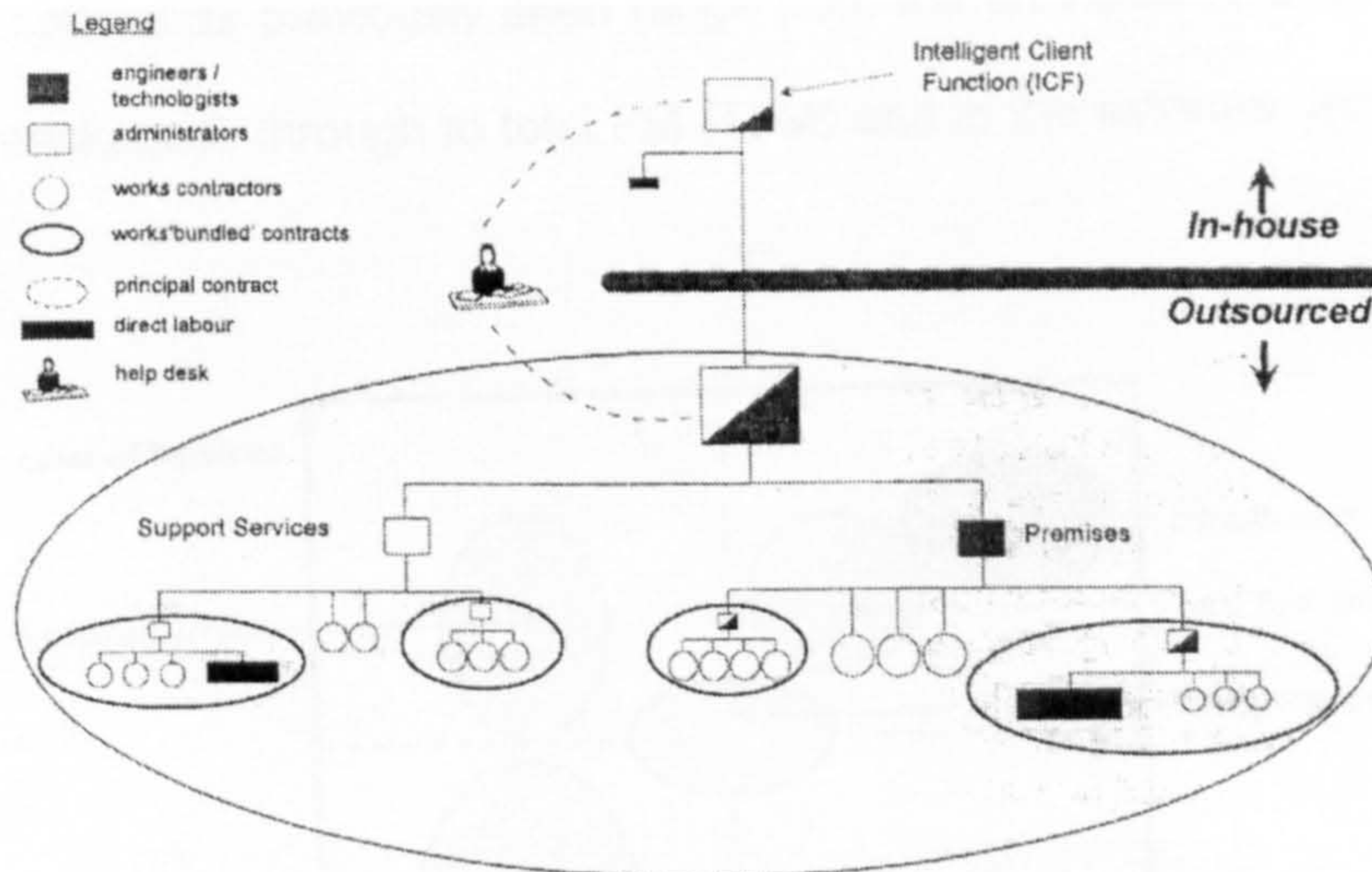


Figure 3.6 Total Facilities Outsourcing (Williams, 1995)

7) Total Facilities Outsourcing (Management Contract)

This model (fig 3.7) sees one service provider providing both FM management and delivery services to the client organisation. Unlike the previous model (fig 3.6) however, the service delivery is contracted out to sub-providers through the key provider.

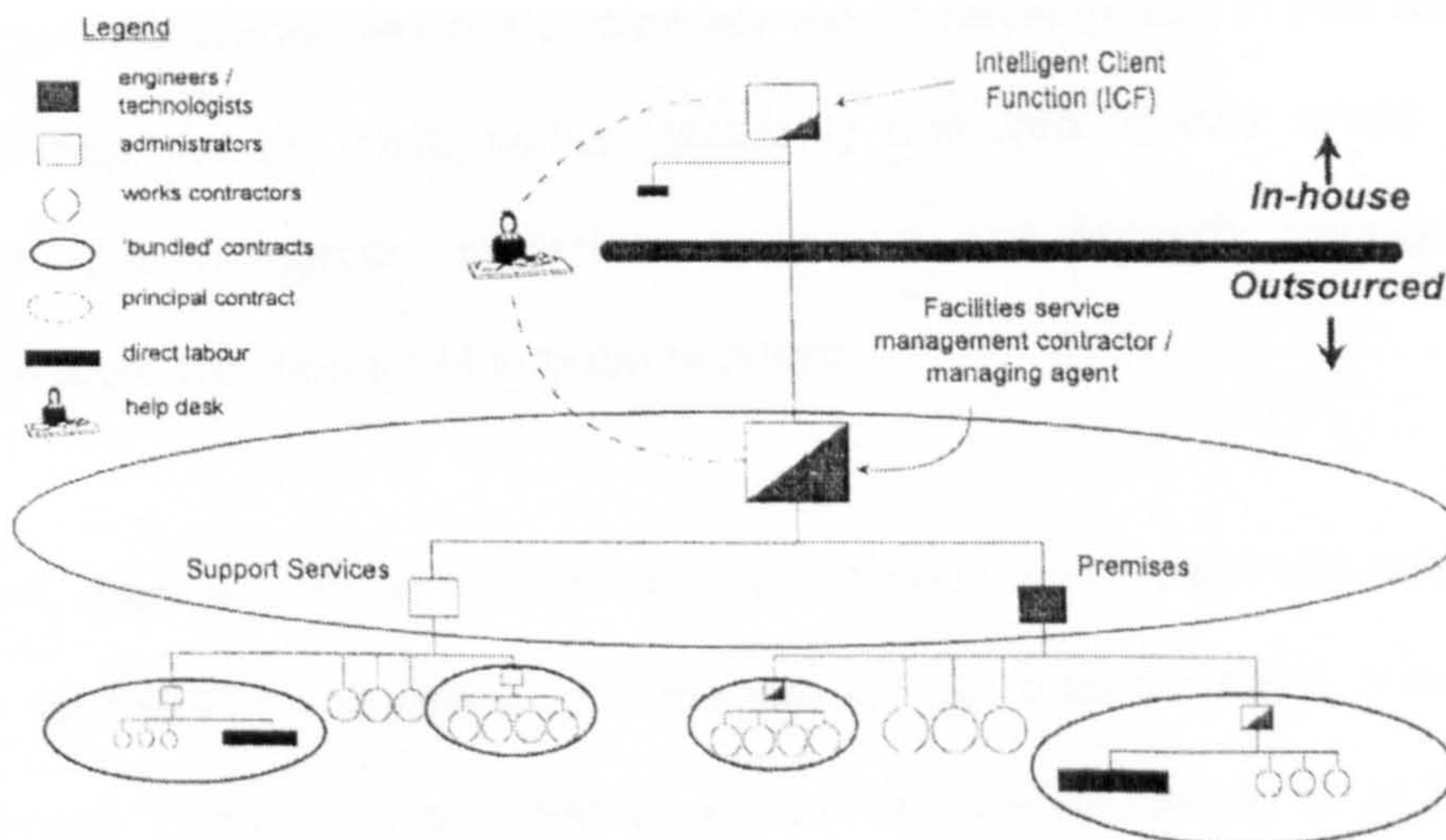


Figure 3.7 Total Facilities Outsourcing (Management Contract) (Williams, 1995)

Contracting options as previously seen range from the provision of single services to 'bundled packages', through to total FM (TFM) and in the extreme, Infrastructure FM (fig 3.8)

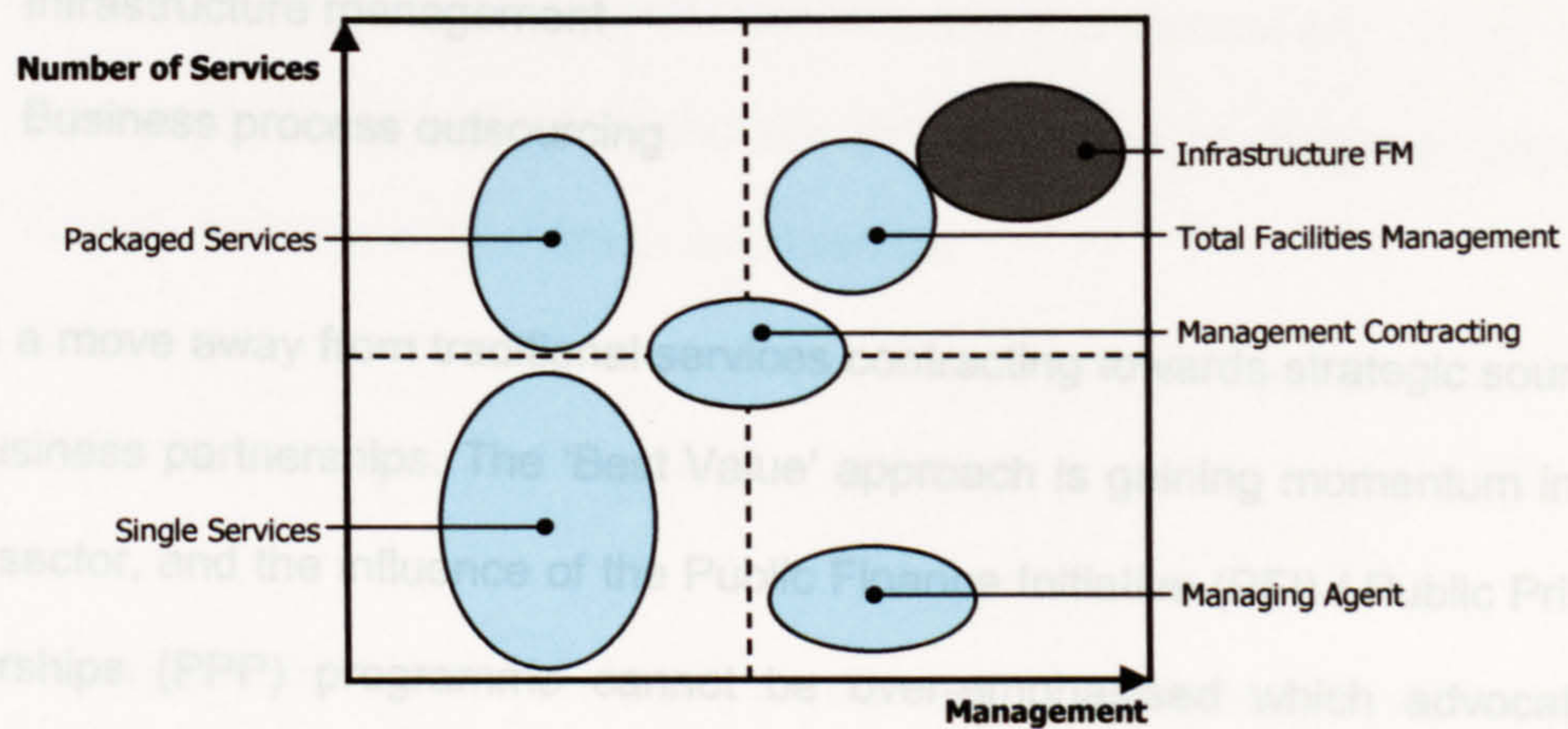


Figure 3.8 Categories of FM Companies (CFM, 2002a)

Figure 3.8 depicts a diagrammatic representation of the UK FM industry, separating FM companies according to the types of services they provide. It provides an overall view to the last six models (outsourcing models 2 - 7) earlier described.

Infrastructure FM companies are a relatively recent development in FM, and offer a 'one-stop-shop' for all client needs, including non-core service areas such as finance, human resources, project management and property management in addition to more traditional FM support services.

In addition, there is another level of service provision which assumes responsibility not only for the FM and Property Management, but also for asset provision and management. This new level of FM service provision is defined by CFM (2002a) as Integrated Workplace Solutions. They provide an integrated solution to business facilities needs and include:

- Principal investment/full service
- Property and facilities consortia
- Serviced occupancy
- Infrastructure management
- Business process outsourcing

This is a move away from traditional services contracting towards strategic sourcing and business partnerships. The 'Best Value' approach is gaining momentum in the public sector, and the influence of the Public Finance Initiative (PFI) / Public Private Partnerships (PPP) programme cannot be over-emphasised which advocate a whole-life procurement approach.

Yet despite all the talk about integration and the influence of PFI /PPP, the traditional industry boundaries remain intact. Examples are however evident of organisations beginning to work across these boundaries. There is also a growing emergence of consortia such as Monteray, which are commercial Special Purpose Vehicles (SPV) similar to those set up for PFI / PP projects to provide a packaged FM service to one client. Research evidence however shows that most of these consortia are in name only, and often provide FM services as separate entities (Nelson, 2001).

3.3 FM Functions

FM is a function or series of linked activities involving the co-ordination of all efforts relating to the planning, design and management of an organisation's physical

resources (Becker, 1990). In this respect 'physical' includes spatial, environmental, human and financial resources. Nutt (1992) stated that its

- Focus is on 'post-occupancy' rather than 'pre-occupancy' issues;
- Central rationale is management decision and implementation;
- Responsibilities cover all of the five primary types of resource: physical, spatial, environmental, human and financial;
- Concern is with an integrated approach and does not concentrate on any particular part of the problem field.

Its goal is organisational effectiveness i.e. helping the organisation to allocate its resources in a way that allows it to flourish in competitive and dynamic markets (Becker, 1990).

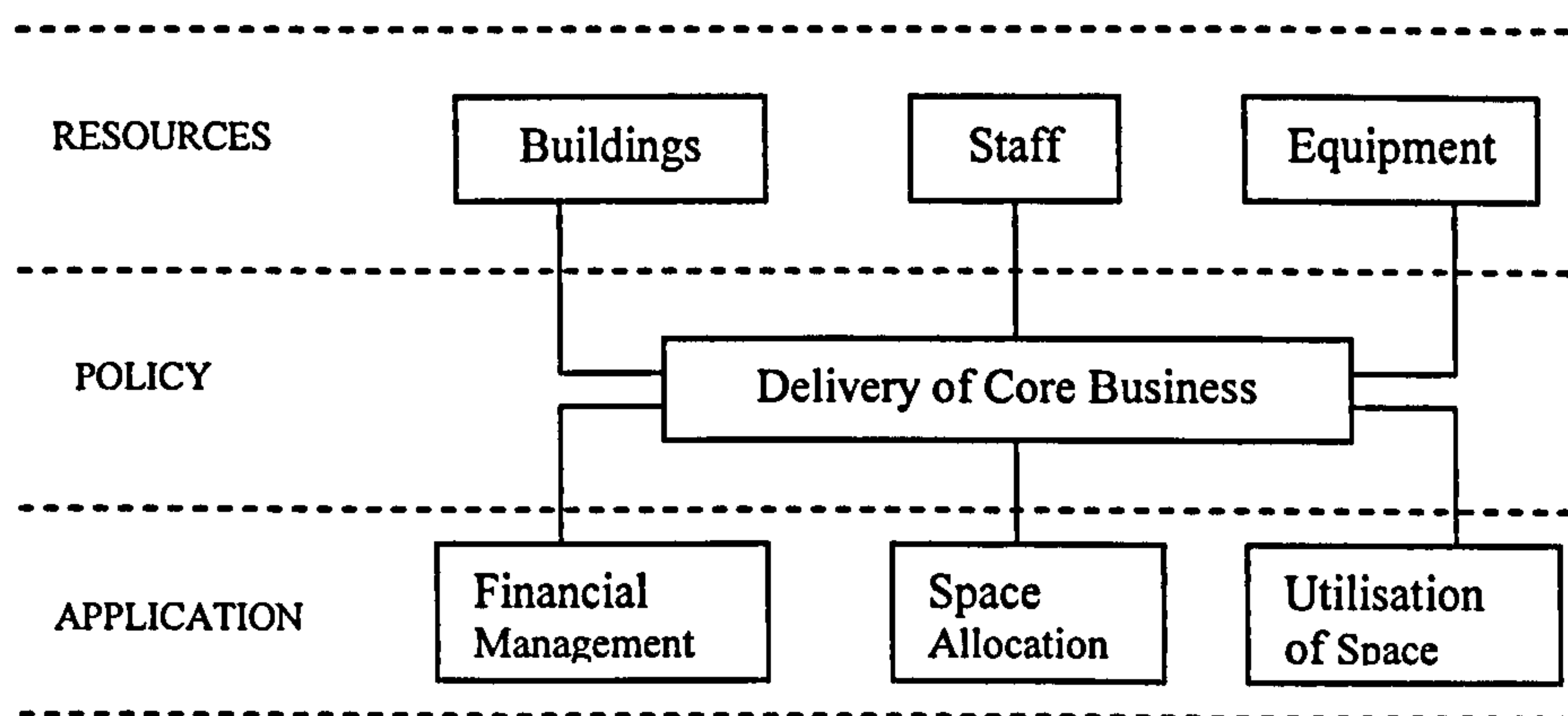


Figure 3.9 FM Context (Then & Akhlagi, 1992)

Fig 3.9 shows how FM applies these resources to achieve its policy of supporting the delivery of the core business of the organisation. The resources show the physical input required, whilst application shows the management input required. The policy is related to process of delivery. What this framework does not show is the output from FM.

FM tasks have been classified into strategic, tactical and operational as shown in table 3.3.1. Strategic FM involves integrating the FM into the overall business plan of the organisation. Tactical FM includes providing an infrastructure within the organisation to support the management of service delivery and laying down policies for service delivery. Operational FM is the process of service delivery.

Table 3.3.1 Classification of FM Tasks (Then & Akhlagi, 1992)

	Executive Responsibilities	Management Roles	Project Tasks
STRATEGIC	<ul style="list-style-type: none"> • Mission Statement • Business Plan 	<ul style="list-style-type: none"> • Investment Appraisal • Real Estate Decisions • Premises Strategy • Facility Master Planning • IT Strategy 	<ul style="list-style-type: none"> • Strategic Studies • Estate Utilisation • Corporate Standards • FM Operational Structure • Corporate Brief
TACTICAL	<ul style="list-style-type: none"> • Corporate Structure • Procurement Policy 	<ul style="list-style-type: none"> • Setting Standards • Planning Change • Resource Management • Budget Management • Database Control 	<ul style="list-style-type: none"> • Guide-line Documents • Project Programme • FM Job Description • Prototypical Budgets • Database Structure
OPERATIONAL	<ul style="list-style-type: none"> • Service Delivery • Quality Control 	<ul style="list-style-type: none"> • Managing Shared Facilities • Building Operations • Implementation • Audits • Emergencies 	<ul style="list-style-type: none"> • Maintenance Procurement • Refurbishment/Fit out • Inventories • Post-occupancy Audits • Furniture Procurement

Another dimension has been added to this, the business level (NHS Estates, 1998).

This goes beyond integrating FM into the overall business plan (strategic level), to

gaining an understanding of the business organisation in order to provide the right services at the right time, cost, and in the right place.

The classification (table 3.3.1) suggests that strategic FM decisions need to be taken at board level in an organisation and integrated into the overall business plan. These decisions would affect the corporate structure of the organisation, which are then translated into tactical FM issues. For example, if a strategic decision to outsource the provision of FM services has been undertaken by the organisation, it would need to be reflected in the organisational structure and the management of FM and supply chain issues by the organisation. The key aspects of FM are an integrating role in which management issues predominate over technical matters, and a service justified and oriented towards making a positive contribution to the primary business (Barrett, 1995).

3.4 The role of FM in an organisation

FM, it has been stated, has three facets or roles in an organisation: sponsorship, intelligence and service management (Williams and Roberts, 2000). The components of these facets are:

- Sponsorship – Policy / Strategy
 - Creation
 - Stewardship
 - Monitoring
 - Changing
 - Directing

- Intelligence – Understanding and Monitoring
 - Customer objectives
 - Customer needs
 - Technology
 - Service delivery

- Service Management - Agency / contract management
 - Task management

These roles can be related to the three classifications earlier explained of strategy, tactics and operations. Recent CFM research has defined these FM roles as the translator, processor and demonstrator roles (CFM, 2002), each based on four principles, as described below:

- Translation role – Strategic focus
 - Get the Chief Executive Officer (CEO) and senior management involved in the process and make them aware of the possible outcomes.
 - Strategy involves a change management process, which will have an impact on the built environment and the human resources (HR), hence to be managed by either HR or FM, or both in co-operation.
 - The focus of the strategy is the community, not the building or a property, or a project.
 - Every individual in the company (from top management to staff) see the project as a business project; i.e. it has an impact on the business objectives.

- Processor Role – Process focus
 - Get the end users involved in identifying their work processes and create support from senior managers.
 - Analyse the needs of end users and communicate objectives of the work, placing emphasis on the individual desire for work as the main concern.
 - Emphasise the organisational culture and expect the suppliers to work for the corporate culture, not for the supplier company. Coordinate the support from the suppliers and give them access to end-users.
 - Train the staff (business representatives) to increase the corporate responsibility.

- Demonstrator Role – Results focus
 - Break down the results into different sub-categories, i.e. corporate (strategic), business unit (tactical) and individual (operations) levels as demonstrated earlier by Then and Akhlaghi (1992).
 - Reveal the non-financial results of the process in co-operation with senior management. Ask how the processes affected their business performance, and expect them to demonstrate the impact.
 - Demonstrate the financial results; i.e. show the cost reduction and process improvement.
 - Cooperate with HR and demonstrate the value generated in recruitment.

As mentioned earlier, FM inputs have been demonstrated by different authors. One of the identified roles for FM is that of the translator. The need to translate business objectives (strategies) into FM outputs becomes a critical role for FM. Research at the CFM (2003) identified nine business drivers and related FM outputs.

BUSINESS DRIVERS		FM OUTPUTS								
		Quality			Value			Risk		
		Communication	Comfort & Satisfaction	Service delivery	Cost Effectiveness	Asset Value Management	Investment appraisal	Health and safety	Corporate Social Responsibility	Minimum Disruption
Adaptability	Flexibility									
	Continuity									
	Innovation									
Performance	Performance									
	Productivity									
	Viability									
Image	Reputation									
	Morale									
	Identity									

Figure 3.10 CFM QMF Performance Matrix ©CFM

These business drivers were grouped under three high level characteristics: adaptability, performance and image (fig 3.10). The FM outputs were related to the quality, value and risk functions associated with FM (fig 3.10). Although the business drivers FM has to respond to are generic, the FM outputs are sector as well as organisational specific. The identification and measurement of these outputs against the organisational drivers become imperative in determining the value adding activities of FM.

FM still has a strategic role to play in the management of whole life building performance. The need for FM involvement in the early stages of a building life cycle, and the through life of the building cannot be overemphasised. FM value adding activities include the feedback and feed-forward of best practice at various stages of the building life cycle. Unfortunately FM is still very much relegated to what happens after 'commissioning' in a building life cycle.

In order to play this role, FM should have adequate knowledge of the business and its physical and spatial needs, as well as physical resources available to meet those needs, thereby playing a strategic role in influencing business decisions related to the organisation's physical requirements. Workplace appraisals (CFM, 2002b) instead of Post Occupation Evaluation (POE) studies would enable FM to play this strategic role in the organisation.

FM is the liaison between these facets or roles. In reality, FM is still predominantly viewed on an operational or at best tactical level. It is gradually evolving and being recognised at a more strategic level, enabled by the introduction of new procurement methods, and the need to demonstrate added value. This has been influenced by new working practices, and the changing business needs of organisations. Grimshaw and Cairns (2000) identify the unique feature of FM as *"its ability to co-ordinate, integrate and apply disparate skills and operations to make a more effective and holistic contribution that should enhance core business performance"*.

This leads to another role, which FM is playing increasingly in performance management. The need to monitor, assess and measure FM performance to enhance workplace productivity has become critical in FM. Benchmarking has been in vogue for some time now (BIFM, 1999; BIFM, 2002), although there is no common protocol for benchmarking in FM. The BIFM's attempt (BIFM, Date Unknown) was financial-based, and covered five cost centres over a range of activities from property to hard and soft occupation. Other organisations have also developed their versions, which are in commercial use.

Research (CFM, 2002c) however identified that even where protocols are in use, organisations differ in their interpretation and financial recording of cost data. This

makes cost benchmarking a tedious and sometimes confusing exercise. Yet as there is more demand for FM to justify its costs and added value to organisations, there is a requirement to look at ways of addressing these issues in the future.

3.5 FM and Change Management

FM has had to respond to changing work practices and organisational forms. The 1990's witnessed a major shift in working practices. Some would argue that the core issue in changing work practices has been the shift in corporate emphasis from activity to information management, enabled by the information technology (IT) revolution (FM Guide, 1995). This has led to the *“fundamental building blocks of all value creating activities, now seen to be packages of information, rather than activities”* (FM Guide, 1995). This has impacted on the way we work and the work we do (Wheeler, 2002).

Improvements in information communication technologies (ICT) have led to increased use of computers and tele-working, and a gradual move towards a paperless office, where processes are carried out electronically. Offices and teams of people working together do not need to be in the same location. The laptop computer and mobile phone have led to the evolution of the mobile office. In a survey of 350 companies in London and the South East between 1994 and 1997, it was found that 39% had changed their working practices adopting cordless technology particularly for sales and marketing staff (Gould *et al*, 1998). It must be noted however that these figures are sadly outdated as the 'mobile office' revolution is far in excess of these figures now, but no reliable data was found on this issue.

The shift from conventional to new ways of working can be seen in the change of patterns of work from routine, individual tasks to a more interactive team approach (table 3.5.1), which resulted in a change in occupancy patterns for office space. Research is currently ongoing in this area (Occupier.org, 2003).

Table 3.5.1 Conventional versus New ways of working (Jaunzens, 1997)

	CONVENTIONAL	NEW
PATTERNS OF WORK	Routine Individual tasks Isolated 9 - 5	Creative Group, project work Interactive Extended
Occupancy	Own desk/office Low utilisation Low density	Shared as needed High utilisation High density
Settings	Status based Single setting	Task based Multiple/varied settings

The role of IT in supporting this change cannot be overemphasised. The Internet has created a whole new way of interactive working, and redefined the term 'networking' in the workplace. The impact on FM is its expansion to include a host of business support activities such as telecommunications systems in addition to the traditional physical space.

It has also led to a re-definition of the workplace (Becker *et al*, 1995; DTI, 2002; HOP Associates, 2002; CFM, 2001) with increased mobility and flexibility of the workforce (Nelson and Alexander, 2003). Prior to the IT revolution, communication and transportation played the two most important roles in economic growth. ICT have led to the capability and need for flexible working, and created the flexibility to

be free from many existing constraints on both working methods and organisation, including those imposed by distance and time.

Work is increasingly seen as a theatre of activities, roles, artefacts, time, logic, geography, social behaviour, trust, and group interactions (Alexander, 2002). The definition of the working environment has been expanded to include the home (home-working), open spaces, trains, planes and other forms of transportation (mobile working), all categorised under the term 'flexible working'. Hence "*the workplace is wherever you work*" (CFM, 2002). However, 'place' still provides a context to organisational action, fulfilling a symbolic role as the physical embodiment of the organisation, and the stage for undertaking the business activities (O'Mara, 1999). FM is now required to pay specific attention to the social implications of new working methods, and their impact on equal opportunities and quality of life (Nelson and Alexander, 2003).

The increasing influence of technological advances, notably web-enabled technology, on changing work patterns has meant that e-business is now being explored by many organisations, both as a means of procuring and managing their suppliers. Cassels (2000) stated "*FM as a means of providing a buffer between the client's business and the business of space is no longer enough. Only by embracing the new rules of e-commerce and becoming part of the intellectual capital of the new economy, part of their value rather than their overhead, will occupancy service providers be at the heart of business decision making.*"

Although IT or ICT has had a huge impact on changing working practices, and enables more efficient use and management of facilities, it should not be seen as driver on its own, but rather as an enabler of ways of responding to a business need.

Grimshaw and Cairn (2000) identify three general types of organisational form which impact on FM:

- Businesses that change very little in the way they deliver their products and services;
- Businesses that change incrementally, enhancing traditional ways of delivery; and
- Businesses that radically alter the traditional methods of delivery.

The third of these forms representing highly dynamic organisations is believed to have the most impact on FM. These include Internet companies, organisations without buildings, and tele-working. Grimshaw and Cairn (2000) view FM's role as bridging the gap between demand and supply, but identify that the required skills are not currently evident. Evidence from recent research (CFM, 2004a) would suggest that this is true even for businesses that change incrementally in delivery methods such as the UK National Health Service.

3.6 FM Futures

FM has demonstrated over the years that it is not a static discipline, but an evolutionary one. It is now moving towards the dynamic, looking for new and innovative ways of delivering business support services. We have witnessed many innovations in service delivery and service procurement, which are set to continue. The question then is 'what does FM need to do, not just to respond to these changing requirements, but to pro-actively manage them'?

Nutt (2000) identified competing futures for FM related to its management of financial, human, physical and knowledge (information) resources. This looks towards FM taking a strategic approach to managing long-term uncertainties.

Grimshaw and Cairns (2000) see the challenge for FM in the growth of integrated infrastructure organisations, and the emergence of extended organisations held together electronically rather than physically. They also see a challenge for FM in taking the lead as the interface between business and infrastructure, against competition from other professions such as HR and IT, which businesses have traditionally turned to for solutions. Similarly Varcoe (2000) sees the trend moving away from 'workplace delivery' towards 'total workplace management' or the provision of infrastructure solutions.

Alexander (2002a) identified a growing trend towards the management of intangibles. This is leading FM away from the traditional need for technical skills to a more generalist skill base in management. Recent research at the Centre for FM (2004a, 2003a and 2004b) shows the requirement for facilities managers to acquire skills in traditional business management areas such as analysis of client requirements and performance management in order to demonstrate added value to the organisation. This is backed up by the competencies expected from facilities managers by professional institutions (Roberts, 2001, RICS, 2002).

Grimshaw and Cairns (2000) propose a solution through business driven research to lead to production of new knowledge in FM. This thesis aims to go some way towards meeting this challenge.

3.7 Summary

Definitions of FM have emerged over the years with the changing nature of the sector's work. There are three main areas traditionally associated with FM namely: building operations and maintenance, property management (real estate), and 'soft' support services. Although generally assumed that the workplace is contained within a building, 'work' is increasingly taking place in various locations enabled by advances in technology. Traditionally though, FM has been seen simply as the management of buildings and building services, and has found it difficult to break out of this mould.

The current trend is to view FM as the management of non-core company assets to support and increase the efficiency of the main business of the organisation including the management of 'hard' and 'soft' functions. There is also a growing trend towards organisations concentrating on their core business activities and outsourcing all non-core activities, including FM. There appears to be a gradual move towards 'Infrastructure FM' companies which offer a 'one-stop-shop' for all client needs, including non-core service areas such as finance, human resources, project management and property management in addition to more traditional FM support services. In other cases, key or principal suppliers are appointed who then need to work with and manage the rest of the FM suppliers.

FM it is believed, should not only focus on post-occupancy issues, but should also be actively involved in pre-occupancy issues. The reality of the FM market has, however, been that it has not taken an integrated approach to supporting the business objectives of the organisation, although it is increasingly moving in this direction.

The key aspects of FM have been seen as an integrating role in which management issues predominate over technical matters, providing a service justified and oriented towards making a positive contribution to the primary business of the organisation. Its main focus to date however, has remained service delivery, rather than service management.

FM has variously been classified into three categories: strategic, tactical and operational; sponsorship, intelligence and service delivery; and translator, processor and demonstrator depending on who is doing the definition. All argued that responsibilities, roles and tasks at each of these levels are different and that FM decisions should be taken at board level and integrated into the overall business plan. These decisions, which would affect the corporate structure of the organisation, are then translated into tactical issues and, finally, into operational activities.

It has also been identified that just as important as identifying the FM inputs required, is identifying the business objectives or drivers and the FM outputs to meet business agenda. In order to take on this role of the interface between business and infrastructure, the facilities manager is increasingly requiring more generalist business management skills such as performance management to justify their added value. The main challenges in the future however lie with managing uncertainties and intangibles in an ever evolving profession and the move away from service delivery to service management.

Chapter 4 Supply Chain Management

The role of SCM in FM is the basis of this study, with a focus on the applicability of the i2i model in generating improvements. This is however a relatively new area of research in FM and the researcher has had to look to other industries to gain an understanding and appreciation of SCM.

This chapter defines SCM in its various guises. It looks at the background, tools and models currently in use. It further identifies the benefits derived from SCM and re-engineering from other industries, such as manufacturing, retail and construction, with the researcher briefly exploring the composition of the FM supply chain.

In addition it briefly examines the demand and value chain management, and the interrelationships between them and SCM in the FM context. This leads to a brief examination of the FM value chain and the role of SCM within the FM value chain.

4.1 Background to Supply Chain Management

The historical background to SCM lies in manufacturing, and in particular, logistics management (Christopher, 1998; Gattorna and Walters, 1996; Cigolini *et al*, 2004). Muller (1990) suggests it is the *“preferred name for the actualisation of integrated logistics”*. Christopher (1998) however describes the crucial distinction between logistics and SCM to be that the former is *“essentially a planning orientation and framework....for the flow and information through a business”*, whilst the latter *“builds upon this framework and seeks to achieve linkage and co-ordination between processes of other entities in the pipeline and the organisation itself”* i.e.

one is focused on internal movement within the organisation, whilst the other brings together the internal and external influences of the organisation as one.

It was also seen as the domain of purchasing and supply (Cox and Hines, 1997; Green *et al*, 1996), with a procurement focus on SCM issues. This view looks at SCM as the management of the environmental, ethical and other sourcing strategies of an organisation across its supply chain. Green *et al* (1998) propose that exertions from client organisations on suppliers through the procurement process eventually feed through to the suppliers' research and development departments. Whatever its background, SCM is a management concept that has been translated by various sectors in different industries to achieve efficiencies or effectiveness in product or service delivery.

4.2 Supply Chain Management

The term 'supply chain' is defined as a *"complex, dynamic network or system of interconnected and interdependent individuals, groups, companies, organisations and relationships whose goal is to satisfy and add value to their particular customer"* (Brown, 2000); or simply as a *"system through which organisations deliver their products and services to their customers"* (Poirier and Reiter, 1996). Christopher (1998) adds *"The supply chain is the network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer"*. The most generic definition found was *"a supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request"* (Chopra and

Meindl, 2001). In all the definitions, the supply chain is viewed as a value adding component of an organisation.

'Supply chain' is sometimes used interchangeably with 'value chain' and 'demand chain' by various authors. All three represent different concepts though they all refer to the process of producing value for an end user, the ultimate 'customer' (Metz, 1998) as will be seen later in this chapter.

In FM, the supply chain involves the complex interaction of several organisations to deliver a FM service to its stakeholders. The word stakeholder is used instead of customer, as it is a lot more encompassing including the many 'customers' in FM. FM stakeholders include the organisation (and shareholders), the business unit procuring facilities services, the employees, visitors and other users of the facility, and the community at large. This will be looked at more closely in chapter 5.

As discussed in the introductory chapter, in common with FM, SCM has a number of definitions depending on stakeholder interest. The various definitions could be classified into three perspectives: process, cost and knowledge management. Thus Lord Chilver of Cranfield (1990), MIT (1998), and Quinn (1997) definitions would be classified under process management. Barrett and Sexton (1998) would be classified under knowledge, whilst the NITL (2000) definition would be a cost view. Although minimum cost is still a major driver in FM, it now has an element of quality attached, and best value has become the most important procurement criteria rather than lowest cost (Nelson and Alexander, 2001).

The Global Supply Chain Forum defines SCM as *"the integration of key business processes from end user through original suppliers that provides products, services,*

and information that add value for customers and other stakeholders” (Lambert et al, 1998), another process view.

SCM was seen as the *“logical customer-focused progression of physical distribution and logistics management” (Metz, 1998); and “every effort involved in producing and delivering a final product, from the supplier’s supplier to the customer’s customer” (Supply Chain Council, 2000), with ‘effort’ comprising four basic processes – Planning, Sourcing, Making and Delivery. This view could also be applied to the provision of services, where the organisation or industry uses as a differentiator to create opportunities for competitive advantage.*

Halland (1996) refers to SCM as *“either a process-oriented management approach to sourcing, producing and delivering goods and services to end consumers or, in a broader meaning, to the co-ordination of the various actors belonging to the same supply chain”.*

In this age of the ‘experience’ economy (Pine and Gilmore, 1999), work is seen as a theatre and every business a stage. Experiences are however viewed as being as distinct from services as services are from goods. FM in the 21st century delivers an ‘experience’ rather than merely a service to the consumer, which differentiates the organisation’s services from those of its competitors, and emphasises the largely intangible form of services. Organisations such as Chiswick Park (CFM, 2003b) are actively turning the workplace into a setting for working, playing and living. They have adopted a hotel management outlook to FM in creating relationships to enhance ‘guest’ experience, the ‘guest’ being the facility user.

SCM was developed out of a concern for the elimination of waste (or non-value adding activities) (NITL, 2000). 'Waste' however, cannot be totally eliminated, as in some cases it is necessary to introduce some 'waste' in order to achieve efficiencies and effectiveness. Creating a leaner and more efficient supply chain would therefore be a more realistic aim, and one of the benefits accruing from SCM.

The core challenge in SCM is the management of uncertainty (Beyer and Ward, 2000; Davis, 1993). This would suggest that SCM is primarily concerned with the management of risk. SCM however goes beyond waste minimisation and management of uncertainty. It is about breaking down barriers and bringing various parties to work together for their mutual benefit and that of the end customer.

Hammer (1998) described the way companies operate as "*the war of each against all*", (Thomas Hobbe's description of society in his book Leviathan). Organisations have been seen to regard everyone else as their enemies - customers, suppliers and other departments within the company. These barriers reduce the organisation's effectiveness and efficiency and ultimately performance. Christopher (1998) goes further to state "*Competition in the future will not be between individual organisations but between competing supply chains*".

Successful SCM initiatives adopt a holistic approach combining both strategic and tactical change. They orchestrate effort so the whole improvement achieved (revenue, costs, and asset utilisation) is greater than the sum of its parts, thereby contributing to profitable growth; whilst unsuccessful efforts tended to be 'functionally defined and narrowly focused', lacking 'sustaining infrastructure' (Anderson *et al*, 2000). Towill (1996) describes this approach as 'seamlessly' working together to serve the end consumer (Mason-Jones and Towill, 1997).

There is also a growing body of 'consultants' in the field of supplier relationship management (SRM). Although there is some overlap, SRM is primarily concerned with "a convergence of supply chain operations and procurement operations" (Manugistics Inc, 2003), though others see it merely as the 'procurement' process (Croxtton *et al*, 2001). SRM is therefore operations based whilst SCM is management focused.

Many theories, models and tools have been developed for the implementation of SCM strategies in other industries. These range from economic and management models to software applications. The models can also be categorised as relating to the configuration of a supply chain (the physical structure of the chain), or to its management (how the chain operates), whilst tools are categorised as information, coordination and control and organisation tools (Cigolini *et al*, 2004). This thesis is concerned with management models, and some examples of such models developed or implemented in SCM include:

- The Supply Chain Operations Reference Model (SCOR) (Stephens, 1998) developed by the Supply Chain Council in conjunction with Advanced Manufacturing Research (AMR) and Pittiglio Rabin Todd & McGrath (PRTM). It was designed to give manufacturers, suppliers, and retailers a framework for evaluating their supply chain effectiveness (Reed Elsevier Inc., 1997).
- COGENT (Wyatt *et al*, 1997), a joint development between Nissan and Cranfield University, aimed to make a step-change in both Nissan's co-development performance and those of its suppliers, and to ensure continuous improvement (Evans & Foxley, 1999). It involved the closer integration of suppliers into the Vehicle Manufacturers (VM) development process under a mechanism termed co-development.

- Integrate to Innovate (i2i) (Barrett & Sexton, 1998) developed at the University of Salford for the construction industry. Its objectives included examining the relationship between construction participants, revealing the processes of innovation in companies, and clarifying between desirable and unhelpful innovation.
- Transaction Cost Analysis (TCA), an economic model described as “*one possible approach to understanding and evaluating supply chain management*” (Hobbs, 1996). There are four key concepts surrounding this approach, namely: bounded rationality, opportunism, asset specificity and informational asymmetry.
- Data Envelopment Analysis (DEA), a decision analysis model. This mathematical technique calculates the relative efficiencies of multiple decision-making units and has been applied in supplier evaluation (Liu *et al*, 2000).
- Systematic Technology for Procurement (STeP) is described as a “high-technology procurement discipline” or “system of purchasing based on teamwork and focused on power buying through relationship management as a business process” (Moore, 2002).
- Thinking Process (TP), based on the Theory of Constraints (TOC), was applied to “*identify critical factors of effective supply chain management, determine the causal relationships between these factors and investigate their interrelationship with supply chain performance*”, so managers can analyse and develop growth strategies in supply chains (Rahman, 2002).

Others have applied techniques from complexity research in SCM to model the behaviour of supply chains and interpret their usefulness (Holström and Hameri, 1999), to a contingency model for SCM strategies (Cigolini *et al*, 2004).

Software applications implemented in SCM include Enterprise Resource Planning (ERP), Advanced Planning and Scheduling (APS), Inventory Planning, Warehouse Management Systems, and Order Management Systems (Kahl, 1998). Planning tools such as these provide a greater degree of visibility and coordination across supply chain entities (Beyer and Ward, 2000). These are however specialist tools, which then need to be integrated to create a holistic view of SCM.

These tools, models and applications are enablers and have been developed to support the business needs of the organisation, and not as ends in themselves. They have been developed for various purposes, not all directly relevant to this study. In addition to the i2i model, which is the focus of this study, two other models were appraised to determine the justification for selection of the i2i model in this thesis. These will be considered later in the next chapter. First we need to explore what SCM is, and the benefits to be derived from addressing these issues in FM.

4.3 Supply Chain Management Examples from other Industries

As earlier stated, most of the literature available on SCM were from industries that made up client bodies for FM. Manufacturing and retail especially have demonstrated benefits to be derived from SCM and reengineering, i.e. a radical transformation of their supply chain processes. These benefits have covered a wide range of areas including quality, response time, waste, cost and risk reduction, maximisation of asset return, and revenue growth.

Some examples of derived benefits from SCM in the manufacturing sector are given below:

NISCI (2000):

- Quality – 20-70% improvement;
- Response – 30-90% shorter cycle-time;
- Waste reduction – 15-30% reduction in Total Cost Accumulation (TCA);
- Technology – 3X to infinity;
- Shared Risk – diminished hazards / obstacles.

Balogh (1999):

- Revenue growth;
- Lower Operating Costs;
- Maximisation of Asset Return;
- Free Up Working Capital.

PRTM ISC Benchmark Study (1997):

- 16% – 28% Improvement in Delivery Performance;
- 25% – 60% Improvement in Inventory Reduction;
- 30% – 50% Improvement in Fulfilment Cycle Time;
- 25% – 80% Improvement in Forecast Accuracy;
- 10% – 16% Improvement in Overall Productivity;
- 25% – 50% Improvement in Lower Supply-Chain Costs;
- 10% – 20% Improvement in Improved Capacity Realisation.

Apart from the PRTM (1997) study which showed marked improvements in forecasting accuracy, most of the significant gains in undertaking SCM initiatives in manufacturing seem to lie in better quality, lower costs and better response time, the key performance indicators in the manufacturing sector.

Although it is generally accepted that SCM has led to marked improvements in the manufacturing sector, these figures on their own are meaningless to the researcher as they do not show the context in which the improvements were achieved. Although it is acknowledged that improvements have been demonstrated, from which FM could learn. Some writers see the most benefits however to be derived from supply chain reengineering.

4.4 Supply Chain Reengineering

The supply chain is perceived to be the *“cutting edge of contemporary reengineering and the logical progression from business process reengineering”* (Hammer, 1998). Business Process Reengineering (BPR) was defined as *“the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed”* (Hammer and Champy, 1993). It is however openly acknowledged that the process of re-engineering is associated with risks, and that between 50 – 70% of the companies that try to re-engineer will fail (Hammer and Champy, 1997). It is important to note that this assertion was not documented nor has empirical evidence.

On the whole, even substantial BPR payoffs appear to have fallen well short of their potential. 'Reengineering the Corporation' set demanding goals: 70% decreases in cycle time and 40% decreases in cost; 40% increases in customer satisfaction, quality and revenue; and 25% growth in market share. The study of the North American BPR efforts showed participants failed to attain these benchmarks by as much as 30%" (Champy 1995).

It has been identified that there is a limit to how much individual organisations can achieve within their own boundaries, and that a basic premise operates that if you *"improve the total system, everybody comes out ahead"* (Hammer, 1998). Whereas BPR focuses on an organisation, supply chain reengineering crosses organisational boundaries. This may imply that the risks associated with supply chain reengineering are higher as you have more organisations involved. There however exists documented evidence of successful examples of supply chain reengineering. This is therefore gaining importance as the next step in the process of reengineering. Notable successful examples include:

IBM (Nelson, 2001a) – Reengineered its supply chain to trace the flow of goods from its suppliers to its manufacturing facilities, distribution channels and customers.

Benefits included:

- Tied people, processes and information associated with flow of goods together;
- Saved \$3.6 billion in materials acquisition cost;
- Cut overall logistics costs by 24%;
- Reduced annual IT costs by 45%;
- Improved on-time shipment to 90-98%;
- Shortened delivery cycle time by 55%;

- Improved inventory turn by 44%;
- Shortened demand/supply planning cycle from 60 to 20 days;
- Provided a framework for initiatives to improve customer satisfaction (better prices, delivery & service);
- Identified and implemented cost-cutting measures.

Wal-Mart (Nelson, 2001a) – Reengineered its relationship with one of its key suppliers, Procter & Gamble, and entered a partnering arrangement in respect of the management of its Pampers inventory. Benefits were demonstrated by both organisations. Wal-Mart benefited through the:

- Elimination of costs associated with maintaining the Pampers inventory;
- More effective management of stock;
- Freeing up of valuable space in their distribution centres;
- Reduction of the need for working capital to finance their inventory.

Benefits to Procter and Gamble included:

- Preferred supplier status;
- Gaining additional shelf space in Wal-Mart stores;
- Having end aisle displays;
- More efficient manufacturing and logistics operations;
- Enabled 'continuous replenishment' of goods in stores;
- Minimised the number of external contact points e.g. accounts;
- Factory utilisation growth from 55% to 80%+;
- Drop in overall costs.

Argos, the catalogue store chain (Axtell, 1999):

- Constructive challenge of their current processes;

- Faster response to customer demand patterns;
- Sharing a common data view with their suppliers.

Further highlighted were the challenges they faced in effectively managing their supply chain namely:

- What collaboration meant to their organisation;
- Bringing the “service” element into focus;
- Understanding their suppliers’ impact on their customers.

These examples from the computer and retail industries are the most inclined towards the service or business support market. They show benefits being derived in areas such as faster response to customer demand, sharing a common data with suppliers, preferred supplier status and integration of people, process and information. These areas are critical in SCM in FM. There are however some examples to share closer to the field of FM, from the construction industry.

4.5 Supply Chain Management in Construction

Following Egan (1998) and Latham (1994) the construction industry embraced SCM as a means of improving process management and achieving the Construction Best Practice Key Performance Indicators (DETR, 2000; Construction Best Practice, 2003).

The construction industry is mature, with strong inherited cultures and working traditions. It represents the second of the three organisational types identified by Grimshaw and Cairns (2000). This means it has the advantage of well-understood

practices that have evolved over a long period of time. Its advantage however becomes a disadvantage as it has difficulty in managing and implementing rapid change.

Trust is a key aspect of SCM (Swan *et al*, 2002). This is a major area of development in the construction industry. Egan (1998) stated that advice given by the manufacturing industry suggested that sorting out the cultural issue was paramount in approaching change. Latham (1994) likewise viewed trust as the 'gatekeeper' to achieving real progress in contractual relationships.

Trust has been defined as *"a willingness to rely on the actions of others, to be dependent upon them, and thus be vulnerable to their actions"* (Swan *et al*, 2002). It has three elements to it: responsibility, accountability, and openness and honesty, which the researcher will refer to as transparency. Research shows trust to be the substance that binds successful supply chains together (Swan *et al*, 2002). The industry features many complex processes, with SCM adding a further layer of complexity.

Trust, it is believed can help to manage the unknown. There exists a relationship between the unknown and uncertainties. Earlier we have seen FM being described as gradually moving toward the management of long-term uncertainties (Nutt, 2000). This establishes that trust is an element of FM.

Another key area of SCM is process management and improvement. New procurement methods such as partnering, prime contracting, design and build, the public finance initiative (PFI) and public private partnerships (PPP) which involve long-term working arrangements and / or the provision of other support services in

addition to building services, have created the need for a tool or model to manage the supply chain through the whole life cycle of the project.

The SPICE projects (Sarshar *et al*, 2000; Amaratunga *et al*, 2002) amongst others have highlighted the need to assess the maturity and capability of an organisation's processes and those of its suppliers. Major issues that have emerged from the assessment of supply chains are:

- How the results will be used. If the results are used in a positive and long term manner, they can help improve the processes in a partnership. Whereas if used in an adversarial relationship, as a "stick" or a deterrent, the supply chain will resist in participating.
- Evidence from the software industry shows that companies may attempt to fake the results (Sarshar *et al*, 2000).

The Department of the Environment, Transport and Regions (DETR) through its Construction Best Practice Programme identified SCM as a 'win-win' scenario, "*designed to satisfy customer demand*" (DETR, 1998). It identified the following benefits to the construction industry:

- Better understanding of key customers needs and suppliers capabilities;
- Reduction in delivery times and costs, whilst being more responsive and improving the quality of products and services.

The DETR (1998) further broke the benefits down into economic benefits and long-term advantages. Economic benefits included:

- Increased net sales – with some companies achieving over 250% increase;
- Increased repeat business with key customers;
- Gives greater confidence for long term planning;

- Provides greater certainty of turnout costs;
- Improves value for money in a 'win-win' scenario;
- Increased production effectiveness;
- Reduction in real costs.

Other identified benefits to be gained as supply chain relationships develop included:

- Reduced bureaucracy;
- Better knowledge of end-market trends;
- More innovation in design;
- Reduced time to market for new products and services;
- Less waste, leading to more effective use of resources and skills;
- Improved safety and after-sales service to end-customer; and
- The development of environmentally sound trading.

The long-term advantages to be gained from SCM were listed as:

- Less adversarialism and fewer disputes;
- Enhanced problem solving;
- Flexibility and a strategic capability to plan and innovate;
- Improved employee motivation and team-working.

These benefits are just as relevant to FM as they are to the construction industry. It is therefore very important to understand the potential for improvements through implementing SCM in FM. This becomes imperative with the movement towards collaborating working between the construction and FM industries (Be, 2003). The 'lean' concept (Howell, 1999; CSCM, 2002) has already been embraced by the construction industry. FM needs to respond to this with more than outsourcing,

consolidation and rationalisation. A whole systems approach is required. To understand this, we need to briefly examine and differentiate between supply, demand and value chain management.

4.6 Demand Chain Management

Although sometimes used interchangeably with supply chain, the demand chain *“represents a circular process that flows from the mind of the consumer to the market”* (Blackwell and Blackwell, 1999). It is *“about unifying the complex network of people, organizations, and processes that are designed to create and service demand for a company’s products.”* (Scribe Software, 2002), or services as the case may be.

The demand chain is seen as the customer-facing corollary to the supply chain (Predictive Consulting, 2003). It has further been described as an umbrella philosophy that places customers at the centre and focuses all business activities on developing long-term relationships with customers by proactively creating and delivering solutions that profitably meet continually evolving customer needs (Predictive Consulting, 2003). It takes account of customer behaviour and in FM focuses the delivery of services towards meeting customer requirements.

Demand chain management (DCM) focuses on company growth potential rather than costs. There is an in-depth knowledge of customer requirements, an integration of their thoughts, attitudes, needs, and desires into everything the organisation does. The organisation also adapts to meet customers actual needs and desires rather than perceived desires. This approach has been found to

emphasise understanding and serve individual customer needs to create and sustain profitable competitive advantage (Predictive Consulting, 2003).

Just as SRM is an important aspect of SCM, customer relationship management (CRM) is an integral part of DCM, and is a strategy used to learn more about customers' needs and behaviours in order to develop stronger relationships with them (Deck, 2001). Closely related to these two concepts is value chain management.

4.7 Value Chain Management

Much of the work on value chain management evolved from Porter (1985). Value chain management is related to an organisation's ongoing strategic management process (Alexander, 1999). A value chain, refers to the *"sequence of activities which build to generate the mix of products and services for the whole organisation"* (Alexander, 1996).

It *"disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and potential sources of differentiation"* (Porter, 1985), which is referred to as the value system (fig. 4.1).

Value chain activities can be categorized as primary activities (logistics, operations etc) and support (Infrastructure, HR Management etc), the latter integrating functions that cut across the various primary activities of the organisation (Christopher, 1998).

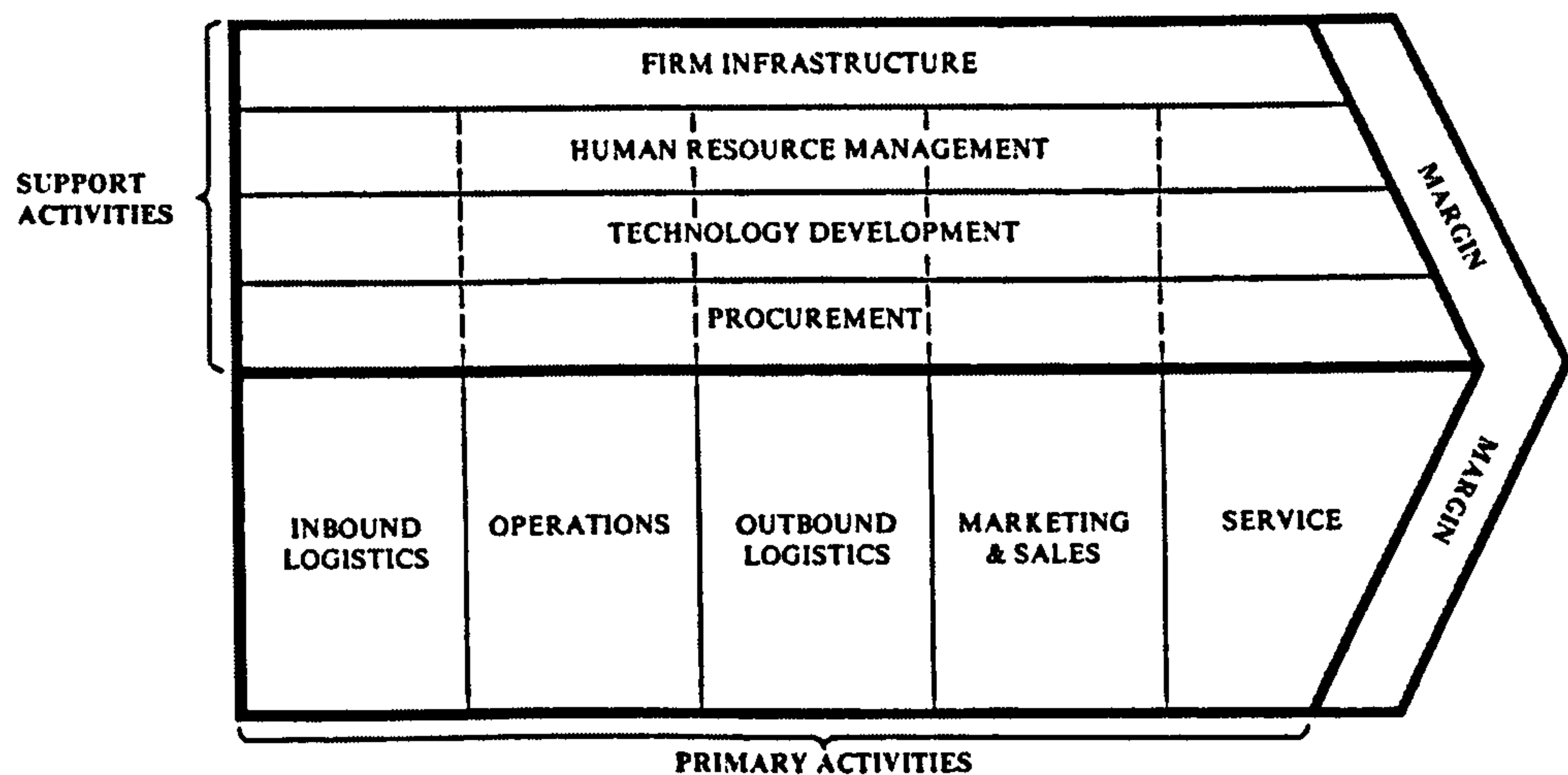


Figure 4.1. The Generic Value Chain (Porter, 1985)

The value system is based on the premise that the *“fundamental basis of above-average performance in the long run is sustainable competitive advantage”* (Porter, 1985). Furthermore, Porter (1985) suggests that *“there are two basic types of competitive advantage a firm can possess: low cost or differentiation”*. In other words, one can either be a ‘cost leader’ producing the same or higher quality service at a lower cost than competitors, or focus on a niche area in which one excels or find other ways in which to differentiate from competitors.

Differentiation is seen as a requirement for success in organisations (Perks, 2000). Being a cost leader in itself is a way of differentiation for organisations. Each firm would have its own value chain, with suppliers’ value chains creating and delivering the inputs used in an organisation’s value chain.

Value chain management involves an element of vertical integration. Porter (1980), defines vertical integration as *“the combination of technologically distinct production, distribution, selling, and/or other economic processes within the confines of a single firm”*. Some of the benefits to be derived from vertical integration (Porter, 1980) include economies of:

- Combined operations;
- Control and Coordination;
- Information;
- Avoiding the market i.e. Transaction costs of market transactions;
- Stable relationships.

The characteristics of these economies of vertical integration were seen to be (Porter, 1980), an opportunity to

- Tap into technology;
- Assure supply and/or demand;
- Offset bargaining power and input cost distortion;
- Enhance the ability to differentiate;
- Elevate entry and mobility barriers;
- Enter a higher-return business;
- Defend against foreclosure.

In addition to vertical integration, horizontal integration is also important in FM, i.e. not just an upstream / downstream integration, but cross-disciplinary and functional integration as well, often referred to as collaborative working.

'Value' as we all know is a relative term, which needs to be examined, in this instance, in the context of the organisation's business strategies and objectives. Value is added to an organisation at strategic, tactical and operational levels. At strategic level it is through the provision of services in the most efficient and effective way. This can be done at the policy level by the development of a strategy and a framework within which to deliver services.

At tactical level it is added through the development and management of quality managed systems, and the establishment of guidelines and service levels (NHS Estates, 1998). At operational level, an activity would add value to the organisation if the customer benefits from it, in which case you are satisfying customer requirements; or if it is done right the first time, in which case the organisation is eliminating waste. Alexander (1999) added "*maximum value is obtained from a required level of quality at least cost, the highest level of quality for a given cost or from an optimum compromise between the two*".

4.8 Value, Demand and Supply Chain Management, and Facilities Management

As previously mentioned, the supply, demand and value chain management are used interchangeably and various authors have their own views about how they relate to each other. SCM has been described as the efficient management of 'conflict' and 'inter-functional coordination problems', which are an inevitable result of differentiation. Lambert *et al* (1998) see SCM processes as encompassing areas such as CRM, SRM and demand management (fig. 4.2).

This requires not only that partners should be 'strategically and culturally' matched, but also that their process capability must be complimentary to the level of relationship involved. It also involves a high level of trust and commitment as explained earlier. There must be the commitment and capacity to be open and share knowledge across the supply chain. Each concept on its own, address specific issues relating to supporting the business need. An integrated and holistic

approach is required which takes into cognisance all the factors in demand management and SCM to create a value system.

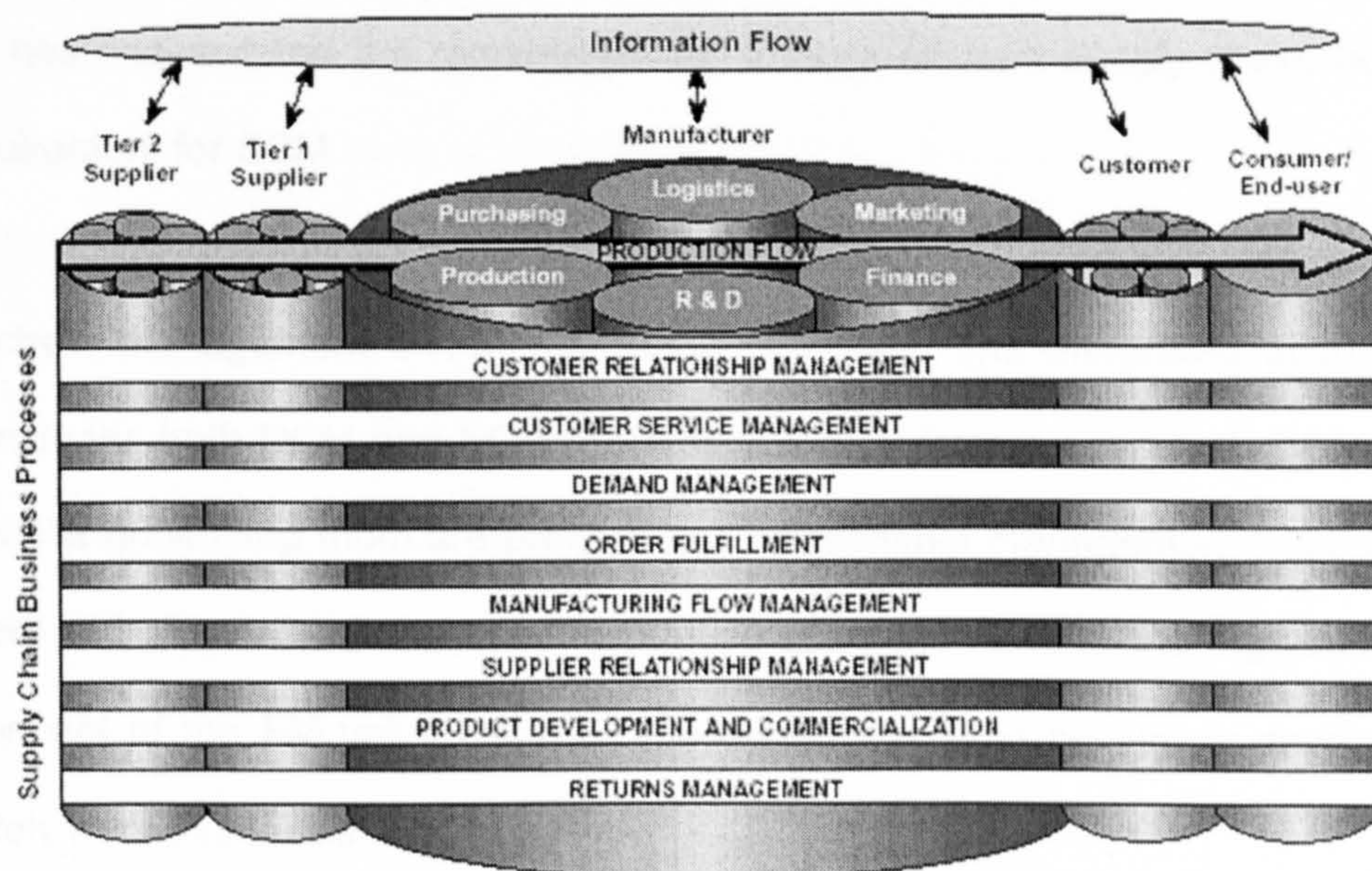


Figure 4.2 Supply Chain Management: Integrating and Managing Business Processes Across the Supply Chain (Lambert et al, 1998)

If we have learnt any lessons from BPR however, it is that where the 'big bang' approach is to be implemented, care must be taken that all the necessary components to make it succeed are in place. In industries where tradition and culture are inherently important, incremental change may be more appropriate.

As mentioned earlier, the 1990's witnessed a significant shift in working practices and corporate emphasis from activity to information management enabled by IT. Competitive advantage is gained by supply chains rather than individual organisations in this 'new world'. As a result, 'people assets' have taken on more significance, and the creation of the right 'experience' through the provision of the 'right' facilities becomes a means of winning the 'war on talent' (CFM, 2002c). This need to be customer-focused creates the requirement for FM to be demand-led, hence the need for DCM.

In response, FM has evolved into a business support service, increasing charged with an ever widening supplier base, and a requirement to manage this expanded supply chain more effectively and efficiently. Cost as a business driver (CFM, 2002c) has necessitated the requirement for a more efficient supply chain, hence the requirement for SCM.

Value chain management in FM represents a holistic and integrated approach, which includes both DCM and SCM (fig 4.3). Cultural issues span both DCM and SCM, whilst underlying them are process and relationship management issues. An alignment of both chains is required to provide optimum value to the organisation. This concept of the FM value chain by the researcher is to be further developed separately from this thesis.

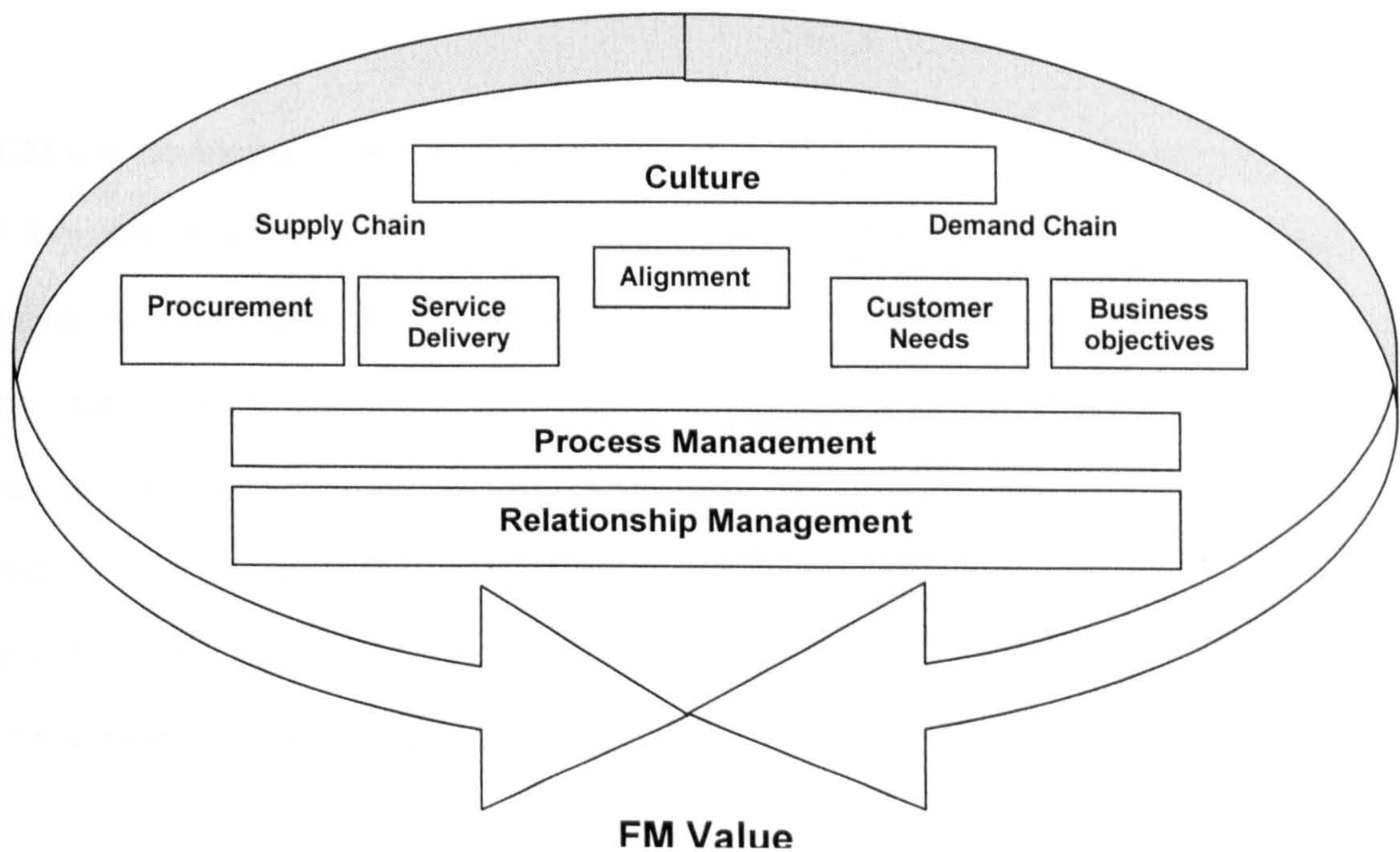


Figure 4.3 The FM Value Chain

FM is demand driven. As such SCM initiatives likewise need to be demand driven. An issue that lies at the heart of FM is the fact that resources are needed to implement effective SCM. However, FM is generally regarded as cost driven rather than value driven, and is usually the first area of business where cost savings are sought. Varcoe (2000) describes this in a broader sense stating that "*corporate real estate teams are using service providers to manage cost-driven issues and achieve economies, whilst they concentrate more on business-facing issues and overall effectiveness*". FM also usually plays a responsive than a proactive role in the organisation. This raises the need to raise the FM profile and address SCM at strategic, tactical and operational levels.

4.9 Summary

SCM was developed in the manufacturing and retail sectors, and remained the remit of logistics management and procurement for a long time. Supply chain re-engineering has been described as the next logical step to business process re-engineering, addressing the contemporary measures of performance like cost, quality, service and speed. Successful SCM involves a holistic outlook, trust and process management. The construction and FM industries have picked up on the benefits to be gained from this area, and are actively seeking to demonstrate improvements through innovation in this field.

SCM shares many similarities with FM, the most notable being that both involve a complex interaction of several organisations. They both also involve various stakeholders. The researcher would go as far as to say that FM, when broken down, represents the management of various supply chains in order to deliver support

services to an organisation, to enable it to achieve its business goals. It is also closely akin to the concepts of 'lean' management.

The management of waste and uncertainty appear to be the primary concern of SCM in the manufacturing and retail sectors. Many of the models and tools developed are therefore geared towards various aspects of this management. Sadly, there is very little integration amongst the tools / software applications.

Nonetheless many benefits have been demonstrated in these sectors from the implementation of SCM initiatives including marked improvements in quality, response time, waste reduction, revenue growth, cost reduction, maximisation of asset return, delivery performance, forecasting accuracy, capacity realization, and freeing up of working capital. Evidence from the manufacturing and retail industries show real gains to be made by crossing organisational boundaries.

Additional benefits from the construction industry have been identified as a better understanding of key customer needs and suppliers capabilities, increased repeat business, greater confidence for long-term planning, greater certainty of costs, more innovation design, improved safety, less adversity, flexibility, enhanced problem solving, and improved employee motivation and team-working. These are all relevant to FM.

The differences in demand, supply and value chain management revolve around the scope of each concept, though all are interrelated. It has also been identified that SCM in FM needs to be demand driven as will be examined in the next chapter.

Chapter 5 Supply Chain Management in FM

“Business is a combination of war and sport” Andre Maurois (source unknown). In both there has to emerge a winner. To win, one party needs to have an edge over the other. This edge in business is called the ‘competitive advantage’. It is not just enough to win the competitive edge, as *“yesterday’s competitive advantage is today’s competitive necessity”* (Hammer, 1998). Businesses have to keep innovating and improving to keep this advantage.

Although facilities are accounted to be an organisation’s second largest expense and the largest item on the balance sheet, it is mostly perceived as an overhead or non-income generating expenditure. Following the ‘lean’ philosophy by eliminating non-value adding activities, this aspect of business is increasingly being outsourced to create leaner, more flexible organisations. This chapter examines SCM issues in FM. These findings have come out of literature review and studies undertaken by the researcher under the SPICE FM project.

5.1 Supply Chain Management in FM

The case for effective and efficient management of the supply chain is backed by research, which shows that *“60% of variable costs are driven by decisions made outside the organisation”* (Ross, 1999). Effective management of the supply chain would enable optimisation of the supply chain as well as the control and management of these variable costs. Considering the fact that facilities account for as much as 15% of an organisations turnover, this would imply that at least 9% of

the organisations turnover can be effectively managed and controlled through successful management of the FM supply chain.

Christopher (1998) emphasises that SCM is not the same as vertical integration, which implies ownership of upstream suppliers, and downstream customers. It goes beyond Just-in-Time (JIT) (Sandras, 1995; Goddard, 1986) and Time Compression techniques employed in manufacturing and retail. For one thing, inventory management is not such a 'hot' topic in FM.

The need for SCM initiatives in FM have been emphasised through:

- The Office of Government Commerce's Achieving Excellence Programme for public procurement. This stated that "*all three procurement strategies (Prime contracting, Design and Build, and PFI) can only achieve best value for money if they are based on the integration and management of the supply chain*" (Holti *et al*, 2000). As the government is the largest procurer of construction (and hence facilities services), a client driven business need is perhaps the best argument for addressing SCM in FM.
- The emphasis on the ideology of "faster, better and cheaper" Bacon (2000).

As in manufacturing (Stevens, 1989), SCM in FM needs to be developed at strategic, tactical and operational levels. The focus at the strategic level is on developing (adapted from Gattorna and Walters, 1996):

- Objectives and policies for the supply chain to achieve competitive superiority;
- The physical components of the supply chain;
- Customer charter;

- Organisational structure capable of bridging the functional barriers to achieve integration.

At the tactical level, the focus is on the means by which the strategic objectives may be met, e.g. identifying necessary resources. Whilst at the operational level it is the efficient operation of the supply chain with a focus on systems, control and performance measures (Stevens, 1989). It was further suggested that a three-stage process is involved in SCM, namely:

1. Evaluation of the competitive environment;
2. Supply chain diagnostic review;
3. Supply chain development.

These stages will be analysed in the context of the case studies in this thesis. Unlike manufacturing, facilities decisions are derived from the overall business strategies rather than simply being part of logistics decisions. In order to manage the supply chain (or network), certain criteria have been identified as being paramount (Christopher, 1998), namely:

- Collective strategy development;
- Win-win thinking;
- Open communication; and
- Process Integration.

In the FM context, Atkin and Brooks (2000) see the key issues as development and management of the right 'cooperative' relationships with service providers and suppliers, and working towards shared goals. To gain a deeper understanding of SCM in FM however, an understanding of what is referred to as the FM supply chain is required.

5.2 The FM Supply Chain

The FM supply chain represents the interests of the following stakeholders: clients, FM planners and providers, suppliers of goods and services, regulatory authorities and insurers (Nelson, 2001a). The last two have a large, albeit indirect role, to play in FM.

- **The client stakeholders** - This group includes financial stakeholders such as the client-owner and the client-occupier. It also includes the users of the facility, who may be employees working in the facility or visitors; and the neighbours and community at large using or affected by the facility.
- **The service planners and providers** - These fall into three categories, in-house, outsourced and managing agents. In-house service planners and providers are those employees of the organisation who plan and provide facilities services to the organisation. Outsourced providers are those who offer FM services to the organisation as opposed to managing agents, who manage the process and suppliers on behalf of the organisation, but do not provide direct facilities services themselves.
- **Suppliers (goods and services)** - This group includes all suppliers of goods and services to the organisation. It would also include contractors, utilities suppliers and outsourced service providers as above.
- **Regulatory authorities** - This includes local and other government agencies that play an indirect role in FM. This role includes determining health and safety requirements, and planning regulations.

- Insurers - Insurers are very important to the FM supply chain, as they insure not only the 'facilities' but also the risks associated with the facilities. They are involved with each supplier to the FM service and the client organisation.

A lot of work has already been done in defining FM supply chains (Barrett, 1995; Haynes *et al*, 2000). As this thesis does not wish to re-invent the wheel but rather to build on it, the generic FM model (Barrett, 1995) will be adopted for this study.

The model (fig 5.1) shows the interplay between the various players in the FM supply chain, and strategic and operational FM. To the right we see that strategy (formulated by client organisation) looks outside the organisation and to the future. This feeds into what is currently happening inside the organisation, and directly to the functional units (the service providers and rest of the supply chain). There is a cyclical feedback system between strategy and operations. Service planners need to be in a strategic role. These then relate to the core business of the organisation (on the left), in meeting their current and future needs. Meeting the current needs of the client organisation is primarily an operational issue. However, this feeds into future FM services based on the future needs of the core business of the organisation (strategic FM).

This model would be quite appropriate for an organisation with in-house FM service providers (direct labour organisation). With an outsourced provider or managing agent, there must be a functional unit within the client organisation to take on the role of an intelligent client. This is the in-house liaison role between the three facets of FM namely: Intelligence, Sponsorship and Service Management (Williams and Roberts, 2000). It would then be the function of this unit as an intelligent client to translate the organisation's strategies into supply chain initiatives.

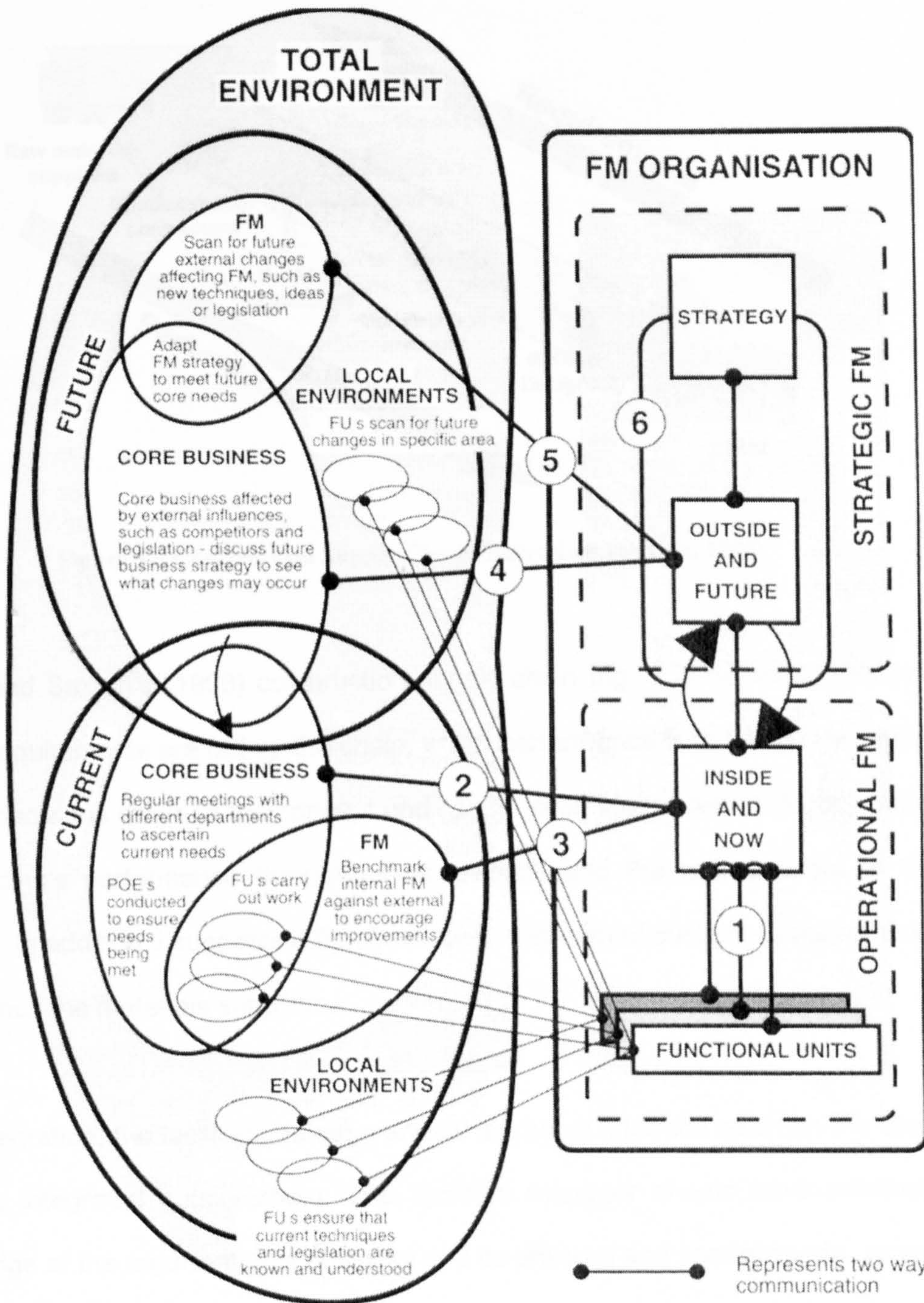


Figure 5. 1 Generic FM model (Barrett, 1995)

Besides the fact that it is more appropriate to a direct labour organisation, this model also ignores issues of integration between the FM and construction supply chains (fig 5.2), and views them as two distinct areas.

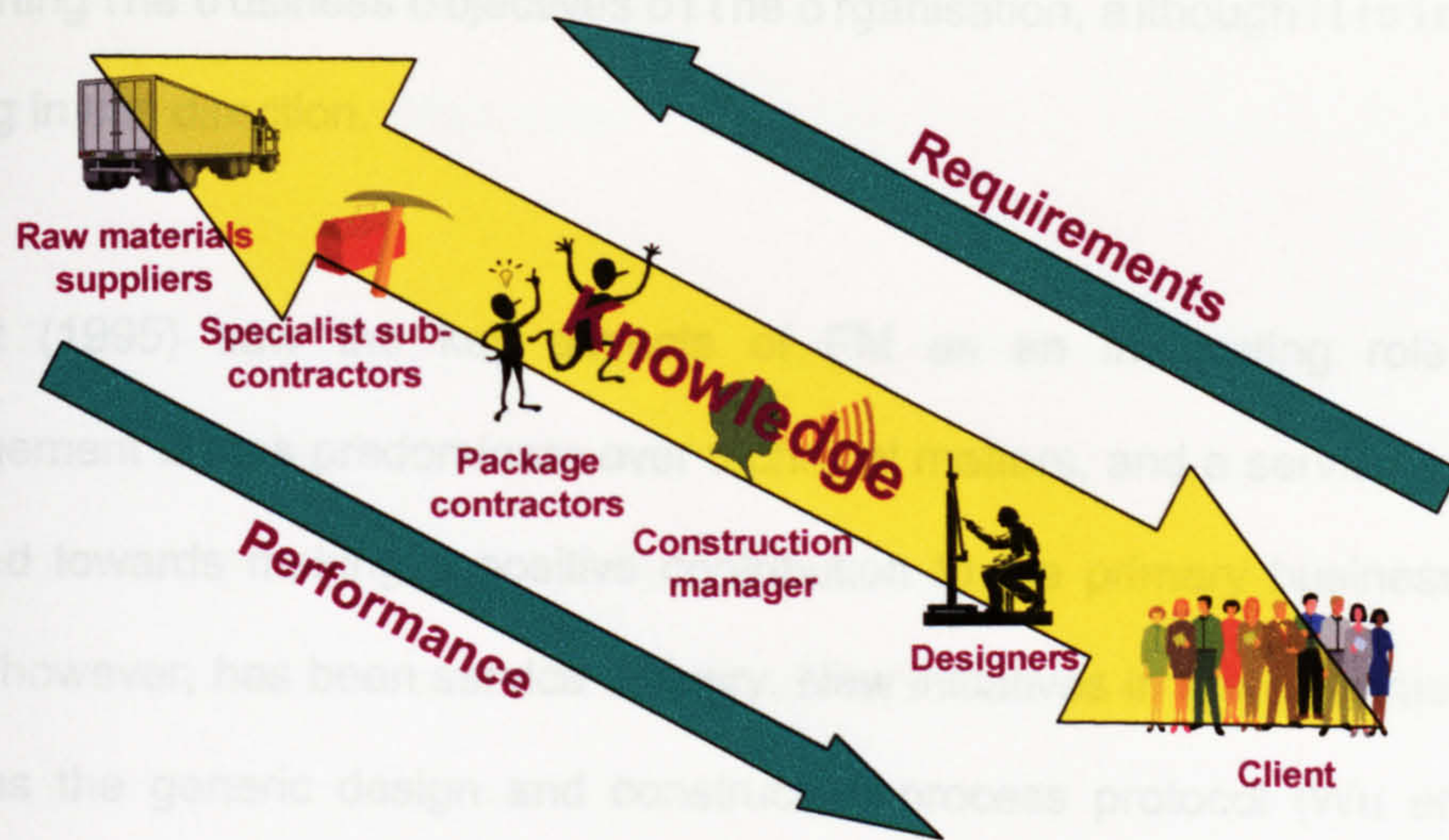


Figure 5.2 Construction Supply Chain (Barrett and Sexton, 1998)

Barrett and Sexton's (1998) construction supply chain (fig. 5.2) demonstrates that clients' requirements are fed up the chain, whilst performance is fed down the chain. Hence, decisions made at the concept and construction stages would directly affect the building's performance throughout its lifecycle and the management of the facilities. In addition it suggests a feedback loop upstream of customer requirements to influence the materials suppliers.

With integration, the facilities manager should act as an interface between the client and the integrated supply chain. The facilities manager should have adequate knowledge of the organisation's business and its physical and spatial needs, as well as physical resources available to meet those needs. This way, FM can play a strategic role in influencing business decisions related to the organisation's infrastructural requirements.

The current view is that FM should not only focus on post-occupancy issues, but should also be actively involved in pre-occupancy issues (CFM, 2002b). The reality of the FM market has, however, been that it has not taken an integrated approach to

supporting the business objectives of the organisation, although it is increasingly moving in this direction.

Barrett (1995) saw the key aspects of FM as an integrating role in which management issues predominate over technical matters, and a service justified and oriented towards making a positive contribution to the primary business. Its main focus, however, has been service delivery. New initiatives in the construction sector such as the generic design and construction process protocol (Wu *et al*, 2000) emphasise the need for integration and the role of FM in the construction supply chain. These are however not the only issues to be addressed in SCM in FM.

5.3 Supply Chain Issues in FM

As SCM is relatively new in FM, there is very little literature or documented evidence available in this field. Most FM organisations consider it an ongoing strategy for competitive advantage, and are not willing to share their results publicly. The primary source of information on the issues identified in this thesis is from an earlier study undertaken by the researcher. This has however been backed up by literature review (BIFM, 1999 and 2002) and recent studies from the CFM (2004).

In a study to determine SCM issues in FM (Nelson, 2001a), no consensus was found amongst participants (made up mostly of practitioners, and one academic) as to the most important SCM issues in FM. Issues varied depending on whether the organisation in question was a client or provider. A content analysis was undertaken to determine the most important issues based on their rates of frequency. It has

however not been presented in order of frequency in this thesis. The most important supply chain issues identified were:

- Client's requirements capture, and specification of service delivery standards. Various views were provided on this issue ranging from the strategic top-down approach, to the operational bottom-up approach. Other views held that it needed to be an iterative process with a feed-back / feed-forward process in place.
- Linking FM with the strategic business processes. This view proposed that in order to capture client's requirements and manage the business stimuli effectively, FM processes need to be integrated and well managed. They also need to be integrated with the overall strategy of the business.
- Developments in technology and its impact on working patterns. Technology has not only led to a change in the way we work, but where we work, the way buildings are constructed to accommodate technology, and how facilities services are provided. Technology should not, however, be seen as a driver on its own, but as an enabler supporting business needs.

The growing influence of web-enabled and wireless technological advances on changing work patterns cannot be ignored when addressing SCM issues in FM. One view is that the way forward is in harnessing the power of the web and e-business. These see web-enabled technology and the opportunities it presents as the most important issue 'on-line'. Bacon (2000) believes that e-business provides an opportunity for FM to streamline complex processes and exchange information. Areas of opportunity in e-business for FM include management,

exchange of information, procurement, resource management and business development. Cable & Wireless for example have recently procured one of their FM services using the web.

In addition to the opportunities it presents, there are also the threats from other sources, most notably the so-called dot.com firms in providing traditional FM services to organisations over the Internet. Security threats also arise when placing the organisation's knowledge in a medium that can be accessed by hackers, or whose security systems may fail, as has recently been witnessed in the cases of British Gas, HSBC bank and Barclays bank.

More barriers exist in the form of rapidly changing and incompatible technology, and process capturing. Technology is changing very rapidly and firms may be hesitant to invest in new technology to enable e-business. Technologies employed will vary between organisations within the supply chain and may be incompatible.

- Organisational processes capture. Of all aspects of process management, this is the biggest issue as many organisations are not mature enough to capture their processes adequately then translate them into an e-format, including all necessary safety checks.
- Consolidation / rationalisation of the supply chain. Client organisations had this at the top of their agenda. Consolidation or rationalisation goes hand-in-hand with outsourcing. Most appoint a small number of key suppliers or a managing agent to manage their supply chain. FM models employed include: commercial contract or management contracting, managing agent,

Total Facilities Management (TFM), infrastructure management or the provision of integrated workplace solutions.

It has been opined however, that rather than reducing the number of suppliers, it is more important to have a clear brief, clarify grey areas and ensure consistency in supply. Organisations with dispersed and regional offices are moving towards reducing the number of local suppliers and appointing a national supplier for all of their offices. Most of the participants believe this leads to a loss of local feel and knowledge, and does not necessarily improve service or management.

It was quite interesting to note however, that this was not an important issue with facilities managers in the National Health Service. Parts of the NHS supply chain (purchasing) had already been consolidated through a government directive that specific supplies were to be sourced through NHS Supplies. It is interesting to note however that NHS Supplies has now been split into two organisations, the NHS Purchasing and Supply Agency and the NHS Logistics Authority. This move is contrary to integration, and is actually a move back to traditional methods of procurement, re-emphasised by the NHS Procure 21 initiative.

- Environmental management. These issues revolve around environmental issues in service delivery, including embedding service delivery specifications, and managing a green supply chain.
- Alignment of organisations' business processes. Organisations need to address both internal and external alignment issues, and have the right infrastructure in place to support SCM. Supply chain initiatives fail where the

client organisation does not have an internal supporting infrastructure for its procurement initiatives.

Integration can be seen is a very important aspect of SCM in any industry. This view is supported by literature (Holti *et al*, 2000; Wu *et al*, 2000). However, the researcher early in this study found amongst some construction professionals interviewed at a construction forum, the view that there was no need for integration of the two supply chains. It was felt that this would create a supply chain that was too large and difficult to manage, as different specialist knowledge was needed for the management of the two supply chains. They also felt that there was a ready integration in some areas, namely building services, where the manufacturer who supplies and installs a piece of equipment also manages it for life.

Recent initiatives however such as the Built Environment (Be) FM working group (Be, 2003) shows that construction has now begun to realise the opportunities which lie in supply chain integration and are actively looking for ways to exploit it.

Literature review revealed that other important issues identified as far back as 1997 were flexible working (including changes in working practice), outsourcing, benchmarking, cost-effectiveness (including value for money and efficiency), space planning, the environment, energy management and Human Resource (HR) matters (BIFM, 1997). Important issues for 2002 were listed as flexible working (including changes in working practice), outsourcing, benchmarking, cost-effectiveness (including value for money and efficiency), space planning, environmental issues, energy management and HR matters. These are, on the whole, very similar to the findings from the researcher's study and are still reflective of the FM market today.

Further studies have shown that the specification of standard codes and protocols are also an issue in the FM market. These issues range between technological and benchmarking protocols. Technologies employed by organisations will vary within the supply chain and may be incompatible. Benchmarking studies (CFM, 2001) highlighted the lack of a common benchmarking protocol for FM. These have led to two sets of problems: firstly, issues relating to compatibility of information technology systems, and secondly issues to do with comparing best practice.

The FM market is also continually evolving, so that what was new and innovative yesterday has past its 'sell-by' date today. The sector now refers to infrastructure management and asset provision, whereas asset management was once the current term. E-business and e-procurement are also changing many facets of FM. Bacon (2000) believes that e-business provides an opportunity for FM to streamline complex processes and the exchange of information. He identified areas of opportunity in e-business for FM to include the exchange of information, procurement, resource management and business development.

5.4 Drivers for Supply Chain Management in FM

Similar to other industries, recent focus on SCM issues in FM resulted from a combination of market and client / customer forces, namely changes in: market and competition, regulations & legislation and technology. These drivers are similar to those of other industries that have applied SCM initiatives (Braithwaite, 1999).

Becker (1990) identified five factors for stimulating the growth of FM, namely:

- Cost of mistakes;

- Employee expectations;
- Global competition;
- High cost of space; and
- Information technology.

In order to effectively manage these stimulants, FM processes need to be integrated and well managed. They also need to be integrated with the overall strategy of the business. These stimulants need to be addressed with a few notable changes. Employee expectations would be viewed as stakeholder expectations, and changing regulations and legislation should also be added to this list based on experiences from other industries (Braithwaite, 1999). Lastly, information technology would be treated as an enabler rather than a driver on its own.

5.4.1 Financial expectations

The FM industry has witnessed a gradual shift away from lowest cost to best value. Both public and commercial organisations now make procurement decisions based on the concept of 'value for money' (although it must be noted that in some organisations this is just a 'politically correct' name for lowest cost). As competition erodes profit margins, supply chain costs become a critically important component of the 'bottom line' (Beyer and Ward, 2000). This driver is related to performance on the CFM QMF performance matrix (fig. 3.10).

5.4.2 Stakeholder expectations

Increasing consumer power and the resultant need to satisfy customers is a major driver for change. The adage “the customer is king” is even more powerful in the service industry where the stakeholders who constitute the ‘customer’ are many and varied, and with an ever changing level of satisfaction. This continuous demand for the provision of more sophisticated FM services has meant that FM needs to be more dynamic, or lose out to other professionals who are willing and capable of providing these services. This is the productivity driver on the CFM QMF performance matrix (fig 3.10).

5.4.3 Market and competition

New procurement initiatives including Just-in-Time, outsourcing and partnering are challenging more traditional methods. Just-in-Time for example, has produced a shift from stockpiling and staff retention, to procuring (services, materials and human resources) as and when needed. Dell Computers is a good example of how successful this procurement method is when well managed, and “*demonstrates the value and effectiveness of a supply-chain integration*” (PRTM, 1999). On the client side of FM, Just-in-Time is being viewed by some as the way forward in procuring facilities. There lies a challenge to FM providers to deliver facilities on this basis. This is the innovation driver on the CFM QMF performance matrix (fig. 3.10).

Outsourcing has opened up the facilities industry to competition, and encouraged benchmarking and best practice. Many organisations are increasingly focusing on the management of their core business, contracting out non-core ‘support’ services. Competitive advantage at an organisational level is increasingly much more than

doing things better than your competition, but staying ahead of them. In this new 'global' economy, service excellence alone is no longer viewed as competitively advantageous, because service quality is increasingly similar. The basis of competitive advantage is now seen to be service (product) excellence plus process excellence (Christopher, 1998). This represents the flexibility driver on the CFM QMF performance matrix (fig. 3.10).

The financial markets traditionally held a poor image of construction companies. The need to increase investors' confidence and enhance shareholder value has led to a number of 'quoted' construction firms re-branding and moving into FM. Return on investment is therefore a prime motivator for change in these companies. SCM is therefore an image enhancer for these organisations who want to be seen as being 'current' and innovative. This driver is related to both the reputation and viability (profitability) drivers (fig.3.10).

There is now more professional and market competition for facilities managers from business development managers and web enabled virtual supply chain networks. The former demands an increasingly multi-skilled profession, whilst the latter is a direct consequence of advancement in technology, which has not only resulted in changes to the characteristics of the facilities being managed, but also to the way they are managed. This is an identity driver (fig.3.10).

5.4.4 Regulations and Legislation

Government directives on procurement such as outsourcing, partnering, prime contracting, and the Public Finance Initiative (PFI) are also a major driver for change. The government as part of its Achieving Excellence Programme for public procurement directed that *"From 1st June 2000 all Central Government clients*

should...limit their procurement strategies for the delivery of new building to PFI, Design and Build and Prime Contracting" (Holti et al, 2000). They suggested that all three procurement strategies *"can only achieve best value for money if they are based on the integration and management of the supply chain"* (Holti et al, 2000). This again is an innovation driver (fig 3.10).

Changing regulations and legislation especially as a result of European Union federalisation and the drive towards environmental friendliness promoting efficiency in fuel use, recycling and certification, and noise and congestion reduction have also had their impact on FM. Many client organisations are now highlighting environmental issues and have firmly placed this on the agenda. This driver is also related to reputation (fig. 3.10).

FM Suppliers however have been very slow in taking up SCM initiatives. One of the reasons given for this is the fact that usually FM contracts are short-term, typically three years (CFM, 1999), with the exception of 'partnering' and PFI contracts, which could be for up to thirty-five years. FM suppliers do not therefore have the incentive to invest in, for example, environmental issues. Some suppliers questioned believed that setting up an effective environmental management system, would be giving competitive advantage away to your competitors if they take over your contract. So even where something is done, it is dismantled at the termination of the contract.

This more than anything else demonstrates the lack of trust in current client-supplier relationships. It also shows that long term relationships are essential for SCM initiatives to take hold and work. SCM involves long term vision and strategy. Strategic supply chain alliances must be long-term in order to incorporate continuous improvement targets to reduce costs, enhance quality, and focus on the through-life cost and functional performance of buildings. Short-term contracts do

not encourage investment needed for SCM. Neither will it show optimum long-term benefits even if implemented.

It has also been suggested that *“successful facilities management is more likely to be achieved through a focus on creating a set of shared values across the full spectrum of FM issues reflecting the overall goals and strategies of the organisation, than through a focus on detailed operational elements”* (Carter, 2002). This implies that strategy should be the driving force, rather than short-term operational gains.

To promote integration across supply chains, both clients and suppliers are looking for new ways of working collaboratively. For example, in the UK public sector, with effect from September 1998, government departments were to adopt a policy of favouring collaboration with others, wherever this offered equal or better value for money (Cabinet Office, 1998).

In the commercial sector, organisations that provide an integrated solution to business facilities needs such as infrastructure management, business process outsourcing and property/facilities consortia are leading the way in collaborative working. In many cases, these organisations are special purpose vehicles (SPVs) set up by a group of organisations to deliver particular services to a particular client.

5.5 FM Supply Chain Management Example

New procurement initiatives including Just-in-Time, outsourcing and partnering are challenging the traditional methods of facilities service management. Just-in-Time

for example, could be seen to be provided on the property side by organisations such as Regus. The FM client increasingly perceives this as the way forward in procuring facilities. The challenge lies with the FM market to deliver on this basis.

In practice, AMEC Facilities, for example have demonstrated real benefits in implementing SCM initiatives (O'Halloran, 2001). Although these initiatives were not shared with the researcher, some of the benefits derived were, namely:

- Average 15 - 20% cost reduction;
- 96% customer satisfaction;
- Reduction in lead times and fault levels;
- Improved service at reduced cost;
- Financial control;
- Service linked to business drivers;
- Performance linked to payment;
- Full commitment to a service culture;
- A forum for intellectual exchange;
- A common vision and goal;
- A virtual company concept;
- Mentoring at company and individual level;
- Rewarding success;
- Embracing change as a way of life.

5.6 Summary

The FM supply chain represents the interests of various stakeholders. The need for SCM initiatives in FM have been emphasised most notably by the UK government

through new FM procurement routes and initiatives introduced in the past few years. Private sector clients are also looking for FM supply chain initiatives, which unfortunately the FM market is yet to deliver.

Integration is a critical issue in SCM in FM, with the facilities manager acting as an interface between the client and the integrated supply chain. Literature revealed research has already been undertaken and is still ongoing in addressing the FM supply chain. As the composition of the FM supply chain is not the focus of this research thesis, current thinking on the FM supply chain has been adopted with caveats.

SCM in FM needs to be developed at strategic, tactical and operational levels. A three-stage process has been proposed for SCM namely: market evaluation, supply chain review and development. Effective management of the supply chain would enable optimisation of the supply chain as well as the control and management of the variable costs impacted on by external influences from the supply chain.

Several drivers and issues have been identified for SCM in FM. Drivers include economic, social and legal drivers. Issues on the other hand range from the micro (client requirement capture) to the macro (impact of technology).

Only one example of successful SCM was shared with the researcher from FM. Although informal discussions revealed other organisations believed that they had some successful initiatives in this area, they were unwilling to share details publicly as they believed it would be giving away some of their competitive advantage.

Chapter 6 Supply Chain Management: Models and Knowledge Management

In undertaking this research, various supply chain management models were identified through literature review and projects that the researcher was involved with over the period of the study. Three of these were selected for closer examination on the basis that they were either internationally renowned or UK-developed models. These were the Integrate to Innovate (i2i) model, Customer Supplier Co-Development Relationships (COGENT) model and Supply Chain Operations Reference Model (SCOR).

A brief examination and analysis of these models, is followed by a detailed examination of the i2i model in the context in which it was developed, i.e. knowledge management. This forms the basis for the next three chapters, which present the three case studies undertaken for this thesis.

6.1 Models

Models are an accepted means for studying complex phenomena (Forrester, 1961). There are two main classifications for models from which sub-classifications are derived. These are physical or abstract (fig. 6.1). Physical models are usually physical replicas of the subject under study but on a reduced scale (Forrester, 1961). Abstract models use symbols, which may be a written language or thought process, rather than physical devices to represent the subject (Forrester, 1961).

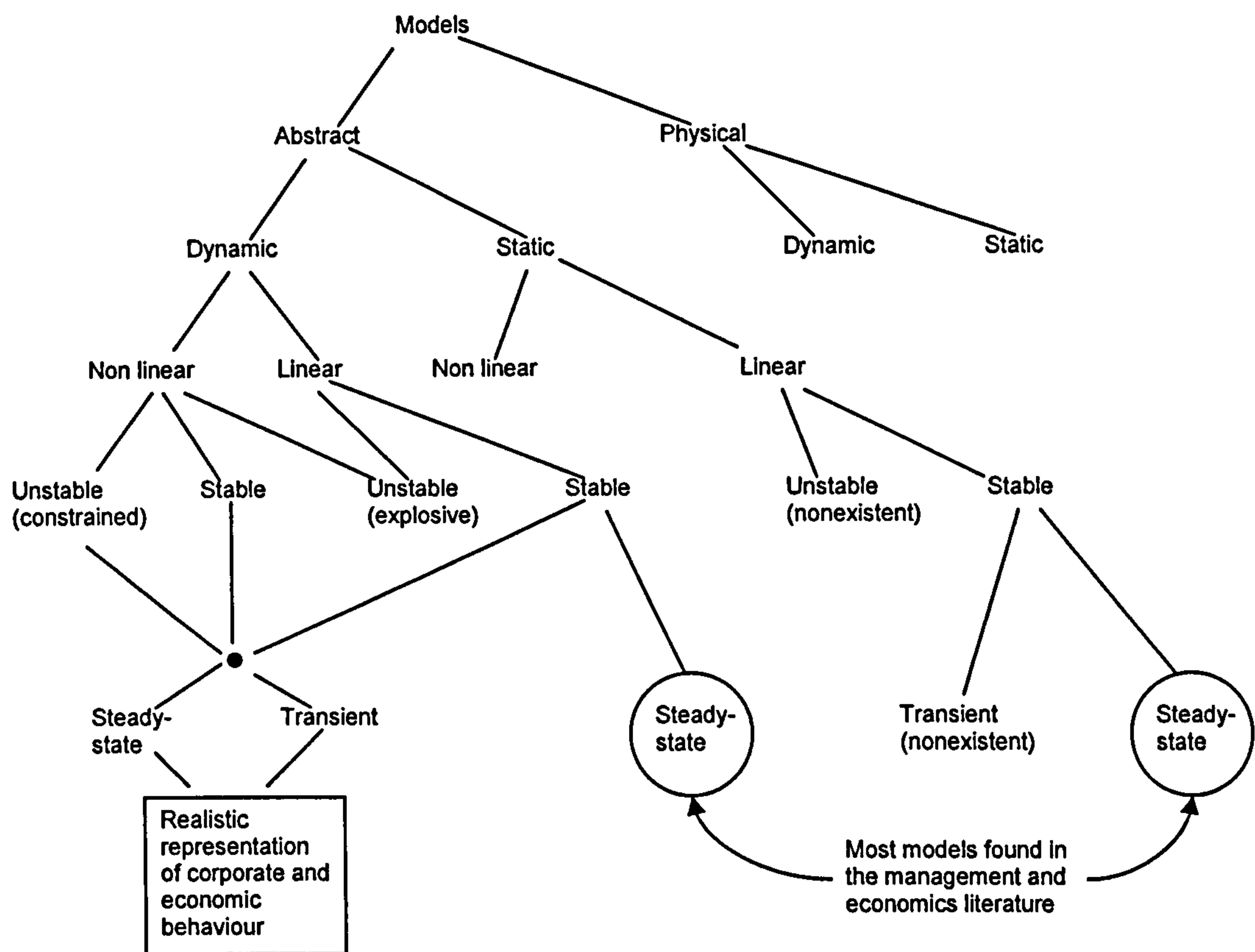


Figure 6.1 Classification of models (Forrester, 1961)

As can be seen from the above classification (fig.6.1), management models are abstract models. They tend to be stable, steady-state representations. A stable system model is one that *“tends to return to its initial condition after being disturbed”*, whilst a steady-state is *“one that is repetitive with time”*, and *“the behaviour in time period is of the same nature as any other period”* (Forrester, 1961).

All three models under investigation in this study are management models. As such they would be categorised as stable, steady-state models.

6.2 Integrate to Innovate (i2i) Model

The Integrate to Innovate (i2i) model was developed at the University of Salford by Barrett and Sexton (1998) as part of a Construction Industry Council / Department of Environment, Transport and Regions funded project. The project's objectives (Barrett and Sexton, 1998) were to:

- Clarify between innovation seen as desirable in industry from a company point of view, and that which is seen as unhelpful, and to relate this to general activities in those companies;
- Reveal processes of innovation in companies;
- Identify the orientation and linkages between different construction participants, including manufacturers and suppliers, and their effect on the scope of innovative activities;
- Generate proposals of ways in which integrating to innovate can produce the conditions that will lead to industry motivation and pull for change.

The i2i model (fig. 6.2) proposed five levels of relationships that could exist within and between construction supply chains (fig. 5.2), ranging from the lowest level (1) representing a one-way flow of information, to the highest level (5) representing an innovation network at organisational level. Level 2 represents a two-way flow of information with no collaboration or problem solving. Level 3 involves collaboration and problem-solving on a firm-by-firm and contract-by-contract basis, whilst level 4 represents a longer term relationship arrangement such as partnering.

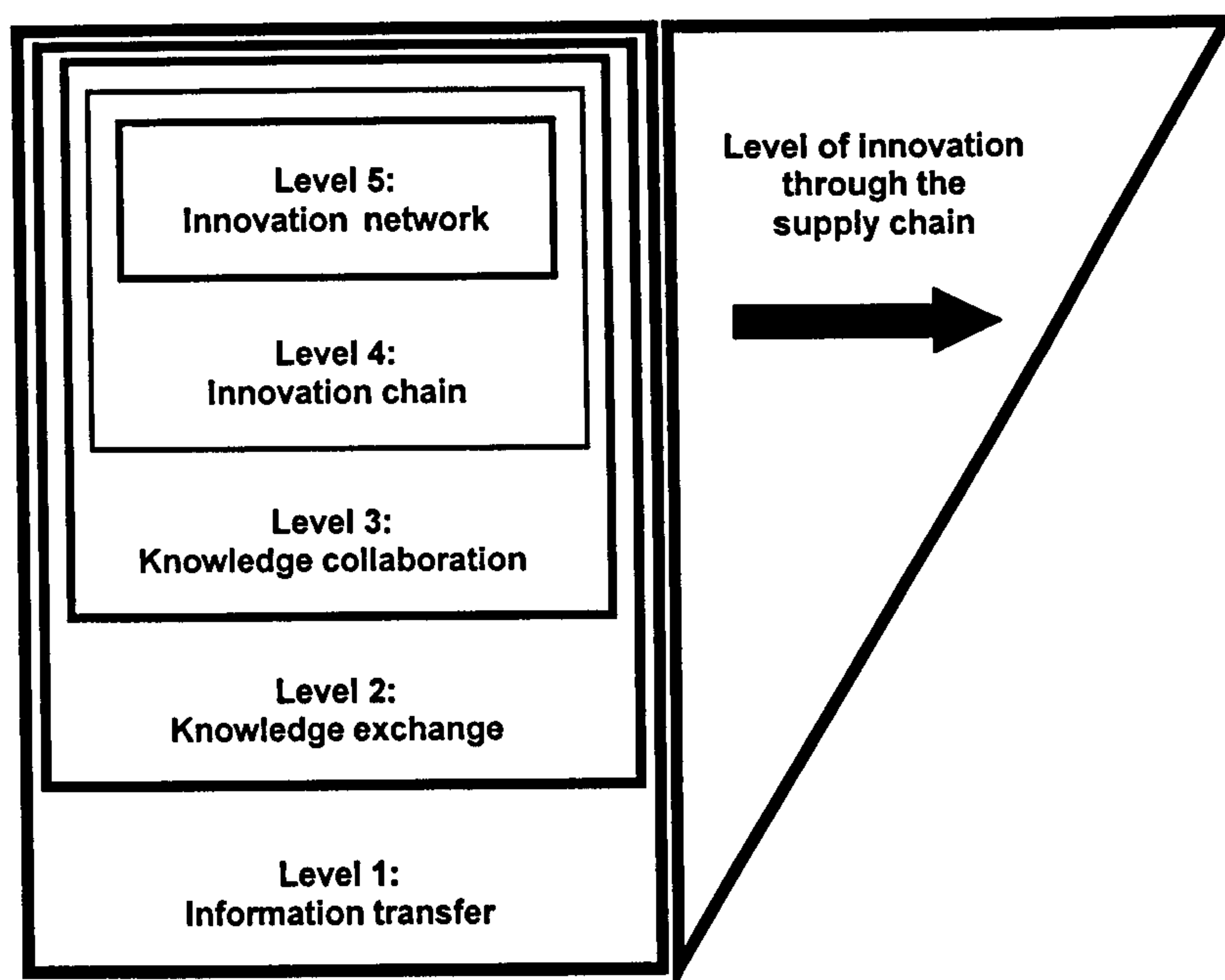


Figure 6.2 – i2i model (Barrett and Sexton, 1998)

These five levels referred to as the knowledge continuum are cumulative, i.e. one level has to be attained before you can achieve the next level. However a balanced portfolio of the relationships may be held with suppliers. The model also reinforces the notion, that the higher up the scale you are positioned (more strategic), the greater the opportunity to innovate.

The model is based on the need to integrate and innovate (hence the name), with integration achieved *“through aligning strategies, structures and processes”*, without which innovation is *“severely limited”* (Barrett and Sexton, 1998). The ‘portfolio’ approach it has adopted stipulates that innovation can be located at different levels depending on the nature of the relationship, with the key objective in achieving the right balance, rather than developing all supply chain relationships to the highest level.

i2i focuses on the creation of new knowledge through the management of both the tacit and explicit knowledge within and across supply chain(s). The innovation chain (network) created is therefore a knowledge chain as well. The aim is for the organisation to become a knowledge creating one (Nonaka, 1991).

The model views integration as an enabler for innovation, and a way of sharing knowledge across the supply chain. It also requires that partners should be 'strategically and culturally' matched, and that their process capability must be complimentary to the level of relationship involved. There is a high level of trust and commitment, transparency and knowledge-sharing across the supply chain.

The i2i model is based around a 3-part framework (fig. 6.3) for evaluating supply chain partners. This focuses around the following issues:

- Could we work together?
- Should we work together?
- How do we work together?

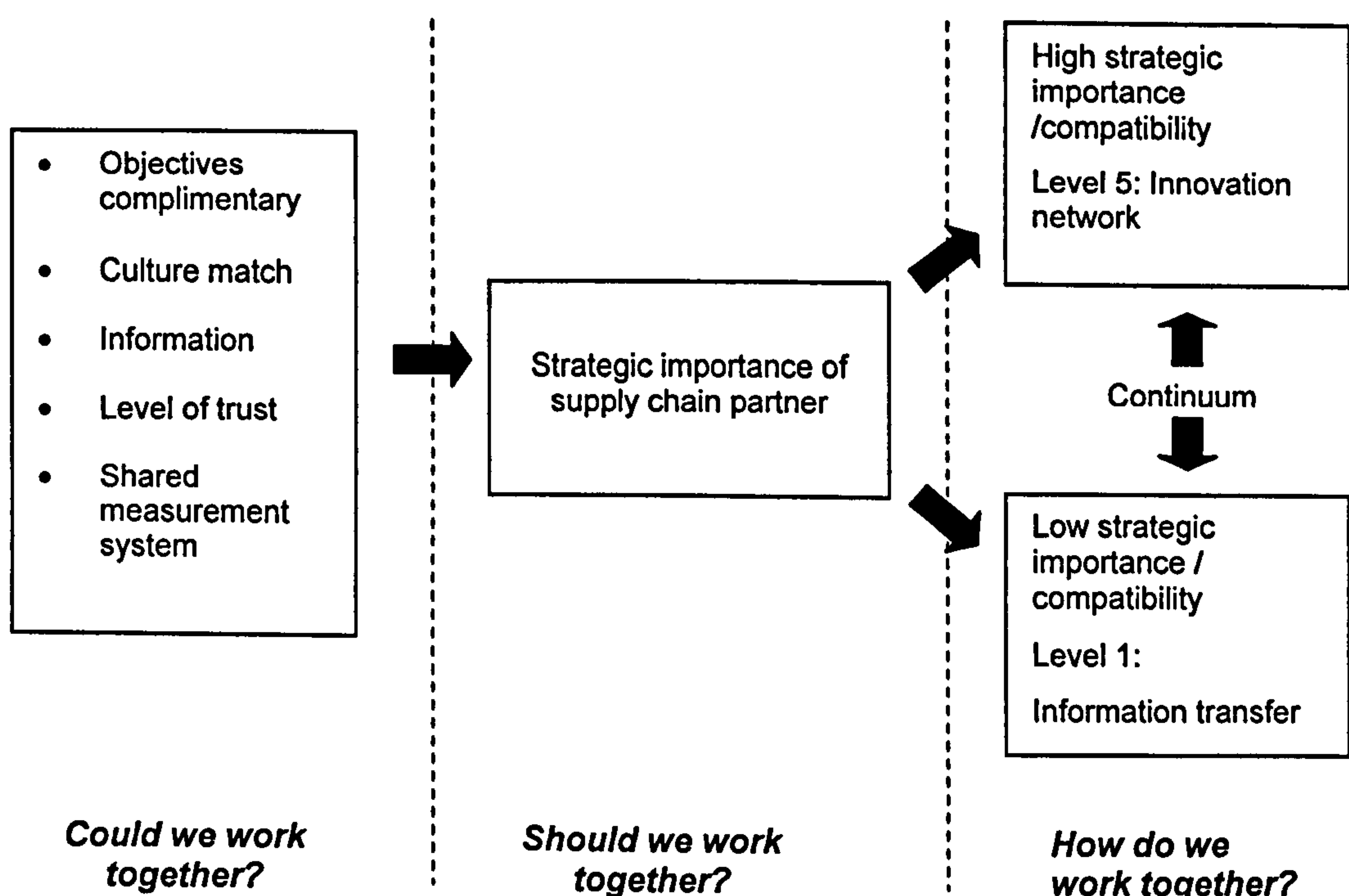


Fig 6.3 Framework for evaluating supply chain partners (Barrett and Sexton, 1998)

The i2i model was developed to generate discussion relating to supply chain management. Unlike the other two models the researcher will be examining, this was based on a series of case studies and not implemented in practice. However similar to the other two models, it was developed through a series of workshops.

6.3 Supply Chain Operations Reference Model (SCOR)

The Supply Chain Operations Reference model (SCOR) was designed to give manufacturers, suppliers, and retailers a framework for evaluating their supply chain effectiveness (Reed Elsevier Inc., 1997). It was internationally adopted and quickly became the *“standard approach to establishing strategic-level objectives for the product line, analysing the pertinent supply-chain, identifying and measuring performance metrics, establishing improvement targets based on best practice, and identifying technology tools that assist in achieving best practice”* (Supply Chain Council, 2000).

The SCOR model is a process reference model (fig. 6.4), and integrates three concepts namely: business process reengineering, benchmarking and process measurement, into a cross-functional framework (Stephens, 1998). It links performance measures, best practice and software requirements to a detailed business process model (Logistics Management Institute, 1999).

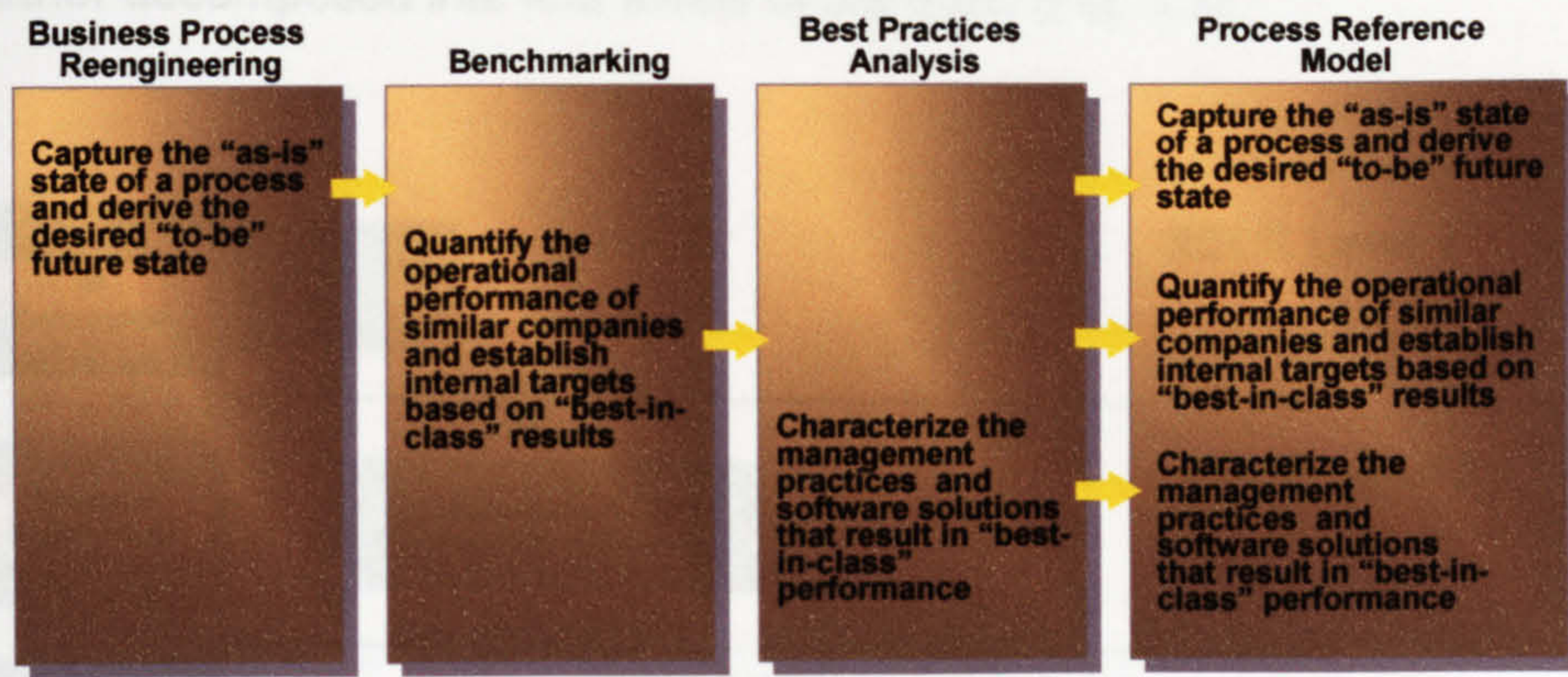


Figure 6.4 Process Reference Model (Stephens, 1998)

The model has evolved over the period of this study and is currently in its sixth version, with work being undertaken on version seven. For the purpose of this study, the fifth version of the model will be examined, which was the most current model at the start of this study. This is in part due to the limitations imposed by the Supply Chain Council over accessibility to the model.

The SCOR model (version 5) was composed of four core management processes (figure 6.5): Plan, Source, Make, and Deliver (Stephens, 1998).

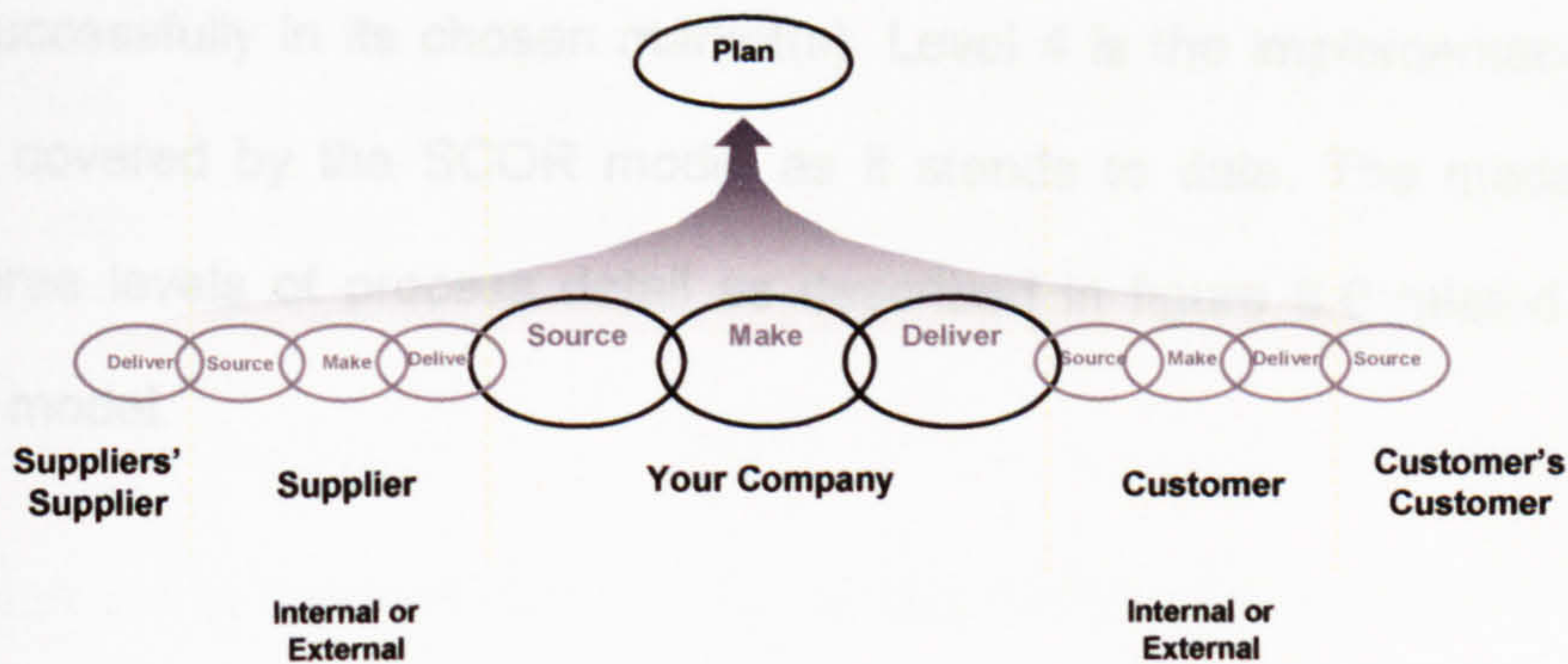


Figure 6.5 SCOR's Management Processes (Stephens, 1998)

This was further decomposed into four levels of activities (Fig. 6.6).

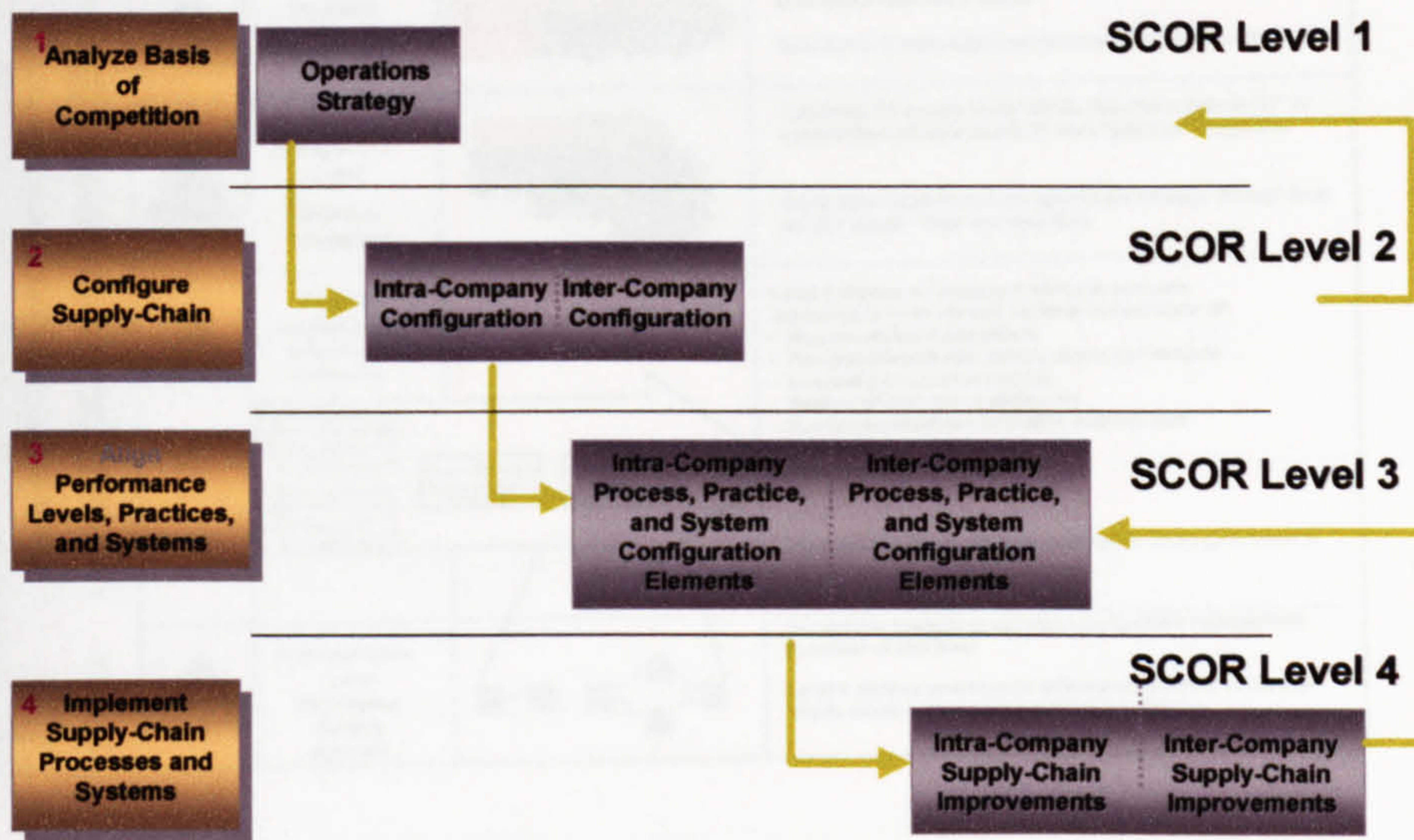


Figure 6.6 SCOR Methodology (Stephens, 1998)

The bases of competition performance targets are set at level 1. Muroff (1997) explains that at this level, the organisation establishes its supply chain competitive objectives. At level 2, organisations implement their operations strategy through supply chain configuration, whilst at level 3 the organisation defines its ability to compete successfully in its chosen market(s). Level 4 is the implementation stage and is not covered by the SCOR model as it stands to date. The model further contains three levels of process detail as described in figure 6.6 related to each level of the model.

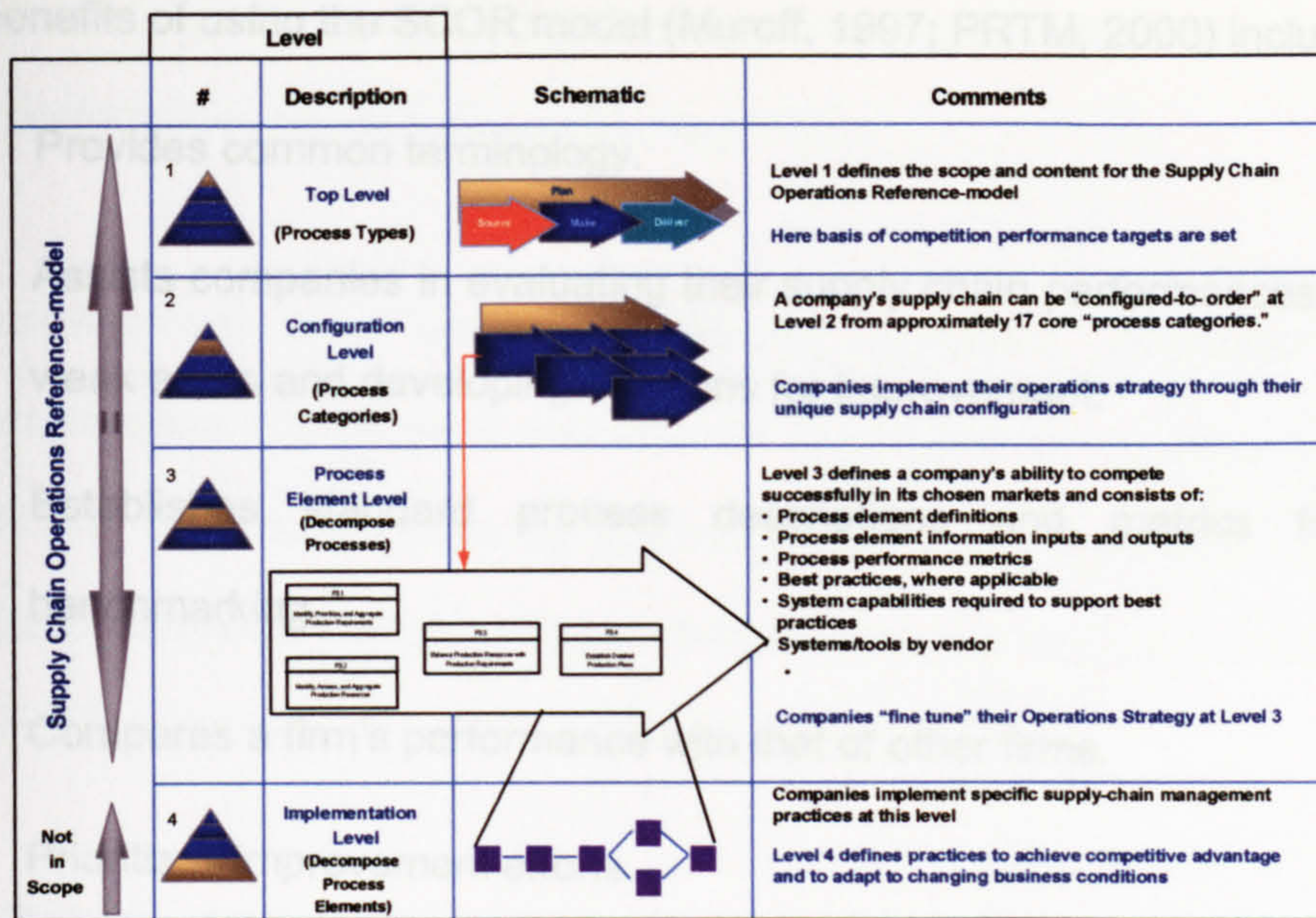


Figure 6.7 SCOR Model – Level Details (Stephens, 1998)

The SCOR model is based on the use of metrics. The premise is that in order to control the contribution of the supply chain to the business success, organisations must be able to measure the right matrices. However, previous research revealed that over 25% of businesses did not understand the critical matrices that describe supply chain performance (PRTM, 1999). To address this issue, the SCOR model employs the use of a 'balanced scorecard' (Kaplan and Norton, 1992, 1993 and 1996) at level 1, to measure overall supply chain performance in five areas – reliability, responsiveness, flexibility, (customer-facing) costs and assets (internal-facing).

The Department of Defence (DoD) in the United States of America describe these matrices as "a set of balanced measures that senior decision-makers can use to monitor supply chain effectiveness" (Logistics Management Institute, 1999).

The benefits of using the SCOR model (Muroff, 1997; PRTM, 2000) include:

- Provides common terminology.
- Assists companies in evaluating their supply chain performances, identifying weak areas and developing solutions for improvement.
- Establishes standard process descriptions and metrics for use in benchmarking.
- Compares a firm's performance with that of other firms.
- Prioritizes improvement efforts.
- Quantifies the anticipated benefits of specific improvements.
- Maps available software products to processes to objectively weigh product fit against needs.

6.4 Customer Supplier Co-Development Relationships (COGENT) Initiative

The Customer Supplier Co-Development Relationships (COGENT) initiative (Wyatt *et al*, 1998) was developed as a joint applied research project by Nissan European Technology Centre (NETC) and Cranfield University. It aimed to make a step-change in both Nissan's co-development performance and those of its suppliers, and ensure continuous improvement (Evans and Foxley, 1999). COGENT facilitated the closer integration of suppliers into the Vehicle Manufacturers (VM) development process under a mechanism termed co-development. The project focused on the

design and development stage of vehicle manufacturing, where 80% of cost, quality and performance are determined (Foxley, 1999).

Co-development is a system of process alignment; 'alignment' being "*the synchronization of processes and attitudes in joint product development*" (Wyatt *et al*, 1997). Two mechanisms for communication were developed as part of the COGENT initiative namely: Product Based Business Strategy (PBBS), and the COGENT workshops (Wyatt *et al*, 1997).

The PBBS process:

- Is a formalized structure for capturing interactions that already occur between customers and suppliers;
- Focuses on the pre-applications phase of product development;
- Enables parties to share key market and technological information through structured discussions in an official forum;
- Will form the basis for the alignment of the product planning processes of the supplier and customer.

The COGENT workshop (fig. 6.8) comprised a series of events and interactive sessions, with clearly defined aims and objectives, focusing on various aspects of co-development implementation.

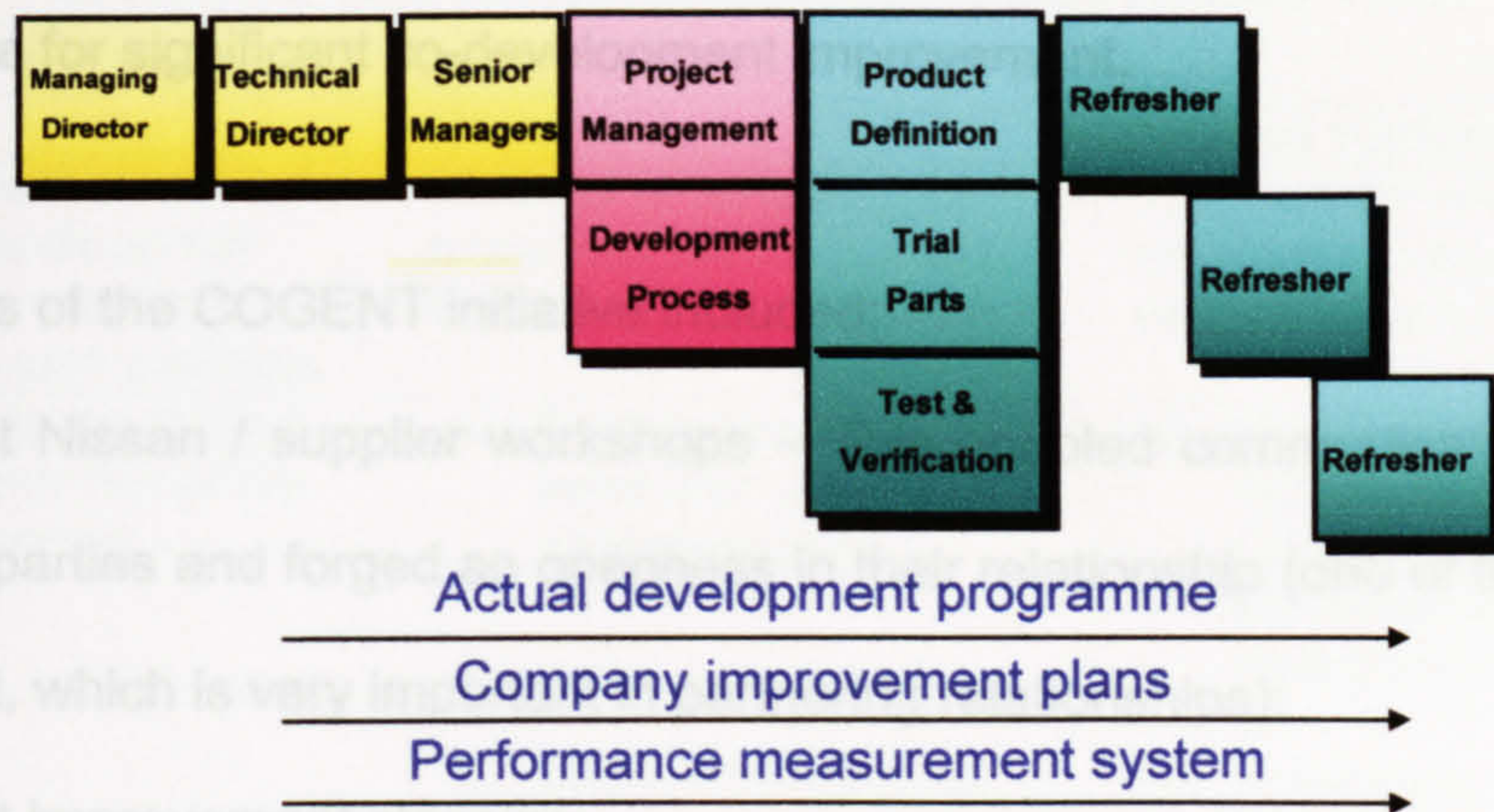


Figure 6.8 COGENT Workshop Process (Foxley, 1999)

The key drivers were:

- Aligning perceptions of competitive pressures and understanding how co-development can help meet these challenges;
- Communicating ideas on what co-development is and agreeing a common focus / vision for the joint change process;
- Aligning perceptions of the current co-development relationship and the capabilities of the individual parties, and discuss possible routes forward.

The workshops were organised in various sessions which centred on specific themes such as how to manage inter-firm teams, commercial aspects of early supplier involvement, measuring supplier appraisal and improvement, and measuring development.

The results showed that there was a very low rate (0.6%) of supplier improvement in development. However, there was a mean improvement rate of 10.3% across the 103 companies that took part in the study. This contributed to a significant 80% reduction in design changes after production release (Foxley, 1999). The COGENT

results also highlighted internal consistency within the customer organisation as a pre-requisite for significant co-development improvement.

The benefits of the COGENT initiative included:

- Joint Nissan / supplier workshops – This enabled communication between the parties and forged an openness in their relationship (one of the basics of trust, which is very important in partnering relationships);
- Joint improvement planning;
- An objective performance measurement system – this was felt to be a prime steering mechanism;
- Focus on co-development – which is primarily concerned with alignment;
- Joint advanced technology planning;
- Third party facilitation – which accelerated openness.

The COGENT model was to have been translated to the construction industry through a research project that commenced in October 2000. The researcher was however unable to gain access to this phase of the project, and is further not aware of its completion or otherwise.

6.5 Evaluation of the Three Models

There are many methods employed for model evaluation, dependent on the type of evaluation to be conducted. Even then Olesen (2001) stated that model evaluation is difficult, and analysed the reasons why as follows in table 6.5.1.

Table 6.5.1 Why model evaluation is difficult (Olesen, 2001)

Difficulty	Reaction	Implied Problems
The appropriate evaluation method depends on the context of the application and the data sets available	An array of various evaluation methods must be developed	What weight should be ascribed to various performance measures?
Input data sets are limited – they reflect only few of the possible scenarios	a) Extrapolate model behaviour outside of validation domain.	a) Does the model give the right result for the right reason? We must understand model behaviour!
	b) Use many data sets	b) Hard work! Ambiguous results
Processing of input data for validation is far from trivial	Take care! Identify pitfalls. Use quality indicators	Numerous problems!
The luxury of independent data sets can rarely be afforded	Use many data sets	Hard work! Ambiguous results
There are inherent uncertainties	Use Venkatram's conceptual framework with emphasis on ensembles, not individual realisations	Ensembles are difficult to establish

Other methods include empirical testing, usability walkthroughs, heuristic evaluation and user modelling (Salvucci, 2004), and the functional assessment study (Strong *et al*, 2001). Most are statistical or mathematical, which are not appropriate for this study.

Of the non-mathematical methods identified, empirical evaluation of all the models could not be undertaken in this study as this would involve testing them within organisations. The researcher had neither the time nor resources to undertake this. The functional assessment study (Strong *et al*, 2001), was developed to evaluate the extent to which a particular participatory action research process stimulated research transfer and utilisation. This was however not the purpose of this evaluation exercise.

The purpose of this evaluation is not to judge which of the models is best for supply chain management, but to look at them more closely and determine commonalities and differences. A tabular approach has therefore been used (table 6.5.2).

This table (table 6.5.2) uses a list of criteria drawn up by the researcher, based on exploring the models, and how they relate to the identified processes, issues and drivers in supply chain management in the FM context.

The three models were developed in different ways for different markets and purposes. The i2i and SCOR models share a similarity in that they are both evaluative models. They however evaluate different aspects of supply chain management, namely relationships and effectiveness respectively. FM in the SCOR model is treated as part of the 'Make' process, and is seen as essentially providing the physical resources to support an organisation's activities.

COGENT is a development model aimed at implementing a stepped-change in the co-development performance of organisations and their suppliers, ensuring continuous improvement. It was the only one of the three models that focused entirely on the design and development stage of the supply chain.

In terms of methodology, the two evaluative models use different approaches. i2i uses both interviews, and in common with COGENT workshops; whilst SCOR uses a balanced scorecard approach. This, the researcher believes, is in relation to the purposes and drivers of the models. The Balanced Scorecard has already been applied in facilities management as a tool in undertaking process improvement (Amaratunga *et al*, 2000).

Table 6.5.2 Evaluation of Supply Chain Models

Criteria	I2i	SCOR	COGENT
Type of model	Evaluative	Evaluative	Developmental
Purpose	Evaluate supply chain relationships	Evaluate supply chain effectiveness	Facilitate continuous process improvement and co-development
Method	Interviews and Workshops	Scorecard	Workshops
Industry	Construction	Manufacturing	Automotive
Drivers	Innovation	Performance Measurement	Alignment
Business Level to be used	Strategic, Tactical and Operational	Strategic, Tactical and Operational	Strategic and Tactical
Supply Chain Stages	Evaluation and Diagnostic	Evaluation, Diagnostic and Development	Evaluation and Development
Support:			
Collective strategy development	Yes	Yes	Yes
Win-win thinking	Yes	Yes	Yes
Open communication	Yes	Yes	Yes
Process Integration	Yes	Yes	Yes
Development & management of right 'co-op' relationships	Yes	Yes	Yes
Working towards shared goals	Yes	Yes	Yes
Client Requirement Capture	Yes	Not Specific	Yes
Process Alignment	Yes	Yes	Yes
Structural Alignment	Yes	Yes	Not Specific
Use of technology	Not Specific	Yes	Not Specific
Organisational Process Capture	Yes	Yes	Not Specific
Consolidation and Rationalisation	Not Specific	Not Specific	Not Specific
Environmental Management	Not Specific	Not Specific	Not Specific

From literature available on all models, it was implied that whilst the i2i and SCOR models had a framework which made them applicable to be used at all the different levels of facilities functions (i.e. strategic, tactical and operational), the COGENT model only operated at the strategic and tactical levels.

In relation to the stages of supply chain management earlier identified (chapter 5), only the SCOR model was applicable in all three stages. At that stage of their development, the COGENT and i2i models were applicable for the evaluation and development, and the evaluation and diagnostic stages respectively. COGENT however paid more of an emphasis on its developmental qualities.

The rest of the criteria used in this analysis were derived from the list of essential characteristics of supply chain management identified from literature review, and the list of issues in supply chain management discussed in chapter 5. Each model had its strengths and weaknesses, these are not analysed in detail for the purpose of this thesis. However, a few of these will be discussed to justify the appropriateness of the i2i model.

The COGENT model has already demonstrated marked success in achieving marked reduction in design changes after production release (Foxley, 1999). This is important to FM, as it is still mainly only involved in the business or building process at the commissioning stages. All latent defects or changes to be undertaken after implementation fall within the FM remit. Capturing these at the conceptual or design stages to demonstrate similar gains in 'defect' reduction would raise FM's added value to the organisation. The drawback is that FM requires a model that looks beyond just the design stage, but to the whole life cycle of the business project. (For the purpose of this thesis, the building project is regarded as a part of the business project).

The SCOR and COGENT models have both been implemented in industry, whilst i2i still remains very much a theoretical model. The second phase of the i2i project focused on innovation in the small and medium sized enterprise (SME), moving away from the five-level model to a three-level model (Barrett *et al*, 2000). It however still remained a theoretical model developed from a series of case studies. SCOR is the most widely used of all three, and has been applied in different industries including manufacturing, retail, technology, and even by internet-based organisations (the dotcoms).

The SCOR model is particularly dependent on the use of metrics and performance measures. This is an area in which FM is still trying to get to grips with (CFM, 2003c and 2004b). Even more worrying is that in industries where the SCOR model has been successfully implemented, a quarter of organisations involved in a study did not understand the critical metrics that describe their supply chain performance (PRTM, 1999). This issue is important, as models that involve a lot of measurements and metrics would have failed in these organisations, as they would not have had the capability to implement them.

Although all three models take a process view of supply chain management, i2i takes a further look at the 'soft' issues related to supply chain management as it deals with relationships. It is however not merely a supplier relationship management tool.

This 'soft' aspect is very important in FM just as relationship management is as important as process management. It is getting even more prominence with the introduction of the PFI / PPP long-term relationships, and 'evergreen' contracts. As the trend towards outsourcing increases, more and more in-house FM functions are

being reduced to contract and relationship management, as in some cases, the intelligent client function is also outsourced.

6.6 i2i and Knowledge Management

As stated earlier, the i2i model was developed as a knowledge management model for supply chain management in the construction industry. The historical background lies in Industrial Dynamics (Barrett, 2003). Industrial dynamics is *“the study of the information-feedback characteristics of industrial activity to show how organisational structure, amplification (in policies), and time-delays (in decisions and actions) interact to influence the success of the enterprise”* (Forrester, 1961).

It also relates to the systems level concept of supply chains (Halland, 1997), and the mismatch model (fig. 6.9) that assesses *“gaps between the customers’ and suppliers’ perceptions of what was required and what was performed in the relationship”* (Halland, 1996).

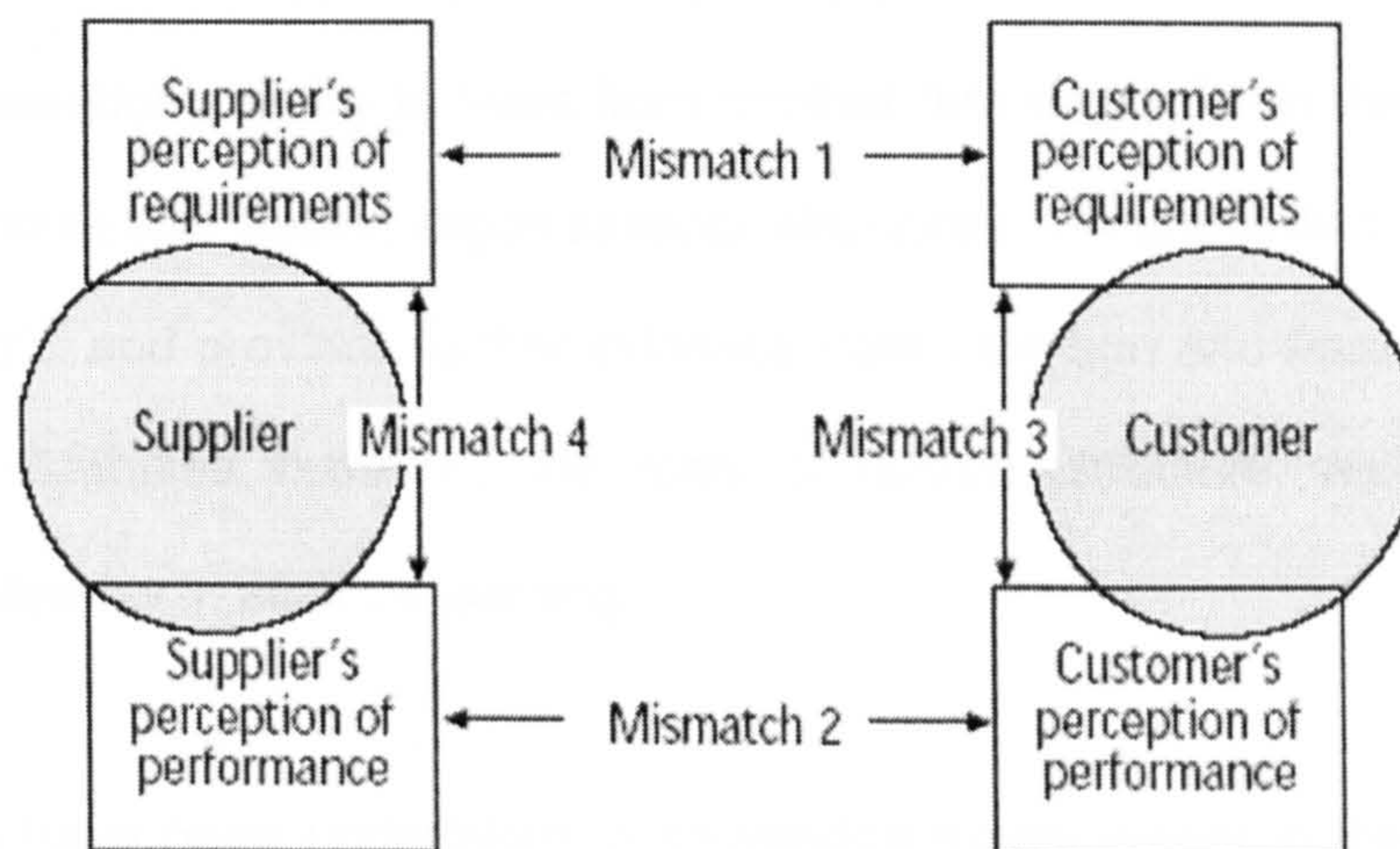


Figure 6.9 Mismatch model (Halland, 1996)

The i2i model was developed to help construction organisations capture and disseminate knowledge across their supply chains in order to innovate. Liebowitz and Wilcox (1997) describe knowledge management as the capability to manage, store, value and distribute knowledge. New thinking in knowledge management is that the knowledge creating organisation of today is a 'learning organisation' (Von Krogh *et al*, 2000). As such, people and learning are central to knowledge management (McAdam and McCreedy, 1999). Puddy *et al* (2001) suggest that knowledge management has displaced the learning organisation as a 'fashionable' managerial term.

Organisations, like individuals learn through experience. Tacit knowledge gained from experience resides within individuals and organisations alike. The challenge is to capture this tacit knowledge and make them explicit to be shared by all. This challenge is tough enough, but the i2i project sought not only how to make the tacit explicit, but to use such knowledge to innovate across the supply chain. This is a cyclical process that involves long-term planning and relationships.

Many studies have been undertaken in the field of knowledge management (McAdam and McCreedy, 1999). Kerrin (2001) quotes Lane and Lubatkin (1998) that an organisation's ability to learn from another firm depends on the similarity of the firms' knowledge bases, organisational structures, compensation policies and dominant logic; and provides further evidence from Levinson and Asahi (1995) that other case examples illustrated the roles of culture, structure, technology and absorptive capacity in alliance learning.

Few studies have been undertaken in knowledge management in the FM context (Puddy *et al*, 2001). Knowledge has however been recognised to have political and economic value in an organisation especially in time of uncertainty and change.

Innovation requires change to occur, and is defined by Barrett and Sexton (1998) as *“the effective generation and implementation of a new idea which enhances overall organisational performance.”* Integration is seen to facilitate innovation, and is a way of sharing knowledge across the supply chain. i2i suggests that integration and knowledge management across the whole spectrum of the supply chain is crucial to its effectiveness, and increases the capacity for innovation across the supply chain.

However, previous studies have shown that integration if not properly managed can inhibit the natural development of innovation. The Honda / Rover alliance pre-1994 highlighted the fact that reluctance and nervousness to pass on information from both sides, unless within the boundaries of the project, inhibited the natural development of informal communication networks and the discovery of unplanned for learning and knowledge acquisition (Perks, 2000). Empirical research in collaborative New Product Development (NPD) also point to the danger of managerial effort being focused on making the relationship work at the expense of market focus (Perks, 2000; Littler and Leverick, 1995; Piercy and Cravens, 1995).

6.7 Key i2i Findings

The key findings from the i2i project (Barrett and Sexton, 1998) on how integration and innovation across the supply chain was to be achieved were that:

- Motivation to innovate came from:
 - Introduction of new products and services;
 - New ways of capturing, sharing and using individual and organisational experience and expertise;
 - New approaches to people management;

- Novel approaches to integrating existing systems;
- New ways of transferring technologies;
- Strategies to encourage and manage partnering arrangements.
- Not all innovation is good or appropriate. Good innovation needs to support strategic corporate and supply chain objectives;
- Supply chain integration was paramount to success and should include:
 - Creation of synergies through strategic, structural and process alignment;
 - Knowledge creation and management;
 - Differing levels of innovation depending on the strategic importance of the relationship;
 - Prioritisation and adoption of the portfolio approach.
- Successful implementation of innovation requires:
 - The right climate / environment;
 - Strong vision and clear directions;
 - Management commitment; and
 - Knowledge management.

These findings formed the basis of the i2i model and framework. Operational issues were to be located at the lower levels of the model, whilst strategic issues were elevated to level 5. The interaction type diagnostic checklist (Appendix 2) was intended to explicitly raise issues that would determine how strategic or operational the supply chain partners and issues were. This was a means of prioritisation and allocation of resources to the right issues.

Also considered important was determining the suitability of the supply chain partner using the i2i framework (fig. 6.3). This framework was, similar to the model,

cumulative in that if the answer to the first question “Could we work together” is ‘No’, then there was very little point in continuing with the evaluation (Barrett and Sexton, 1998). This would have identified at this stage that the supplier in question was not the most suitable to develop a long-term relationship with.

6.8 i2i Methodology

The model and framework were developed from the findings of a series of case studies and three workshops undertaken with construction practitioners. The primary sources of data for the case studies were observation and interviews (Barrett and Sexton, 1998). The workshops were described as problem-solving which entailed working with a team of construction stakeholders (panel of experts) employing ‘flexible pan-disciplinary thinking’ to generate practical solutions.

The researcher had access to the interaction type diagnostic checklist, which had been used in the study for data collection. Although literature (Barrett and Sexton, 1998) suggests that the first draft of the model was ‘tested’ in practice during the second stage of the fieldwork, it does not state how or where it was tested. Neither does the report give details of the methods of data analysis employed. Informal discussions with Dr. Martin Sexton, one of the team who developed the model, revealed that the primary method of data analysis was cognitive mapping.

Cognitive mapping is an analysis tool most commonly used by psychologists and operational researchers. *“A cognitive map is an abstract representation of a system which identifies its component parts and the nature of their interrelations”* (Volterra, 2004). They are ‘mental models’ or ‘belief systems’ (Omni, date unknown) used with

both individuals and groups to provide *“help with structuring messy or complex data for problem solving, assisting the interview process by increasing understanding and generating agendas, and managing large amounts of qualitative data from documents”* (Ackermann *et al*, 2004).

The researcher identified some weaknesses in the model. Firstly, the link between procurement strategies and business objectives was obscure. Secondly, it did not state whether all or a number of criteria have to be met in the first part of the framework in order to move on to the next question.

The applicability of the i2i model in supply chain management in facilities management, the focus of this thesis, was undertaken through three case studies in three FM market sectors. The case studies are laid out in chronological order in the next three chapters. The first was undertaken in the public healthcare sector. The second was undertaken in the commercial FM market with a commercial airline, whilst the third was undertaken again in the public sector, with a central government agency. Two explanatory and one descriptive case study were undertaken with these organisations to ‘test’ its appropriateness in the FM sector.

In the course of this study several research tools were employed in the application of the model similar to / adapted from those used in the original study. These were questionnaires, interviews and workshop. Observations were not used in this study.

6.9 i2i and FM

A review of the i2i model revealed to the researcher that the levels of interaction (1-5) of the model can be related to the three levels of FM tasks (strategic, tactical and operational) earlier identified in chapter 3. Levels 1 to 2 of the model are operational levels of interaction. They involve the day-to-day processes of facilities management. Level 3 of the model operates at a tactical level. It is more related to project and contract management.

Levels 4 and 5 of the model operate at strategic level. This includes issues related to procurement, management of long-term relationships such as partnering and innovation networks. This relationship between the model and FM tasks will be important in the analysis of the findings from this study in later chapters.

6.10 Summary

Models are classified as either physical or abstract models depending on their characteristics. Management and economic models tend to be abstract models. They further have the characteristics of being stable and steady-state systems. Although many different model evaluation techniques exist, they are mainly quantitative. Qualitative techniques identified by the researcher were deemed inappropriate for this study, as the purpose of evaluation was different.

Three models were selected for evaluation at the start of the study with each having different purposes. Of the three, the SCOR model is the most widely used in various

industries including manufacturing, retail and technology. It is a framework for evaluating supply chain effectiveness, and views FM essentially as providing the physical resources to support the organisations' activities.

The COGENT model was developed to make a stepped-change in the co-development performance of organisations and their suppliers, and to ensure continuous improvement, hence its focus on design and development. This model demonstrated cost savings, lead-time reduction and overall performance improvements from the supply chain.

Integrate to Innovate (i2i) was developed as a model for evaluating the relationships between supply chain partners. Its basis lies in industrial dynamics and supply chain / network systems. It is essentially looking at the 'soft' issues involved in managing a supply chain including people and knowledge management. i2i views innovation in knowledge management terms across the supply chain(s), and uses a 'portfolio' approach, i.e. innovation can be located at different levels depending on the nature of the relationship. Achieving the right balance should be the key objective in supply chain relationships, rather than developing all supply chain links to the top level.

There were many issues that the models addressed from the given list of criteria. However none of the three models explicitly addressed issues relating to consolidation and rationalisation of the supply chain, nor environmental supply chain management. The i2i and COGENT models were also not specific, or dependent on the use of technology. This, in the researcher's opinion, was because these are specific strategies adopted by organisations which then require implementation.

The i2i model was deemed to be the most appropriate to be taken forward in FM, as it looked beyond the design stages, and was not dependent on the use of metrics. FM was identified as immature in performance measurement. As described earlier in chapter 3, although benchmarking is often undertaken in FM, there are no common protocols across the industry. Where the same protocols are in use, the definitions differ from organisation to organisation, depending on their accounting system.

There was also found to be a correlation between the different levels of the i2i model and FM tasks. In addition, the i2i model was the only one of the three which explicitly dealt with 'soft' issues (although the COGENT model did to a limited degree). Its main strength lay in the generation of discussions in supply chain management, whilst its main weakness was its lack of details.

Chapter 7 Case Study 1

The previous six chapters make up the planning and definition aspects of this action research thesis. They explain the background, knowledge and grounding which the researcher had to acquire in order to answer the research questions identified in the introductory chapter. This and the following two chapters represent the action and observe phases of this action research thesis (Zuber-Skerritt and Perry, 2002). Three case studies were undertaken to test the applicability of the i2i model in SCM in FM for this thesis.

The first case study, described in this chapter, was undertaken as a pilot study at a National Health Service (NHS) Hospital Trust in the North-West of England. Pilot studies refer to either a mini-version of a full-scale study, or a specific pre-testing of a research tool or method (van Teijlingen and Hundley, 2002). The advantages of undertaking a pilot study (van Teijlingen and Hundley, 2002; The Children's Mercy Hospital, 2003) include:

- Identifying where the main research project could fail;
- Identifying where research protocols may not be followed;
- Determining whether proposed methods or instruments are inappropriate or too complicated;
- Enables familiarity with the procedures in your research protocol;
- Assists in deciding between two competing research approaches.

This pilot study had two main objectives, namely to:

- Test the research method, and data collection and analysis tools to be used in the study; and

- Examine the applicability of the i2i model in the management of the FM supply chain in NHS Trusts;

The first part of the i2i framework, “Could we work together”, was not fully explored in this pilot study, due to resource and project limitations. The case study however examined the second and third questions of the i2i framework namely: “Should we work together”, and “How do we work together”?

7.1 Background to the Organisation

The NHS provides ‘free’ healthcare to UK citizens and residents, funded by the government through taxation in the form of National Insurance contributions. In addition, each trust is required to generate income from enterprising activities. It was set up in 1948 (NHS, 2004), after the second world war to provide healthcare based on needs and not the ability to pay by the then Labour government of Clement Attlee.

Since then it has gone through many reforms and structural changes. It is managed by the Department of Health (DoH), and currently responsible for healthcare policy formulation and implementation, target setting and performance monitoring (NHS, 2004) through the modernisation agency, strategic health authorities, special health authorities and primary and secondary care Trusts (figure 7.1). It must be noted that different variations in structure exists between England, Scotland, Wales and Northern Ireland.

The NHS in England has a current annual budget of £50 billion, set to rise to £69 billion by next year (NHS, 2004). Its performance is independently regulated by the Commission for Health Improvement (CHI) (NHS, 2004b).

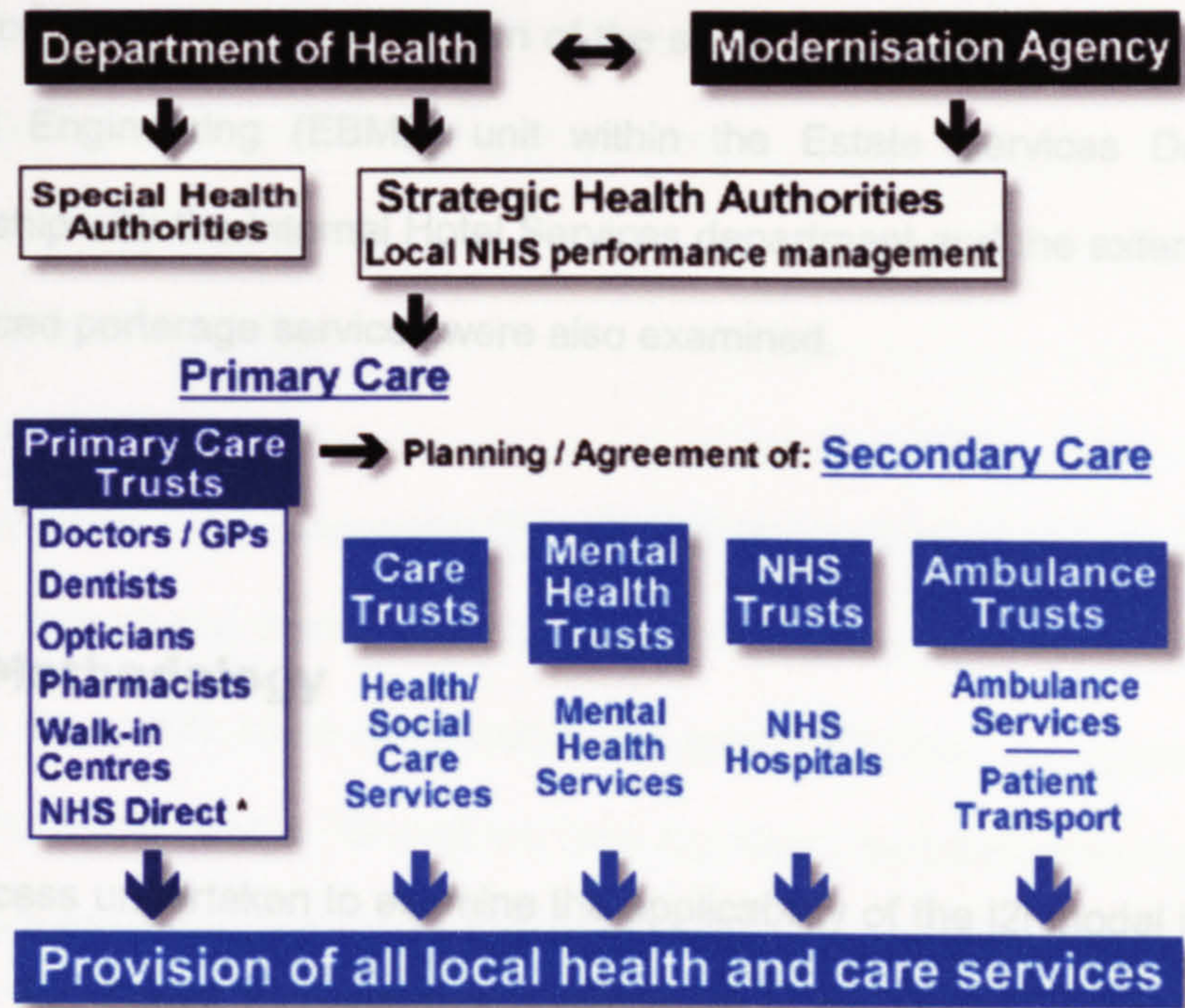


Figure 7.1 NHS Structure (Source: NHS, 2004a)

This trust was by NHS standards, a large acute trust (with 941 beds), which provided accident and emergency, medical, diagnostic and surgical services to a population of over 270,000 people. Support services were divided under the following directorates; Finance, Human Resources, Medical Support, Facilities, and Service Development (Nelson *et al*, 2000). The estate portfolio was made up of a number of old and new buildings, the newest building having being commissioned in 1996.

7.2.1 Literature Review

Although FM was 'integrated' under one director, the functions were split up under three departments, namely: Estates, Hotel Services and Capital Projects. The FM

model in use was the partial outsourcing model (chapter 3, figure 3.2), a mixture of in-house provision and outsourced services.

The pilot case study was undertaken with two in-house FM departments, and one outsourced supplier. The main part of the study focused on the Electronics and Bio Medical Engineering (EBME) unit within the Estate Services Department. Its relationship with the internal Hotel Services department and the external provider of outsourced portage services were also examined.

7.2 Methodology

The process undertaken to examine the applicability of the i2i model is represented in figure 7.2. Senior management commitment to the study was obtained from the heads of Estate and Hotel services. Resource limitations meant that only senior and middle management staff were involved in this pilot study, as it was believed that they could provide a view of strategic, tactical and operational issues within their departments or organisations. Three research tools were employed in this case study namely: literature (document) review, questionnaire and interviews. Although it was intended at the start of the study to include a workshop in the methodology, early conclusions from the study, which are explained later in this chapter, prevented this.

7.2.1 Literature Review

As the pilot case study in the research, current literature on the i2i model had to be reviewed to understand how it could be applied. Knowledge on the i2i model was

limited to the publicly available information to which the researcher had access. This information described to some extent the data collection methods, but not the data analysis methods employed in the original study.

In addition, a document review of the Trust was conducted to identify the structure, functions, as well as current policy and strategy.

7.2.2 Questionnaire

The Interaction Type Diagnostic Checklist (ITDC) had been used in the original i2i study by Barrett and Sexton (1998). The ITDC (Appendix 2) set out to identify how strategic the supply chain relationship with each party was, addressing the second part of the i2i framework “Should we work together”, by measuring the frequency of interaction and the impact of the failure of service delivery on the organisation. From initial discussions with the Head of Estates, problems were identified with the terminology and rating scale employed in the ITDC. The researcher in conjunction with the Head of Estates and Dr. Sexton, one of the original team of researchers who developed the i2i model, adapted the questionnaire to reflect terminology more easily understood by the FM staff (appendix 3).

The questions addressed issues relating to the following:

- Frequency of interactions between the parties;
- Radicalism of consequences – This measured how far the interaction was likely to create fundamental changes within the organisation;
- Seriousness of consequences – This measured the level of disruption that would be caused should problems arise with the relationship;

- Diffusion of consequences – This measured how widespread the impact of the interaction is likely to be;
- Endurance of consequences – This mentioned how long the effects of the interaction is likely to last;
- Percussiveness of consequences – This measured how far the solution of the interaction is likely to impact on future decisions; and
- Supply chain stakeholders involved in resolving problems – This identified named stakeholders who may be involved in resolving problems that may arise in the relationship. These stakeholders were identified by the Head of Estates.

The rating scale was also adapted into an itemized scale (University of Connecticut, Date Unknown) to reflect definite responses (appendix 3); in place of the semantic differential scale (University of Connecticut, Date Unknown) previously used in the original version (appendix 2), which left the respondent guessing at what was in between the two ends of the scale. The range for the amended ITDC varied between three and five depending on the question and the type of responses. This was in a bid to make the responses more reliable, by tailoring the options to meet the requirements. The measurement of the responses was that the rarer the frequency of interactions and the higher the impact of consequence of an interaction, then the more strategic the supply chain partner is to the Trust.

The ITDC questionnaire also enabled the participants to add their own comments in addition to the fixed responses given. Copies of this amended checklist were completed by the Head of Estates and EBME manager for each of the identified supply chain parties, and the responses plotted in a matrix (Appendix 4).

7.2.3 Interviews

Semi-structured interviews were employed at various stages of the case study. It was used to identify the supply chain parties in the first instance. Using the model as a guide, the interviews were also used to capture the current structure and level of interaction of the EBME supply chain, and identify the desired level of interaction. This was intended not only to identify the gaps in the levels of interaction, but also in each party's perception of their level of interaction. Similar to the original research, each interview lasted approximately 1 hour. The results were plotted out in a matrix (appendix 5), and the priority areas were highlighted as those having the highest differential between current levels of interaction and desired levels of interaction.

7.2.4 The Process

There were six steps involved in this pilot study. The first step in the process was to gain the commitment of senior management, and identify the functions of the Estates Services department. The former was achieved through the Director of Operations. The latter was done through both literature review of Trust documents and interviews with the Head of Estates.

The Electronics and Bio Medical Equipment (EBME) unit was nominated by the Head of Estates for the i2i pilot case study, because of other research studies that were being undertaken with this department.

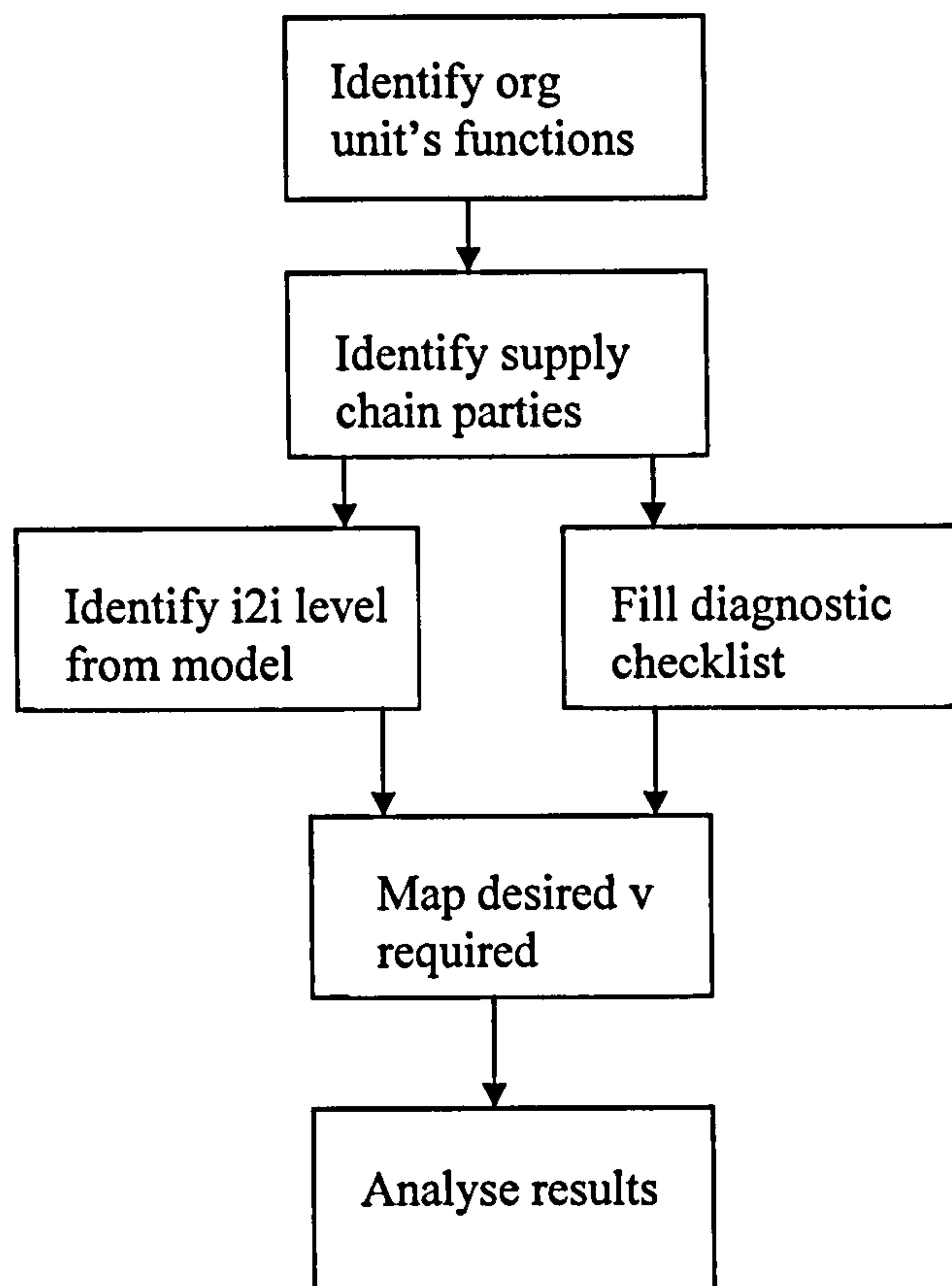


Figure 7.2 i2i Methodology

The second step was the identification of the EBME supply chain. At this stage, the Head of Estate Services and EBME manager were introduced to the i2i model. Supply chain partners for this unit were then identified through an interview with the Head of Estates as follows:

- Customers
 - Theatres / Intensive Care Unit (ICU)
 - Wards
 - Other departments
 - Other trusts
- Collaboration for Service Provision
 - Estate Services
 - Hotel Services

- A separate category was identified under hotel services where staff needed to work gases. This was because of the health and safety implications and regulations governing the use of gases.
- Suppliers
 - Supplier A
 - NHS Supplies
- Manufacturers
 - Manufacturer A
 - Manufacturer B
 - Manufacturer C

It must be noted that since this case study was undertaken, NHS Supplies has ceased to exist, and has been replaced by two organisations – NHS Logistics Authority and NHS Purchasing and Supply Agency. The identities of all other service providers, suppliers and manufacturers are protected in this study.

The third stage of the process involved completing the ITDC, and undertaking the rest of the interviews. As mentioned earlier, the ITDC was completed by the Head of Estates and the EBME manager to identify how strategic their suppliers were, under the second part of the i2i framework, “Could we work together”?

The interviews focused on the third part of the framework “How do we work together”, and involved four senior members of staff (three in-house and one outsourced supplier). The first two interviewees were the Head of Estates and the EBME manager. Based on an analysis of their responses, two other managers were identified for further interviews namely the Head of Hotel Services and the Operations Manager for the company that provided portering services.

The interviews involved the use of the model itself as a tool in the assessment of the current level of interaction. They were conducted using the five-stage i2i model as a reference point. The interviewees were shown a copy of the model with the different levels defined. They were then asked to pick which level they currently operated at and which they believed they should be operating at, with each previously identified supply chain partner, and why. The responses to the former were plotted in a matrix (Appendix 5), and prioritised on the differential between actual and desired levels of interaction in the supply chain relationships. The 'why' question sought to gain a deeper understanding of each party's perceptions of their levels of interaction.

The two relevant managers for the priority area, identified from the analysis, were then interviewed using the model to capture their perception of their current and desired levels of interaction with the EBME department.

The earlier stages represented the planning and action stages of the action research case study. The next stage of the process (observe) involved the analysis of the results from the study. In terms of the ITDC, the analysis involved plotting the responses on a matrix with S representing a strategic relationship and O representing an operational relationship. The frequency of S's and O's were then calculated to determine which supply chain parties had the most strategic relationships with the department.

To analyse the results of the interviews, the structured responses of the interviewees were plotted in a matrix, and compared to 1) identify the frequency of similar responses, and 2) identify the gaps where perceptions on levels of interaction differed.

This study was stopped at this stage with the Trust, as some constraints had already been identified which meant that if the study was followed through to its final conclusion, the recommendations would not have been implemented. These will be discussed in the next two sections. For the purpose of this thesis however, the researcher was able to use the data already gathered to reflect on the applicability or otherwise of the i2i model.

7.3 Findings

The findings of this study have been presented in three sections. The first presents the results of the literature review, the second the interviews, whilst the third presents the results of the ITDC questionnaire. These are then followed by an analysis and review of the case study in section 7.4.

7.3.1 Findings from the Literature Review

Findings from the literature review on the i2i model have already been discussed in the previous chapter. A review of the trust documents was undertaken to gain an understanding of SCM in FM in the Trust. These documents included the organisational structure, business plan and FM process and performance management documents and revealed that:

- Although FM was said to be 'integrated' in the trust, this was only in as far as the three senior managers (capital projects, estates and hotel services) reported to the same director of operations. Each department within the directorate worked independently of each other.

- There was very little correlation between the trust's business plan and supply chain strategies. Although another study went further and developed a balanced scorecard to link the trust strategy with FM strategy (Amaratunga *et al*, 2002), this was not focused on the SCM aspects.
- Supply chain strategies were partly determined and imposed by central government and central government agencies including the Department of Health (DoH), NHS Estates, and NHS Supplies.
- Likewise supply chain performance measurement was mostly governed and driven by the need to respond to government regulations such as controls assurance, and initiatives such as the PEAT assessment.

7.3.2 Findings from the Interviews

The interviews aimed to identify the gaps in the levels of interaction and perceptions of interaction in the EBME supply chain. An analysis of the results (appendix 5) revealed that only three supply chain relationships were operating at the desired level. These were the interactions with the rest of the estates department, theatres and the intensive care unit (ICU), and other trusts.

The EBME department provided outsourced services to other trusts, and so played a dual role of in-house service provider and an income generating unit for the Trust. It was however highlighted that although in most respects, the department was operating at the desired level of interaction with these trusts, some areas were identified as requiring a higher level of interaction to deliver a more effective and efficient level of service.

Two areas were identified as having the highest gaps between current and desired levels of interaction. These were the wards and hotel services (the latter only in relation to the transportation of gases). These were found to be interacting through a one-way information transfer (level 1), whereas the desire was that they should be more integrated and working jointly at problem solving (level 3). Although the relationship with wards sometimes involved a two-way flow of information (level 2) there was still no problem solving involved.

Six other relationships had differentials of one between the current and desired levels of interaction. Out of these one was operational (Hotel Services), another was tactical (other departments), and four were at strategic level. The strategic relationships were with equipment and parts suppliers and manufacturers.

Feedback and discussions with the Head of Estates and EBME manager identified that the relationship with hotel services in relation to working with gases was of high priority as determined by the exercise, as it involved Health and Safety issues. Further discussions revealed that although the Pharmacy department was responsible for the procurement, risk assessment and risk ownership of medical gases, it was not responsible where FM worked with gases. It was unclear where risk ownership lay within the supply chain, as neither Estates nor Hotel Services had overall responsibility for the use or transportation of gases by FM staff.

Subsequent interviews with the Head of Hotel Services and the representative of the outsourced service provider responsible for moving the gas cylinders (appendices 7 and 8) were then compared with responses from EBME to identify the gaps in perceptions in the relationships. This revealed that perceptions varied between the departments regarding the level of interaction required.

Whereas EBME perceived the level of interaction in relation to working with gases on level 1, i.e. one-way flow of information, where porters were simply asked to move gases from one place to the other without any feedback, hotel services perceived that there was a two-way flow of information involved with feedback. However, the service provider shared the same perception of the relationship with EBME in terms of their current level of interaction.

In terms of desired levels of interaction, EBME required a level 3 relationship because of the risk issues related to working with gases. Hotel Services and the service provider did not share this view. Both parties believed that they were currently working at the right level of interaction, which involve information flows only. The service provider did concede though that working with gases was an important risk issue for their operatives.

In relation to the levels of interaction with suppliers and manufacturers, EBME were interested in deepening this relationship and interacting at a more strategic level with these organisations. The suppliers' views were not sought due to time and resource implications.

7.3.3 The ITDC Findings

The relationships were analysed using 'S' to represent a strategic relationship, and 'O' to represent an operational relationship. This was judged on the basis that operational relationships had high frequency of interaction and less impact of failure. Strategic relationships however had a lower frequency of interaction and higher impact of failure.

The matrix (appendix 4) showed that all the customer relationships, with the exception of other departments, were strategic. The relationship with Hotel Services in the transportation of gases was not assessed separately in this part of the study. Manufacturer B was shown to have the most strategic relationship with the department overall. Theatres/ICU and other trusts were the most strategic customers to the EBME department, whilst NHS Supplies was the most strategic of its suppliers.

Results from the various methods of data collection were not easily comparable. However the intention in this study was not to compare like-for-like, but to identify any correlations between them. This will now be analysed in the case study review.

7.4 Case Study 1 Review

This section reviews the results of the study, as well as reflecting on lessons learnt from this phase of the study. This represents the last stage of this action research case study, and is an important aspect of action learning and the practice of reflective research. In the first instance, the correlations between the findings are analysed. Secondly, the strengths and weaknesses of the model are examined, and lastly the case study itself is reflected on.

7.4.1 Analysis of Findings

The i2i framework could not be fully tested as there was neither available data nor time to evaluate the first part in this pilot study. Likewise, the study could not be taken on to the next level with a workshop, as constraints had been identified which

prevented further exploration of this study. This also limited the evaluation of the model in this sector.

The main constraint identified was the in-built government regulations and directives, which were a barrier to change. This included regulations governing procurement. Secondly, the organisational structure of the trust meant that before any major SCM improvements could be undertaken, some reengineering of the structure of the organisation and its business processes was required. Not only was this outside the remit of this study, but the trust did not have the resource or management commitment to undertake this exercise.

Thirdly, the very nature of the market for medical equipment and devices meant that there was very limited choice in suppliers and manufacturers for this department. In some cases there were as few as one or two manufacturers or suppliers in the UK for a particular piece of equipment, for example incubators. This constraint however highlighted the strategic positions of these organisations to the Trust, because of the impact of failure. It also highlighted the necessity for the development of a more strategic relationship with these organisations.

In terms of prioritisation, although comparisons could be undertaken between similar supply chain partners, it was not possible to determine which relationships were more strategic in order to prioritise efficiently. For example, although the interview results highlighted working with wards (customer relationship management) and working with Hotel Services (supplier relationship management) as priorities, the results of the ITDC contradicted this prioritisation as it highlighted the relationship with Manufacturer B as being the most strategic. This would imply that the gap highlighted in the relationship with Manufacturer B should be given the most priority, as its impact would be more severe. This study however did not

measure the severity of impact to make this judgement. This has been identified as an area for future research (chapter 11).

7.4.2 Strengths of the Research Study

The strengths of the research tools employed in this case study are now reviewed. The literature review provided valuable background information on the Trust and the department. It also gave an insight into the current processes, which would have enabled a gap analysis between actual and desired levels of interaction.

The strengths of the use of the interview and the identification of current and desired levels of interaction were found to be:

- Highlighted the areas where there was disparity between the current and desired levels of interaction. This showed at a glance, areas where a gap analysis was required and identified areas for further improvements.
- Generated discussion on SCM issues. It raised a lot of issues, some of which, although previously known, were not highlighted. It particularly generated discussion on what the organisation was doing right and areas that required change or improvements.
- Highlighted the differences in service delivery objectives between supply chain partners, and showed a clear picture of each partners' perception of their relationship. Where there was disparity in views, this implied that there were no clear standards or specifications in place for what needed to be done, nor in some cases, explicitly defined roles and responsibilities to get the work done right.
- Prioritised areas for improvement by highlighting those areas where there was the most disparity. However this had a weakness in that it did not

prioritise according to its importance to the organisation. Further discussions were necessary to identify their levels of importance.

The main strengths of the ITDC were found to be:

- The identification and prioritisation of the strategic importance of supply chain partners; and
- The awareness of the impact and risks associated with failure of strategic supply chain partners.

7.4.3 Weaknesses of the Research Study

The main weakness of the interviews using the i2i model was that it was highly subjective. Although the levels of interaction at each level were defined, there were no common criteria defined on which judgements could be based. This may have been validated by a review of relevant literature; however there was neither the time nor resource available for this level of verification.

Although the checklist prioritised suppliers by ranking them in order of strategic importance to the organisation, it had a number of weaknesses highlighted by the study:

- Terminology was difficult to understand. On initially going through the interaction type diagnostic checklist, it was felt that some questions were rather abstract and similar. The major problem however was in the way the answers were rated. Despite the fact that this was changed from the abstract to specific terms in the boxes, feedback was that the meanings of the terms were not very clear. Also the wide variation in some responses, as well as

some obvious answers, which were not picked up, suggests that the terminology still needs to be addressed.

- As there were only two members of staff involved in this part of the study, the wide differences in replies in certain cases made it difficult to adequately analyse the results of the assessment. Further discussions had to follow to gain a consensus.
- Difficulty in translating checklist – The checklist was intended to differentiate between strategic and operational dimensions, and thereby be in a better position to locate these dimensions at a suitable knowledge management level. Although overall results revealed strategic relationships, which were a fair reflection of the situation, the method of assessment needed to be more clearly defined and precise.
- Difficulty in formatting checklist to show correlations with desired levels of interaction.
- The results did not assist in prioritising or positioning the organisation's objectives.

7.4.3 Discussion

The issues highlighted in this study are very important SCM issues in FM. FM is a service focused, predominantly customer demand-led industry. A faster response time to changing customer demands is therefore a real issue, as is bringing the service element into focus. In the public healthcare sector this may in some cases influence the number of patients that can be treated, as the number of working equipment would determine capacity.

Horror examples from the news media have told stories of expectant mothers whose babies need post-natal care having to be taken hundreds of miles away from their locality because there were no incubators available for the babies. This in some cases may be linked to a delay in the supply of parts for medical equipment, as earlier described; although this was not investigated by the researcher.

Suppliers' impact on service delivery standards cannot be overemphasised. Oftentimes delays and problems are caused not within the FM organisation but within their suppliers' organisation. The example given of the nine month delay for parts for an incubator, because there was only one supplier in the UK, has demonstrated that when there are breakdowns, with no alternative supplier, the Trust is very much dependent on the performance or 'goodwill' of the supplier. This particular example ultimately affected both the facilities and medical services' delivery standards of the trust, as that incubator was taken out of commission for almost a year for repairs.

The application of the i2i model identified a number of important issues. The first is dependency within the supply chain, and the second is performance along the supply chain as described above, both of which ultimately affected FM performance and added-value to the organisation.

It also highlighted the differences in perceptions, which relates to managing expectations. The expectations of EBME and Estates regarding the transportation of gases were different from the expectations Hotel Services and their service provider felt they were delivering to. There was therefore a requirement for clarity in the type and level of service to be provided, and the level of interaction needed to support it.

Another issue highlighted by this case study was the lack of integration between the two departments in the same directorate. Although collaboration existed in the operational delivery of services, there were no shared objectives at tactical level. Each departmental head therefore had a different view of the importance of their level of interaction. This issue of integration is deemed to be very important to SCM in FM (Atkins and Brooks, 2000).

It must also be noted however that since this case study was undertaken, changes have occurred within the NHS which may have addressed some of the issues raised in the study and changed the order of priority. For example, the introduction of the Ward Housekeeper role, would have created closer integration between FM and its customer, 'the ward', and addressed some of the problem-solving issues highlighted in this area.

7.5 Summary

The i2i assessment was a quick and graphic way of determining the current and the desired levels of the supply chain relationships. The application of the model generated discussions in SCM that would not otherwise have taken place. It developed a better understanding of how the department collaborated with their suppliers, and their suppliers' impact on their service delivery standards.

It further identified the constraints faced by the FM department and the Trust, mainly government or politically related, which drove their priorities and compromised the logical steps to be undertaken to achieve improvements in SCM.

Although the model identified areas where there was room for improvement, it did not give guidelines on how to make those improvements, as the next stage, the workshop, was not undertaken.

The application of the model highlighted areas of priority for the department both in terms of the development of strategic relationships and tactical and operational relationships. It however did not link its prioritisation with the Trust's objectives.

This pilot study fulfilled its objectives both in evaluating the research methods and the applicability of the model in this sector. It highlighted the problems to be encountered with the use of the ITDC and interviews, demonstrating the usefulness of pilot studies in evaluating research tools. Verification of the case study was via follow up discussions after interviews, confirmation of the case study report by participants, and a workshop involving the three main participants from the Trust. Lessons learnt from this exercise and areas of further research identified could now be taken forward in other studies.

Chapter 8 Case Study 2

The earlier case study addressed the second and third questions of the i2i framework. Based in a public sector organisation it identified governance and regulatory issues that imposed constraints on the full application of the model.

The second case study was undertaken with the FM procurement team of a UK based commercial airline with a global presence. The objective was to explore issues around the first question of the i2i framework: “Could we work together”, which was not tested by the pilot case study. However partway through the study, the researcher realised that the second part of the framework “Should we work together” was also relevant to this study. The results would also help to answer issues on “How do we work together”.

Unlike the first and third case studies, this focused entirely on the study of a procurement exercise in order to determine how relevant the i2i model was in FM procurement, and where it could be applied. The organisation had already begun the process, and there was no opportunity for the researcher to have an input in the process. It however provided an opportunity for the researcher and the organisation (Company A) to learn from the processes it was going through.

8.1 Background to the Organisation

The airline industry was originally driven by the demand for business travel reflected in the rapid growth in world trade and investment. Rising living standards and extra

leisure time, led to the subsequent take off of the leisure market as holidaymakers were encouraged to travel to destinations increasingly further a field; making it a \$300 billion industry (BA, 2004).

Privatisation and deregulation of the airline industry provided a further stimulus, exposing national flag carriers to the forces of competition. It also led to the emergence of the 'no frills' airlines, who have achieved a rapid growth in market share in the US domestic and European short-haul markets

The resulting competitive pressures have generated a persistent downward trend in air fares. Thus the rapid growth in airline passengers has been at the expense of lower yields. After adjustments for general inflation, airline revenues per passenger kilometre are about half the level achieved 30 years ago (BA, 2002). Major networks are also meeting these challenges posed by the 'no-frills' airlines by re-inventing their short haul business to become low fares operations (Airline Business, 2004).

The long-standing problems of the industry (large numbers of network carriers and substantial over-capacity in many markets) were exacerbated by the events of September 11th 2000 (9/11). Due to the 9/11 terrorist attacks, the airline industry witnessed a sharp drop in passenger demand not seen since the Gulf war of 1991. Since then airlines have sustained large losses as the industry deals with the biggest challenges it has faced for a decade. The war against Iraq and terrorism and the recent outbreak of SARS caused even more worries for the industry in the summer of 2003 (BA, 2004).

The biggest impact has been in services to and from the US and in the US domestic market, where immediate traffic falls were in the region of 30-40%. Middle East

traffic was also hard hit. Although the European short-haul market was less adversely affected, it still showed significant falls of 10-15% for member carriers of the Association of European Airlines (AEA). This however excludes the 'no frills' carriers who saw little adverse impact on their business. Gradually network airline organisations around the world are beginning to report growth and increased profits post 9/11 (Airline Management, 2004). These events and trends have led to the need for restructure and reform in the European airline market, which is currently under review (BA, 2004a).

Company A is ranked 8th in the airline world in terms of operating revenue. It is however ranked 4th in terms of operating profits, though 11th in terms of net profits (ATW, 2003). Company A spends approximately £4bn per annum (representing about 43% of its revenue) on the procurement of goods and services from third parties. Due to the pressures on margins brought about by a combination of declining profits in the airline sector, competition from other airlines, and global terrorism with the attendant 'War on Terror', it became critical that value for money was achieved and cost savings actively sought. In order to remain competitive in the market, the organisation had undergone restructuring, and undertaken internal rationalisation in line with industry trends. Efficient and effective SCM was therefore seen as critical for Company A.

The organisation devised a business strategy that focused on four issues: Capacity, Costs, Customers and People. The main drivers for this strategy were profitability and return on shareholder investment, one of the business drivers earlier identified in chapter 3 (figure 3.10). This led to a need for change and a requirement for the organisation to respond in a dynamic business sector. A defined time span could not be identified for its business strategies, as it depended largely on market forces,

competition, the global economy, and modern terrorism etc, which were subject to rapid changes.

The main procurement strategy was rationalisation, resulting in the reduction of total suppliers from 14,000 to 2000 within a defined time span. To implement this, the organisation underwent internal restructuring, and introduced a central procurement unit, with teams of two attached to each business unit and responsible for implementing the organisation's procurement strategy in that unit. These teams were disbanded upon completion of the procurement exercise.

Whilst FM reported as part of the property group under operations to the Director of Customer Service and Operations, the FM procurement team reported under general procurement to the Director of Finance. The current FM strategy utilised three FM models namely outsourcing on a package or bundled contract basis, managing agent and total facilities management. Each model operated for a different property portfolio. The new procurement strategy was to further consolidate these contracts to create fewer interfaces with service providers by bundling more contracts together.

8.2 Methodology

This case study followed a different process from the pilot study as described previously in section 7.2.4. Data for case study 2 was collected through literature review and an interview with the procurement manager for FM. Commitment to the study was obtained from the senior procurement manager for FM. The study could not be continued with the FM team as originally intended, as they could not commit

the resources to complete all sections of the study due to internal and market pressures.

It must also be noted that although Company A gave permission to the use of their case study for the purpose of this thesis, it was on the basis that the report will remain confidential, and any references to their organisation remain anonymous. This also set limits on the amount and type of information that could be explicitly used in this thesis.

8.2.1 Literature Review

Data was collated from publicly available material on the company's Internet website, as well as from company documentation provided to the researcher by the procurement manager. This primarily gave information on the background to the organisation and its strategies. It also set the context for the findings from the case study. References will be made to the company documentation albeit anonymously.

8.2.2 Interview

An initial semi-structured interview was held with the procurement manager using the CFM case study framework (Appendix 8). A case study framework sets out the guidelines within which to undertake the study. It contains the architecture of the report, as well as the elements and sub-elements to the study. The main advantage of using a framework in undertaking case study research is that it enables the researcher or other researchers to conduct similar future research and undertake

comparisons at a later stage. The framework should ensure that a similar level of data is collected from each case study.

This framework was derived from a series of case studies previously undertaken by the CFM, and updated by the researcher to reflect the intended outcomes of this particular case study. The face-to-face interview was then followed up by short telephone interviews and correspondence by email mainly to clarify issues or request for additional information.

8.2.3 The Process

The first stage of this process after gaining senior management commitment to the study was to identify the organisational structure and how this supported the change management programme. This was followed by a literature review of website documents, confidential company documents and presentation slides provided by the procurement manager (fig. 8.1).

The semi-structured interview was the main source of data for this study. Although a visit was paid to the organisation's headquarters building, it was mainly for the researcher to get a feel of the organisational culture and a better understanding of the FM objectives, rather than a fact gathering visit based on the use of observations as a research tool.

Follow up telephone interviews and emails were to confirm data, or to seek additional information for the case study. The draft case study report was then sent to the organisation for verification. The project ended with the organisation on the presentation of the case study report.

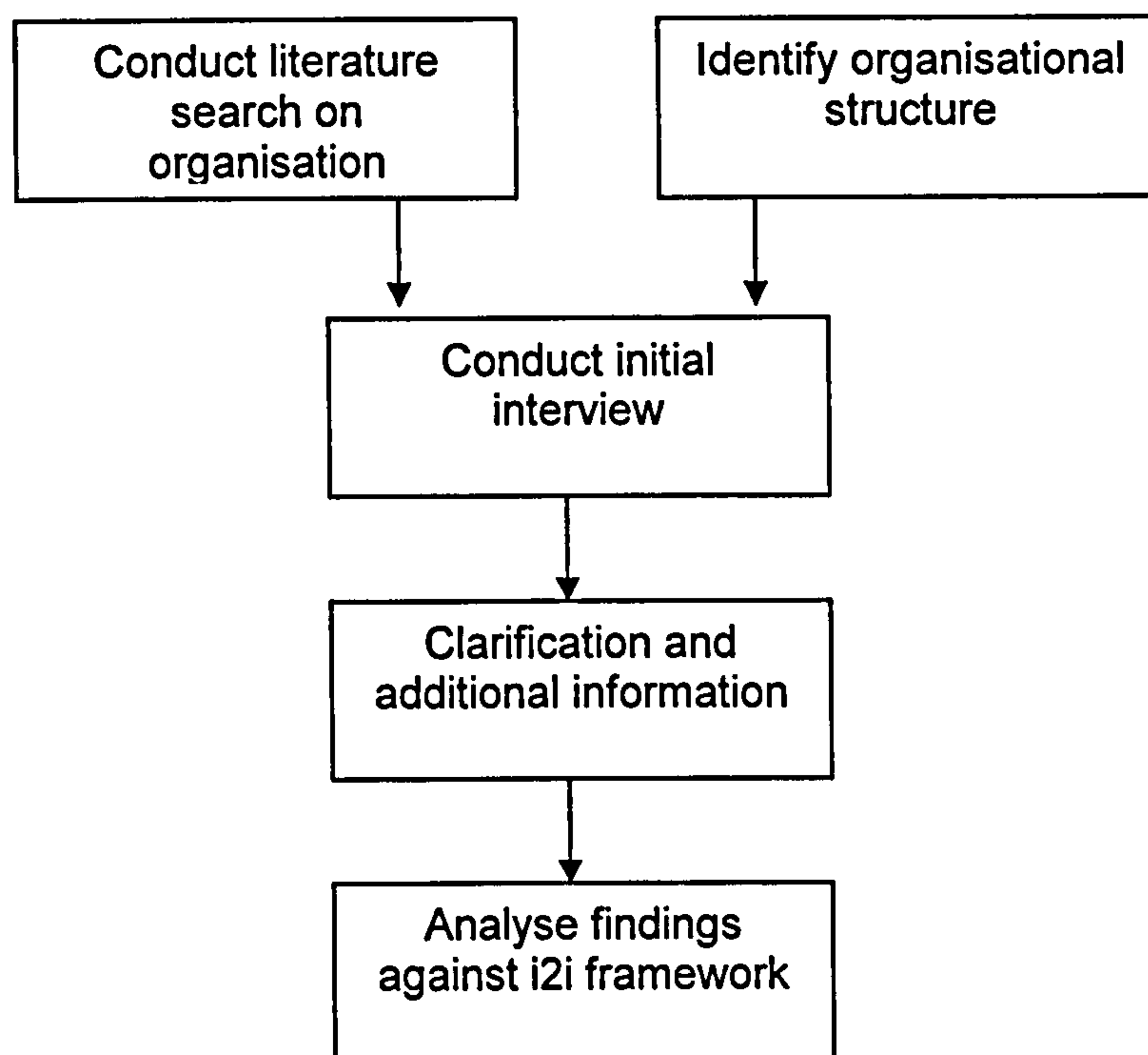


Figure 8.1 Case study 2 methodology

However, the next stage for the researcher was to analyse the findings from the report and relate them to the i2i model and framework. This had been in the background throughout the study, and the i2i model had been presented to the organisation.

The findings from the case study are presented below, and the analysis presented later in this chapter.

8.3 Findings

The findings from this case study are all descriptive, as this was a fact finding case study. The information is presented below in terms of those found through literature review and those found through the interviewing process.

As mentioned earlier, information was obtained from the organisation through confidential company documents and publicly available sources such as the company website. All the information contained in the literature review section (8.3.1) is derived from these two sources. Direct references can however not be made to the organisation in order to protect its identity. The findings were as follows.

8.3.1 Literature Review

Generic SCM decisions were taken at corporate level in this organisation, and were cost driven. This is evidenced by the fact that the procurement function was under the direct reporting line of the Director of Finance. In 1999, the supply chain had the following characteristics:

- 14,000 suppliers (in the UK);
- Major elements of the business were outsourced;
- Few strategic relationships with suppliers; and
- Not focused on maximising value of relationship.

As a result, the following issues needed to be urgently addressed:

- Uncontrolled expenditure;
- Fragmented supplier base, unable to leverage spend;

- Lack of reliable information on performance;
- Inability to benchmark;
- Inconsistency of management;
- Duplication of roles;
- Dissemination of best practice;
- Lack of data i.e. contracts in place;
- Health and Safety, and compliance.

The property division which is responsible for FM had its own set of issues as well. Due to restructuring, this division was streamlined and the number of staff reduced drastically. Supply chain issues included:

- The number of suppliers to be managed effectively by a streamlined division;
- Inconsistency in management, with regards to service and reporting;
- The scope of services to be managed;
- Different contractual arrangements with existing suppliers;
- Locally managed property; and
- Contracts due to expire.

A project was put in place to implement new FM contracts for the organisation's property portfolio with effect from 1st April 2003. FM2003 as it was called aimed to *"provide cost efficient FM services to .. providing the appropriate levels of service to each part of the .. business"*. Its objectives included:

- Rationalisation of the supply chain;
- Protection and utilisation of the assets;
- Optimisation of cost versus service;
- Management of information systems;
- Provision of fit for the future facilities; and

- Measurement of performance through independent Service Level Agreement (SLA) measures.

The key stakeholders in the project were: Property (including Procurement), Customers (internal and external), Finance and the organisation's Board. Intended successful outcomes of the FM2003 project were given as:

- Fewer suppliers;
- Performance (data) driven relationships;
- Longer term contracts and agreements;
- Leveraged volumes to obtain best pricing;
- Continuous improvement;
- Cost savings;
- Managing and minimising risk;
- Maintaining and improving where appropriate, service quality;
- Successful staff retention and TUPE;
- Maintaining flexibility to react to a changing business; and
- Innovation.

A strategic partnership route was adopted, which is a high spend, high risk option (see figure 8.2). This focused on building long term strategic relationships with service providers. As the diagram (fig. 8.2) suggests, costs are high relative to expenditure, as there will be fewer contracts with higher values. The risks associated with this route are also high, as the organisation goes into a long term partnership with the service providers. These will need to be properly managed.

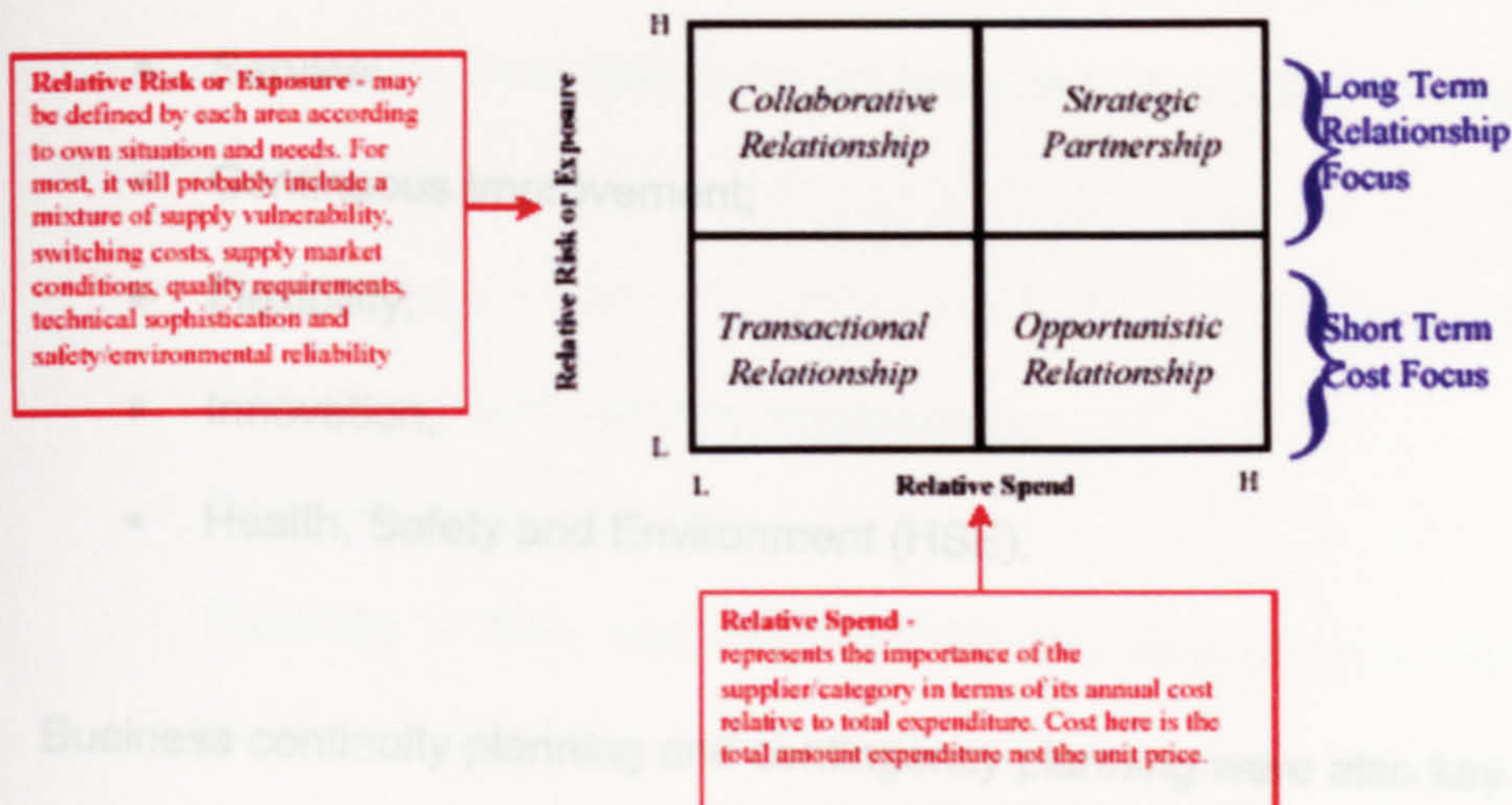


Figure 8.2 Risk versus spend matrix (Source: Organisation)

A review of the tender documents revealed that the initial contract term being offered to prospective service providers under the new arrangement was three years. However, it was stated explicitly that the organisation was prepared to offer a longer term contract, should the service providers be prepared to offer a percentage discount. In addition, prospective service providers were requested to include in their proposals any innovative ideas to the mutual benefit of the organisations leading to a lower total cost of ownership.

They were also asked to indicate whether they would be prepared to work in an open book environment. This environment is one where all relevant management data would be available to both organisations.

With regards to supplier selection, a list of evaluation criteria was drawn up, though final selection was not limited to this list. The evaluation criteria included:

- Total Cost of Ownership (TCO);
- Quality;

- Delivery;
- Service;
- Continuous Improvement;
- Flexibility;
- Innovation;
- Health, Safety and Environment (HSE).

Business continuity planning and contingency planning were also key aspects to be considered in the selection process.

8.3.2 Findings from the Interviews

The interview revealed that the property procurement team was responsible for strategic sourcing as earlier described. Their task was *“to minimise the total cost of purchased services and products, whilst improving quality, delivery and service”*. The mission is ‘to deliver World Class Procurement Performance’.

The property and procurement functions were integrated in 2000 for the whole business. Previously the procurement unit purchased, whilst contract management ran operations. This merger was followed by a restructuring programme which saw the rationalisation of the property unit. Furthermore, as more ‘concepts’ became actual projects for the organisation, these were merged with the newly structured Property unit. The suppliers and supply chain therefore needed to be rationalised to enable property to be more effective and efficient in managing the supply chain.

The change initiative was mainly cost driven. This included the rationalisation of most levels of staffing and keeping only key personnel in-house in an intelligent

client role. However in order to remain competitive, quality improvements to services provided, also had to be implemented. A number of other drivers were identified including:

- Consistency;
- Compliance with statutory regulations;
- Good Practice;
- Flexibility – This was important as the organisations portfolio changes constantly. Flexibility was to be allowed for in service contracts;
- Health and Safety – This was in relation to delivering an appropriate service – i.e. providing the right service in the context of cost / customers.

Reliability was not included amongst the drivers, as the organisation believed that this had already been achieved. Innovation was an important driver in early 2001 when the organisation was striving to be the market leader. However this was no longer a key driver and the focus had switched to risk management and minimisation. It was unclear why this change in focus had taken place, but the new threat of global terrorism certainly increased the focus on risk.

The requirement for change had not been led by poor performance, which has made the process a difficult one. Performance levels not only had to be maintained but improved throughout this process, with the benchmark already set at a high level.

Several procurement options had been considered including the preferred bidder option in 2001, but this was no longer considered an alternative. Although one of their main service providers had been appointed preferred supplier, the process was

stopped. An explanation for this was not given. The service provider however remained a part of this new bidding process.

Three models were already in operation for the procurement of FM contracts namely:

1. Total Facilities Management (TFM) contracts – in operation at main airport;
2. Managing Agents – in use in the regions; and
3. Packaged contracts – in use for the office portfolio.

The property contracts had already been consolidated into nine of these contracts, with an additional four managed by cargo services, whilst there were another three contracts elsewhere. The property contracts were to be further rationalised into four, and TFM was the preferred mode of delivery. The processes followed were typical of the organisation's procurement projects. This was known as the strategic sourcing process involving seven stages, namely: understanding the business need, research, developing sourcing strategy, tender, negotiate, implement, and managing and developing suppliers.

As the organisation was satisfied with the quality of services offered by their current service providers, a strategic decision was taken to open bidding only to a select list of current providers. The property procurement team went through the list of existing service providers and determined if they could become first-tier suppliers against a list of criteria. These criteria were based on the strengths of the suppliers, who were invited to bid for specific packages / contracts. Seven service providers were identified and chosen for the bidding process.

The criteria for supplier selection were defined in terms of:

- The number of years suppliers have worked with the organisation - Only those suppliers who have worked with the organisation for at least five years could be considered as a key supplier. A one-on-one meeting was held with each supplier who met this criteria;
- Best Cost - Cost was based on the total cost of ownership;
- Environmental standards - All current suppliers already meet the organisation's environmental criteria. This would become an issue for final selection as suppliers' environmental criteria will also be taken into consideration;
- Attainment of a minimum level of service – i.e. what is best cost for that level of service. This is constantly under review;
- Ability to best match the organisation's business requirements.

The strategy was to specify what the different suppliers should bid for, by looking at their strengths and using it, rather than moulding them to the organisation. Another eight service providers in the organisation's supply chain were identified and recommended to the seven preferred bidders to work with, in a bid to minimise the risk to the business. It was decided that although these eight suppliers could not provide the service packages required by the organisation on their own, because of their knowledge of the organisation's portfolio, they were to be kept on as suppliers to the preferred bidders.

Risk management and mitigation was an important aspect of this procurement process. The major risks identified were old management and consistency issues. Under management risks, the property portfolio had been reduced, resulting in a need to change the management structure of the supply chain. In terms of consistency, the main issue was in the varying standards of service in various

buildings with different suppliers. A common standard was required across the property portfolio that would reflect the organisation's image.

The new risks identified with this initiative were:

- Risks associated with change. Having a 'new' supplier delivering services in a new area in operational buildings.
- TUPE and issues to do with staff retention especially in engineering.

No cultural risks were identified as the suppliers had already been branded as part of Company A's property team, so very little cultural change was required for the suppliers.

No changes were to be made in terms of monitoring supplier performance. The approved suppliers will submit a monthly report on performance as before. This would be the main means of communication between the suppliers and the organisation in terms of performance management. The system was to be web-enabled within a year of the let of the contracts.

At the end of the procurement process, one supplier was appointed for all four contracts. The contract term is an initial three-year term with incentives linked to performance. There are also attached risk and reward schemes. The organisation would however be comfortable with evergreen contracts based on performance. The process had already achieved a 15% cost saving, with an estimated 10% on top upon completion.

8.4 Case Study 2 Review

This case study was a clear demonstration of how organisations use SCM initiatives to drive down facilities costs making both short and long term gains. Atypical of most organisations, Company A embarked on internal rationalisation and restructuring first, creating the 'right' structure to support the proposed 'lean' supply chain. The restructuring aspect is important as most organisations simply rationalise, and assume that the slim lined version of the old structure would be adequate. This relates back to the issues of internal alignment raised earlier in chapter 5.

Its approach to rationalisation was to reduce the number of suppliers that the organisation had a direct interface with, but not necessarily reducing the total number of suppliers in the chain. This was to be achieved through consolidation of their contracts, and the appointment of key suppliers from their current service providers. These 'key suppliers' would then be responsible for managing the organisations supply chain which would still be made up of some of their current suppliers. Hence the organisation identified seven service providers to bid for the key supplier contracts, with an additional seven identified that the key suppliers would have to work with.

The criteria for selection as key supplier were based on the capability of the service providers to provide the packaged contracts. Although Company A had stated from the outset that a TFM approach was preferred, it did not offer the contracts as one TFM contract, but as four bundles of contracts. Contradictory as well was the fact that although their new approach to FM procurement was based on a long term strategic partnering / high risk model, the contract was only let for three years;

identified as the average term of FM contracts, with long term contracts between five to seven years, or longer (CFM, 2002d).

This implies that Company A was trying to mitigate against the high risks it had associated with long term contracts, by letting an initial three year contract with options. These options were not made explicit to the researcher. It may also imply that three years is long term in the business cycle of an airline.

Company A has demonstrated however that it has confidence in its current supply chain. Hence, tenders for the new contracts were only open to current providers, with the stipulation that they continue to work with other named suppliers. However, the organisation is looking towards continuous improvement in order to remain competitive.

Although the organisation had four contracts to let, it has consolidated its supply chain even further by appointing one key supplier for all four contracts. It is not clear however whether the contracts have been let as one TFM package or whether they will still be managed as four individual contracts with one organisation. The researcher believes that the model adopted is that of total facilities outsourcing on a management contract basis (fig. 3.7). The key supplier is through this arrangement required to manage all other existing service providers in the delivery of FM services.

8.5 Link with the i2i Model

There were found to be strong links between the i2i model and the strategic approach to FM procurement undertaken by Company A. The analysis of the links with the framework will be undertaken on a step-by-step basis addressing each question of the framework.

“Could we work together?”

This part of the framework looks at a number of issues to be considered when procuring FM services. This is similar to the list of criteria which was drawn up by Company A addressing issues to with:

- **Compatibility** – this issue was addressed by limiting the preferred bidders to a selection of their current service providers;
- **Capability** - key suppliers to have worked for a period of five years with the organisation and be capable of undertaking TFM contract;
- **Transparency** - issue raised on open book environment in the tender documents;
- **Trust** - although this was not explicitly stated, it is implicit in the partnering arrangement being set up. Trust is a very important element of partnering (Swan *et al*, 2002);
- **Performance Measurement** – this was addressed and it was decided that there would be no change to the current system in place.

This demonstrates that the model is flexible enough to be adapted using an organisation's own criteria.

“Should we work together?”

The ITDC gave guidance on the issues to be addressed in this section of the framework. This included various evaluations of the consequence of failure on the part of the service provider. This is reflected in the risk model developed by Company A (fig. 8.2) which shows that the strategic relationship being sought by the organisation had a higher exposure to risk.

Risk in Company A is measured in terms of supply chain vulnerability, switching costs, supply market conditions, quality requirements, technical sophistication and safety/environmental reliability. These were all considered in the selection process. The ITDC measured risk on the other hand in terms of impact of consequences over time, coverage, disruption and future decisions, amongst others.

Most organisations have already developed risk models which could be applied in the analysis of this question. It determines the strategic position of the suppliers, and could be an alternative to the use of the ITDC, which although it did what was intended, had many criticisms surrounding terminology.

“How do we work together?”

This question may be related to both the procurement strategy and the answers to the second question. Should the organisation choose to work in a strategic partnership with its key suppliers, it will need to work at different levels of the model from the strategic to the operational depending on the activities involved. However it will not be required to work at a strategic level with non-strategic suppliers.

In this case study we have the organisation working at strategic level with the key supplier, who is then responsible for managing all other relationships along the supply chain.

8.6 Summary

As in the first case study, the use of semi-structured interview in this case study proved to be an effective mode of data collection. It enabled the researcher not only to obtain the facts, but to probe them and investigate them further. The CFM case study framework provided the basis of questioning. Verification took place through follow-up discussions and a confirmation of the report by the procurement manager who participated in the study.

This was a descriptive study of a FM procurement project. It enabled the researcher to gain an insight into the drivers, processes, input and outcomes of the exercise. Analysis of the findings then revealed strong links with the i2i framework, confirming that the framework provided a guideline for organisations in FM supply chain procurement.

It also demonstrated that SCM should be driven from a strategic level, and translated into tactical (procurement) and operational (monitoring, assessing and managing the relationships) tasks. Senior management commitment is very important in the implementation of SCM as demonstrated by this organisation. The organisation also demonstrated through its spend / risk matrix, that longer term gains (total cost of ownership) are to be considered in SCM rather than short term quick wins, to be sustainable.

The framework as a guide could be populated with an organisation's own criteria in finding out if they could work with suppliers, and to test the capability of the suppliers. The current criteria listed in the framework are merely a guide for the organisation to see if they are in keeping with good practice from industry.

This case study revealed another dimension to the second part of the framework. In the pilot case study, the ITDC had been used to determine the strategic importance of supply chain partners. In this study, links were found between this dimension and the risk model in use in the organisation.

Although the focus of this case study was on procurement, it demonstrated the strategic and tactical levels of SCM. These inform the last dimension of the framework. Strategic partnerships will operate at various levels of the model. The further down the supply chain command an organisation is positioned, the lower down its levels of interaction with the organisation.

Lessons from these case studies are taken forward in the final case study.

Chapter 9 Case Study 3

This case study brings us back into the public sector arena and tests the applicability of the i2i model in the Estates and FM unit of a central government department in applied research. The aim of this study was to provide an opportunity for suppliers and managers to contribute to the development of future FM strategy, and participate jointly in improvements to services delivered i.e. supply chain diagnosis and development. This involved the use of the i2i model to determine current views on partnership, and review their joint position.

It draws on knowledge gained from the previous two case studies in terms of use of research tools and the applicability of the model. This case study however goes further to evaluate the applicability of the model in the development of the supply chain.

9.1 Background to the Organisation

This central government department plays a vital role in working towards a vision of prosperity for all by the UK government (DTI, 2004), with its' work guided by three strategic objectives (fig. 9.1) to drive up sustainable economic growth in the UK economy. It is made up of a number of executive agencies, non-departmental public bodies, as well various departments which make up its supporting infrastructure.



Figure 9.1 The three departmental objectives (Source: DTI, 2004a)

Its role (DTI, 2004b) includes:

1. Supporting successful business through:

- Business Relations team,
- e-Business,
- Support for manufacturing,
- Support for small and medium enterprises,
- Carefully targeting business support,
- Export and inward investment,
- Working with the regions,
- Tackling inequalities,
- Shaping policy;

2. Promoting world class science and innovation:

- The Office of Science and Technology (OST),
- The Innovation Group,
- Investment in research,
- Investing in knowledge transfer;

3. Ensuring fair markets:

- In Europe and the world,
- By encouraging confident consumers,
- By modernising the competition framework,
- By promoting confidence in capital markets,
- By maximising potential in the workplace,
- By promoting equality and diversity in the UK and internationally,
- Through energy policies and markets.

Estates and Facilities Management (EFM) is a function of the former Estates and Accommodation unit, which merged with the IT and legal functions in April 2003 to form a new unit known as Integrated Workplace Solutions (IWS), with the aim of delivering excellent corporate and legal services to the department. IWS delivers IT, accommodation, information and strategy planning services to support departmental groups in their work with external customers. It is not directly responsible for Public Service Agreement (PSA) targets or activities that contribute to UK success measures. However, the outcomes of IWS' services impact on:

- The cost effectiveness of the department as a whole;
- Customer take-up of e-services; and
- The ability of the department to deliver against UK success measures.

EFM is one of six units delivering facilities/estates services and solutions and responsible for managing the headquarters estate for this central government department across London, Sheffield and Scotland. Their functions include estate management, SCM (including procurement of facilities contracts), health and safety issues related to the estate, major works related to the upkeep of the estate, moves

management and the in-house provision of services such as mail, portering, translations and reprographics.

EFM have outsourced a number of facilities contracts including cleaning, security, foliage, maintenance, conference management, catering, waste management, stationery, etc, but do not retain operational management of these contracts. They operate a managing agent FM model (chapter 3, fig. 3.5), and contracted out the day-to-day operational control of the service providers to a Facilities Managing Agent (FMA).

In addition, the FMA provides a finance team to complete accounts for the FM activity, projects and moves managers, and a Health and Safety team. EFM directly manages the contract with the FMA, although they retain a high level of interest in all service provider contracts, especially as they retain commercial responsibility for the contracts. The FMA have no contractual relationship with the outsourced service providers.

9.2 Methodology

A number of research tools were employed in this case study. They include the use of an adapted version of the ITDC, which had evolved at this stage into the Partnership Interaction Diagnostic Checklist (PIDC), feedback to the organisation and a joint improvement workshop with the organisation and all its service providers.

Semi-structured interviews were not employed at this stage of the study as there were time constraints involved on the part of the organisation. It was also decided that the workshop would serve two purposes: 1) to feedback to the suppliers on the results of the questionnaire and discuss issues arising; and 2) to explore areas of improvement and how to carry that forward.

9.2.1 Questionnaire

Primary data was collected through the use of the partnership interaction diagnostic checklist (PIDC) questionnaire (appendix 9), an adaptation of the ITDC. This had been adapted by the case study organisation in conjunction with the researcher for their specific use. The questionnaire was sent to all of the organisation's suppliers and their FMA. Respondents were given the option to return their questionnaires anonymously.

The PIDC questionnaire contained twelve questions with an itemised rating scale. Similar to the pilot case study, specific response options were developed which were directly relevant to the organisation. Respondents were also given the opportunity to add comments after each question, as well as general comments at the end of the questionnaire.

In the development of the PIDC, the objectives of the ITDC were explained to the department, as well as the problems with terminology encountered in the pilot study. This informed the format and contents of the PIDC.

The PIDC reflected all three aspects of the i2i framework. The questions were designed to capture the suppliers' perspectives on their relationship with both the

EFM department and the FMA, in order to identify gaps and areas for improvement. The questionnaire was followed by a feedback meeting with the EFM department.

9.2.2 Workshop

Further data was collected at the workshop in which the analysis of the questionnaire responses was reported. The workshop was undertaken in two parts. The first part discussed the results of the questionnaire, whilst the second used the content analysis of the comments from the questionnaire to drive forward discussions on improvements.

9.2.3 The Process

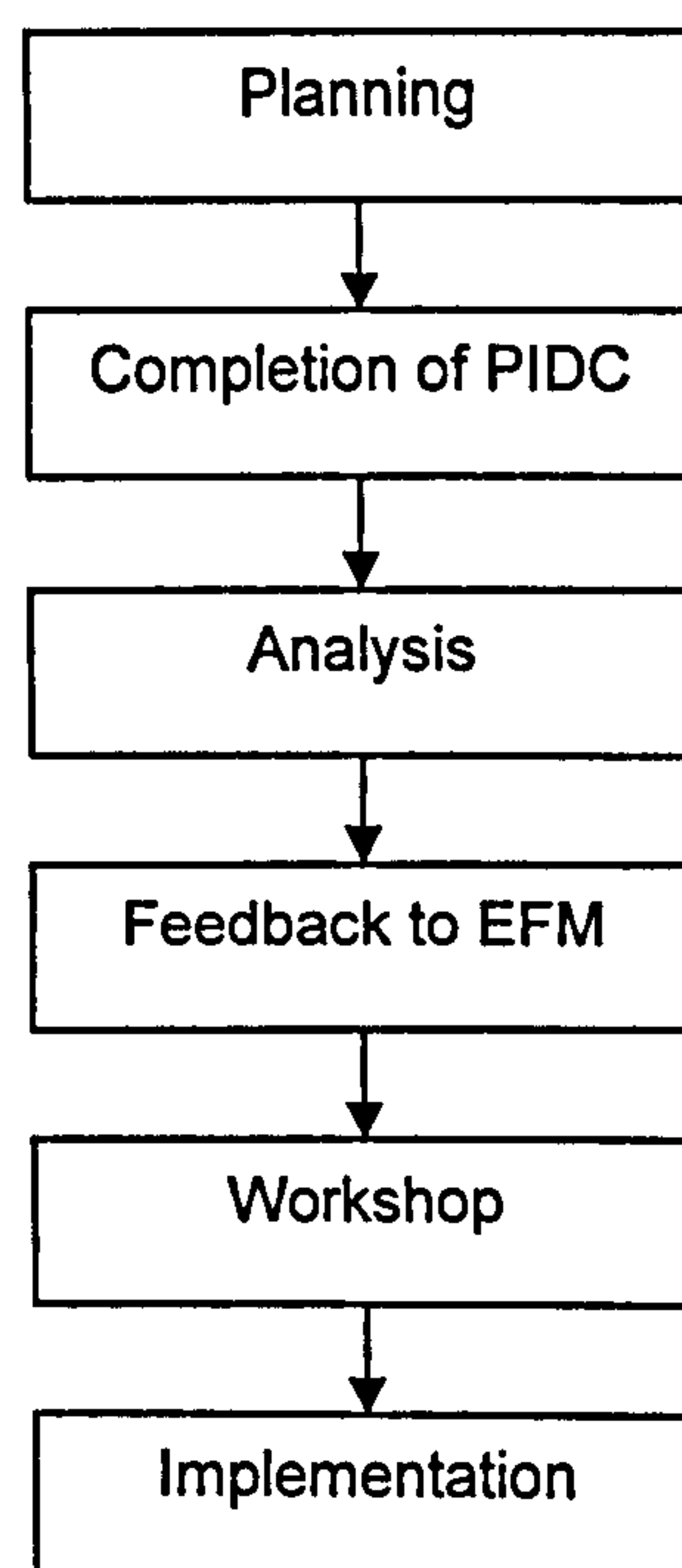


Figure 9.2 i2i application process

The first stage of this process planning involved the identification of EFM's requirements and the development of the PIDC. EFM identified i2i as a model to address a specific SCM issue, continuous improvement. The issue of perception was also of importance, and one of the aims of the study was to identify their suppliers' perceptions of the supply chain relationship and their levels of interaction. The workshop was also in planning at this stage by EFM staff with a date fixed and draft agenda.

Once all parties were happy with the PIDC, it was distributed to all the EFM suppliers including the FMA by the department itself. This ensured at least one returned questionnaire from each supplier, directly to the researcher.

The questionnaires were then analysed using a mixture of methods. For the responses on the itemised scale, whole number responses were counted and displayed as bar charts. For the comments which supported the questions and the general comments at the end of the questionnaire, a content analysis was undertaken. Unlike conventional content analysis where the criteria or codes have been pre-set, the researcher derived the criteria from the responses. This involved a longer process but ensured that the information derived from the analysis was a true reflection of the supplier's perceptions, as the researcher's pre-conceived beliefs had not been imposed on the results.

The next stage was to feedback the results in the first instance to the senior and middle management in the EFM department. The initial results were discussed and then taken forward to the workshop.

The workshop involved the main participants within the EFM department and at least one representative of each supplier organisation. The results were

summarised at the end of the workshop, and a decision made on which areas of priority to move forward in implementation.

9.3 Findings

The response rate as earlier stated was 125% as all suppliers returned at least one completed questionnaire. Three of these organisations returned two questionnaires each, as they had more than one contract manager responsible for the department. Ten questionnaires had comments, and five without. Therefore although the fifteen questionnaires are analysed, only ten are used for the content analysis.

9.3.1 Findings from the PIDC Questionnaire

The PIDC explored all three dimensions of the i2i framework in terminology that was easily understood by the participants. Results were analysed both in terms of the number of responses to the itemised scale and the content analysis of the comments on the questionnaires. A brief summary of the findings are as follows:

1. Half of all respondents felt that direct contract with EFM was helpful, whilst the other half were either indifferent or felt that the direct contract was a hindrance (appendix 10, question 1).
2. The majority of suppliers felt they had a partnership of equals with the FMA (appendix 10, question 2).
3. The majority of suppliers agreed that they had a partnership of equals with EFM (appendix 10, question 3).

4. The majority agreed that frequency of contact with the FMA was just about right, three respondents could do with a little less contact, whilst two could do with a little more (appendix 10, question 4).
5. The overwhelming majority felt that contact with EFM was just about right. However, a couple could do with a little less contact, whilst another couple could do with a little more (appendix 10, question 5).
6. The majority of respondents felt that they could offer ideas and influence the service provided to varying degrees (appendix 10, question 6).
7. All respondents felt they were an important service provider to the department (appendix 10, question 7).
8. The majority of respondents felt that a significant failure in the service they provided would be harmful to the department (appendix 10, question 8).
9. The majority opined that a change to the contractual relationship would have a beneficial effect on the services provided (appendix 10, question 9).
10. The majority felt that interaction with other suppliers was just about right (appendix 10, question 10).
11. There was very positive response to the use of the suppliers' expertise (appendix 10, question 11).
12. All respondents agreed that some use was made of their expertise when sought. More than half felt that this was adequately exploited (appendix 10, question 12).

The content analysis of the commentary identified fourteen categories of responses from this study. These have been listed below in order of frequency (i.e. the category with the most comments to the category with the least number of comments).

Contract management – Issues raised under contract management were:

- The need for regular reviews which contributed to good contract management;
- Enabling EFM to meet its own standards;
- Direction and objectives from EFM help to make the partnership with the FMA work well;
- Suppliers have some influence over certain areas of contract;
- Opinion is asked regarding provision of services;
- Onerous administration involved in contract management now reducing;
- Managers are parochial and assist co-managers at expense of suppliers;
- Preference for a closer relationship with EFM, instead of operation through the FMA;
- More confident of achieving results by approaching EFM directly;
- Conflicts arising between receiving instructions directly from EFM, not authorised by the FMA;
- Protracted negotiations and discussions with the FMA which were not in agreement with new instructions from EFM;
- Too many minor issues raised not directly relating to the contract;
- Too many service providers;
- Excessive Communication:
 - Meetings are too frequent and time consuming;
 - Too much contact with the FMA (and EFM at start of contracts);
- Level of management required, especially for smaller contracts, is excessive;
- The FMA have final decision even where suppliers are not in agreement;
- Involvement of EFM in more operational issues;
- Being told what to do;
- Contract management structure can prevent rapid action;

- Direct requests from EFM to suppliers without the FMA's knowledge;
- Effectiveness of contract management dependent on individual contract manager.

Partnering and Trust – These issues were related to:

- Ability to exercise judgement and expertise within certain limits;
- Suppliers' ideas welcomed by the department;
- Opinions were actively sought and considered;
- Some recommendations implemented and suppliers were able to influence decisions within certain limitations;
- Suppliers provided some support to the FMA with own expertise;
- Being told what to do – e.g. the FMA having the final decision even if there is a difference of opinion;
- Lack of trust and respect demonstrated by man to man marking in management.

Cost driven – These included:

- Cost drivers enabling the creation of synergies;
- If suggested option is viable, then it has more chances of being implemented;
- Reluctance to implement anything that costs money! Whether small or beneficial;
- Suggestions governed by financial constraints;
- The FMA may choose alternative option which in suppliers view is not best suited for the purpose;
- Pressure to deliver service initiatives without increasing costs;

- Suggestions may be positively received or ignored depending on costs.

Public Relations (PR) - The respondents felt that their services in one way or another contributed to the image of the department. The need to show the department in a 'good light' was considered very important. It was also recognised that the failure of a service would be bad PR for the department.

Service quality - In terms of service quality, the following issues were raised:

- Enabling the department to meet its own standards;
- Provision of the same high level of service regardless of length of contract;
- Enabling the improvement of standards of service;
- Contract type and management may prevent rapid response;
- Building occupants are affected by the standards of service
- Services at a level

Service Importance - Generally the view was that an important or essential service was provided to the department. Where the service was identified as not critical to the department, the PR implications were noted.

Consequences of Failure - It was important to note that suppliers who considered their services as essential to the department, did not comment on the consequences of failure as critical. They believed it 'must be harmful'. However the respondent that believed that their service was very important rather than essential, identified that failure of their service may be as severe as to close down the building.

Continuous Improvement - Issues raised in this area were:

- Constant change to develop an improved service;
- Improvements required in the provision of services;
- Need for the provision of a scope to grow and change with the department's requirements.

Room for innovation – This included:

- Many new initiatives having been implemented in the year of study with full support from the management (both EFM and the FMA);
- Long term contracts would enable ability to plan ahead;
- The detailed specification in the contract provides little opportunity to change things or suggest something innovative.

People Focus – Three issues were raised regarding this category, namely:

- Ability to invest in staff;
- Greater stability of workforce; and
- The lack of provision for individual financial reward.

Networking and Knowledge Transfer – These included:

- Need to learn from each other through greater interaction;
- Need to build relationships to develop business; and
- A few respondents believing there was little need for interaction.

Morale – The suppliers like being made to feel like a valued service provider. However, some perceived that service importance was not universally understood, whilst others wanted more financial rewards for individual's effort.

Independent Third Party – Having the FMA viewed as an independent third party in the supply chain was considered useful to seeing both the demand and supply viewpoints. However, the FMA model added a strain on the contract.

Common Interest – These involved:

- Resolving emergency and non emergency issues; and
- Both parties agreeing on the direction to follow.

9.3.2 Findings from the Workshop

The first part of the workshop involved discussions leading to further clarification or analysis of the questionnaire responses. The findings from the workshop fell into two categories, those that supported the responses on the questionnaire, and those that contradicted it. These are as follows:

1. Those working outside the London portfolio, had less contact with the FMA and onsite contact with the department all the time, leading to a conflict of masters. In such cases, the perception was that the FMA hinders (slows) communication.
2. There was a perceived disparity in the FMA's role, who were seen by the suppliers as directing their services, rather than managing a partnership of equals. This contradicted the responses from the questionnaire. Other issues raised were related to trust – e.g. some suppliers questioned whether they might make some decisions purely for their own benefit; shared goals required between the FMA and all other suppliers; more empowerment to the FMA and a review of current procedures on authorisation of contract

variations up to £500; and the main problems with the relationship leaned more towards personal communication rather than process issues.

3. The type of contract affects the equality of the partnership. Suppliers felt that there could not be a true partnership with the client, and they are still expected to do what the client wishes. They highlighted a need for trust to ensure that the client is not using that role wrongly.
4. Questions 4 and 5 were felt to be related as the both involved frequency of contact albeit with different parties. The FMA felt that there was too much contact between them and EFM (almost like 'big brother' watching over your shoulder was the expression professed).

In terms of the frequency of contact in relation to the value of contracts, the contract management did not allow for this discrepancy. Suppliers with lower value contracts therefore felt that there were too many meetings. It was agreed that more flexibility was required in the management of contracts by the FMA.

The mode of communication was also brought into focus with the suggestion that more support in decision making was needed – e.g. approval to act on an ad hoc basis via phone. Informal meetings were also found to be useful, with the suggestion that scheduled monthly and quarterly meetings should become merely a formalisation process of what is already known.

5. The workshop further confirmed the results from questions 6 and 7.

6. The workshop did not throw any further light on the disparity highlighted between responses to questions 7 and 8.
7. Although the main change discussed was to the contractual term given as an example, many issues were raised under this topic. Other changes discussed included changes to the supporting management structure and the tendering process. Benefits to be derived from longer term contracts included taking a whole life view to costing, better assessments of client requirements as the suppliers would have time to understand the business thoroughly, staff security and improvements to suppliers' ability to invest in staff training and development.

Issues were also discussed relating to break clauses, and managing a change of contracts, which was considered by all to be extremely painful. EFM felt that the early termination of a contract was a poor reflection on their performance as well as the supplier's. Suppliers must be able to demonstrate the benefits of longer term contracts to EFM who were not opposed to the idea.

Other related issues raised were concerned with the inconsistency in service quality through the life of the contract, with opposing views from the suppliers and EFM, and whether the emphasis should be on the contract term or on performance. Suppliers were also not clear about the criteria adopted in the procurement process. It was generally agreed that there was a need for transparency in this area.

The FM model was also under the spotlight, with most suppliers' perception of the FMA in most contractual relationships as that of cost cutters. They

also introduce other contracts where the suppliers had no contact with the client management team, and the FMA was perceived as the client.

8. On the issue of the level of interaction with other service providers, opportunities to create partnerships amongst the supply chain were highlighted through greater interaction. For example in the area of waste recycling, an opportunity was identified at the workshop where the waste management supplier could work with the stationery supply to fill the missing link in recycling stationery packaging. Contact with others was also considered beneficial as it made the some of the suppliers feel more involved in FM.
9. In terms of the knowledge capture, sharing and innovation from suppliers, it was explained that not all ideas and suggestions could be implemented as the department have certain restrictions (legislation and budget) which limited the extent of implementation. It was however felt very important that service providers understand the reasons why sometimes, there ideas could not be implemented.

Although some of the ways forward had been discussed during the first part of the workshop, the second part focused more on identifying the key issues and prioritising. The key issues were identified as the need:

- For shared objectives;
- For a review of the performance measurement system;
- To address cultural issues and identify ways to overcome personality issues;
- For more transparency in processes;

- For flexibility in the management of contracts to take in disparity in contract values and size.

It was also identified that although there were currently no major supply chain issues, there was the potential for highlighted issues to become more prominent and imminent if not properly managed. The need for a review of the performance measurement system was considered of the highest priority to be taken forward.

9.4 Case Study 3 Review

This case study had the benefit of learning from the previous i2i case studies. Effort was made to avoid the problems highlighted from the pilot study in terms of the use of the ITDC. In order to gain the most benefit from the framework within a limited amount of time, it was decided that a new questionnaire should be developed based on the principles of the framework. This new questionnaire, the PIDC could be categorised as evaluating:

- Partnering relationship;
- Contract management;
- Level of communication – in terms of frequency and people;
- Level of innovation;
- Strategic importance of the supplier;
- Impact of consequences;
- Knowledge capture, sharing and utilisation.

Feedback from both the department and suppliers was that they found the whole process very useful. In terms of the department, it confirmed a number of previously

held suspicions which were not shared with the researcher previous to the study. It also brought to their attention misconceptions they had about the suppliers' knowledge of their processes.

The suppliers found it a very useful means of airing their dissatisfaction and putting across their own points of view. They also appreciated the effort being made by the department to involve them in the continuous improvement process and development of the supply chain. They however pointed out the need for this to be a continuous process, rather than a one-off event which will not be acted upon.

In terms of the outputs of the study, it identified that the prominent issues revolved around communication and transparency of processes, contract management, timescales in receiving information, bypassing correct procedures, over-specification of environmental requirements, the development of a long term relationship, and partnering.

Contract management issues were by far the most common issues. Communication and transparency issues were also widely discussed. These were manifested mostly in the management and tendering processes. Bypassing correct procedures and the FMA was put down to the timescales involved in decision-making and feedback to the supplier. Another issue related to timescale was the time it took to compile necessary information and data for the FMA.

The level of administration was felt to be very high for small contracts and on environmental issues. Although the perception was that there was too much communication at the start of contracts, on review it was found that the level of administration involved in the management did not decrease, but the suppliers simply got used to it.

All the suppliers agreed that this department's environmental and administrative requirements were over-specified compared to other government agencies and departments. Flexibility was therefore required in contracts and the interpretation. This was identified as an area for improvement, with suppliers to work jointly with EFM to improve the environmental aspect of the FM contracts.

There was felt to be a need for a closer relationship between suppliers and EFM, which was not supported by the ensuing discussions. The main reason given for the need for a closer relationship with EFM was to hasten the decision making process. However it was identified that the correct processes and procedures were in place to enable decision-making, and this was not therefore a valid reason for establishing a closer relationship to EFM. This area was earmarked for improvement by the participants.

An analysis of the responses revealed that contract management had the highest single number of responses, as well as the highest number of negative responses. Partnering and trust had the highest number of positive respondents.

Trust and respect were however a big issue from the questionnaire results. This was not however discussed in detail at the workshop as the participants in some cases had a reversal of opinion on the issues which came out of the study. This reluctance to openly discuss an issue which was prominent in the anonymous questionnaire highlighted a serious issue relating to trust within the supply chain. There was a further reluctance to take this issue forward openly, as all agreed it was more related to personality issues.

Performance measurement issues were raised concerning individual and organisational incentivisation, and monitoring and reporting. Suppliers raised the

need for individual reward. The department did not see this as an issue as there was already a bonus scheme in place, and individual suppliers were then responsible for financially rewarding their staff.

The study identified that FM operation may be excellent, but poor reporting may lead to penalisation. There was a perception that administrative processes were not properly appreciated by all parties. The involvement of a large number of people in the reporting chain also affected delivery and administration of services. The need for suppliers to give explanations for missing deadlines was identified. There was also a query on the understanding of key performance indicators (KPIs), as it was not always clear why something needed to be measured.

9.4.1 Strengths

In terms of the research methods employed in this case study, the results highlighted the following:

- Terminology is very important when designing questionnaires, and could make the difference between getting a true reflection of the situation or a skewed result due to a lack of understanding.
- The use of workshops support, verify and enabled amore detailed exploration of the issues arising out of questionnaire surveys. It enables a deeper understanding of the context in which the responses were given.
- The development of analysis criteria using an analysis grid assisted in the identification of a set of criteria, unbiased by the researcher's preconceived ideas.

The use of the two methods of data collection further highlighted contradictions in responses, e.g. regarding the relationship between suppliers and the FMA. This verification process ensured the reliability of the information processed in the study.

9.4.2 Weaknesses

The main weakness of the PIDC was found to be the use of examples in some questions. This raised the danger of discussions only centring on those examples, and not showing anything new.

9.5 Summary

The main SCM issues to come out of this study revolved around partnering and contract management, communication and transparency of processes, time scales, bypassing correct procedures, over-specification, and the necessity for the development of a long term relationship. It was also highlighted that there were no standardised or shared performance measurement systems in place.

Trust was a major issue; both the questionnaire and discussions showed that there was little transparency and therefore little trust between all parties. This issue was also related to the type of relationship that existed between the supply chain partners.

Although the FMA / EFM relationship was intended to be a partnering one, it was in fact a contractual one, with the FMA essentially performing roles which were civil service functions before contracting out. The study highlighted some tension in this

relationship as the FMA felt that the close relationship with EFM undermined their authority.

Trust was also an issue between the FMA and the suppliers. This was evidenced by the fact that suppliers bypassed the FMA to get amendments to contracts. Hence the supply chain relationships generally operated at levels 1 or 2 of the model (fig. 9.2). There is either a one or two way flow of information between FMA and the suppliers, but very little problem solving.

The lack of transparency and adequate communication resulted in the suppliers not understanding the criteria for measurement and approval of contracts, and also why decisions were taken. To complicate matters even further each supplier had a different system of measurement. There was an agreement for a need to review the performance measurement system and develop supply chain relationships to a partnering level where necessary. There was however a consensus that the general principles of the FMA management structure are solid, although the need for some fine-tuning was identified. In addition the need for flexibility in contract management was identified.

Innovation was encouraged and could be suggested by suppliers at any point in their contract term. This must be supported by a sound business case to gain the approval of the management. One of the FMA's roles was to support the suppliers in the development of business cases that support innovation.

The PIDC was successfully applied in the evaluation of the FM supply chain relationships in this organisation. It identified the key areas for improvement, supporting the supply chain in its ownership of its continuous improvement process.

Chapter 10 Reflection

As earlier stated, this is an action research thesis based on an explanatory case study approach to develop an understanding of the phenomenon that is SCM in FM. The first six chapters of this thesis gave the context in which the study is based, and represent the planning stage of this thesis. They examined the background to FM and SCM, and drew correlations between the two management fields. They also explored the issues surrounding SCM in FM, and the requirement for a model to support SCM in FM. An evaluation of three SCM models revealed the i2i model to be the most relevant to FM.

Chapters' seven to nine provided the case studies that applied and evaluated the i2i model, and represent the action and observation stages of the thesis. The next two chapters represent the final cycle of this action research thesis, i.e. reflection. This chapter reflects on two actions. The actions of the research represented by the research findings, and the actions of the research process represented by the methodology, and the research methods and tools employed in the study.

Reflection is an important part of the action research cycle. It is also an essential aspect of action learning (Botham and Vick, 1998). Reflection is defined as *"the crucial process by means of which we make sense of evidence – whether from specific data gathering procedures or from our practical experience as it occurs . . . reflection must build upon the competencies which practitioners already possess"* (Winter, 1989). This mode of learning by 'trial and error' is a means of creating knowledge. Knowledge according to Einstein *"... is experience; everything else is*

just information" (Race and Brown, 2001). To make this knowledge explicit however, it needs to be shared.

The challenge to this research lay in how to create knowledge in the application of SCM in FM from experience and multiple sources of information, and share this with relevant stakeholders. Knowledge can be gained from other people's experiences as well as own experiences. Learning from own experience is termed reflective practice (Winter, 1989). It is defined as "*complex and challenging, particularly when used for public accountability*" (Beaty, 2000). This research thesis has responsibilities for accountability to different stakeholders, namely: the case study organisations, FM practice, FM research, the wider research community, and last but not least, the University of Salford to which it is to be submitted.

10.1 Reflection on the Content

This research reflects state of the art thinking in FM research and practice. The thesis identified FM as a continually evolving and growing discipline, though still mainly reactive to business requirements. It demonstrates through literature review how FM has evolved in its role from a predominantly building services management based discipline, towards a business support management discipline.

The key issues identified in SCM in FM ranged from the micro to the macro, and included client requirement capture, consolidation and rationalisation, integration and process alignment, environmental management and impact of technology. The latter was identified to both create opportunities as well as threats in this field. The drivers for SCM in FM were found to include economic, social and legal drivers.

Case study 2 was an example of a financial driven SCM initiative, whilst case study 3 was driven more by social factors.

SCM initiatives in FM have been emphasised most recently by the UK government through new FM procurement routes and initiatives introduced in the last few years. Private sector clients like British Telecom (BT) are also leading the way in FM supply chain initiatives. Unfortunately the FM outsourcing market is yet to deliver its true potential to meet expanding client's needs.

Integration was identified as a major issue in SCM in FM, with the facilities manager acting as an interface between the business and services management. Integration occurs at different levels within the FM supply chain. This may be in form of systems, processes, information, and management or delivery teams. Hence, SCM in FM needs to be developed at strategic, tactical and operational levels.

The thesis further identified that in order to move from a mainly reactive position to a pro-active one, FM innovation was required. This innovation needs to take the form of new ways of thinking, working and positioning of FM within the business context. Literature review further revealed that the benefits to be derived from innovations in SCM are now being actively pursued in FM, primarily driven by the need for cost savings, and to demonstrate added value to the organisation in terms of shareholder value. Despite this, various authors (Hinks, 2000; Nutt, 1999, Green and Price, 2000) conclude that the discipline is still a way off from achieving a strategic position in business.

The background studies into facilities management and supply chain management highlighted correlations between the two disciplines. Some of the characteristics they share include:

- Management of uncertainties;
- Driven by customer demand i.e. the demand chain;
- Value adding activities to the organisation;
- Involve the management of a complex network of organisations;
- Increasingly subject to the principles of 'lean' philosophy;
- Similar levels of management i.e. strategic, tactical and operational.

It identified that FM is the management of service delivery (Nelson, 2003), and its goal the support of organisational effectiveness (Nutt, 1992); whereas SCM is the management of the system of delivery (Nelson, 2003), with its goal to satisfy and add value to their particular customer (Brown, 2000). Furthermore FM is typically the largest item on the balance sheet, and the second highest expense on the profit and loss account (Alexander, 1996). SCM on the other hand is concerned with achieving the highest possible level of service at best cost (NITL, 2000).

Considering Ross (1999) had proposed that 60% of variable costs are driven by decisions made within an organisation's external supply chain, there are ample opportunities for creating efficiencies within an organisation through effective management of its supply chain. The two disciplines are therefore complimentary and possess the capability for the creation of synergies to improve overall efficiencies and effectiveness.

The three case study organisations approached SCM and FM in different ways. In case study one strategic SCM was initiated at national level by external agencies such as NHS Supplies, with responsibility for strategic procurement, and the DoH. At Trust level SCM was managed very much as operational issues related to the day to day FM service delivery.

FM was split into hard and soft FM, and construction related projects. Each unit had responsibility for managing its own supply chain, although there was an element of collaborative working involved in FM service delivery. The FM model was primarily a direct labour organisation with in-house provision of FM services, and outsourcing of a few 'soft' services. Its FM supply chain was made up of a mixture of in-house and external suppliers.

Case study two had a corporate approach to SCM. It was the only one of the three organisations to have a corporate wide SCM strategy with overall ownership of procurement for all business and support units. FM was only one of the units the procurement team worked with. However its corporate SCM strategy did not go beyond the procurement phase, as there was no evidence of a corporate-wide contract management strategy.

FM was a part of the Property division, although separate from the property management function. It initially operated three FM models namely: bundled or packaged contracts, managing agent and TFM. However supply chain rationalisation resulted in the adoption of one single model, the TFM model.

There were also different drivers for the corporate procurement and FM strategies. Whilst the former was being driven by the need to achieve cost efficiencies, rationalisation to reduce fragmentation of supplier base, performance benchmarking and compliance issues; the latter was driven more by a need for effective management structures, achieving consistency in management and reporting, and the expiration of a number of contracts which provided an opportunity for innovation.

Although case study three had a procurement unit within IWS, the FM unit had direct responsibility for FM procurement. Strategic SCM policy was regulated by

central government. A mixture of direct labour service delivery and single package outsourced contracts managed by a managing agent was in operation. This FM model had implications on the management of the supply chain, giving rise to some of the issues in this study. Both the FM and SCM strategies were driven by best value.

The key areas of development in SCM in FM were identified as the development and management of the right 'cooperative' relationships with service providers and suppliers, and working towards shared goals (Atkin and Brooks, 2000). These key areas have been the subject of the application of the i2i model in this thesis. Co-operation can be viewed in various ways including a contractual relationship, or strategic relationships such as alliances, partnering or collaborative working. These terms represent different, albeit complimentary principles in FM. A contractual relationship based on service level agreements may be cooperative. Partnering and alliances need not necessarily involve integration, whereas integration is an essential aspect of collaborative working (CFM, 2004c).

This was clearly demonstrated in case study 3 where the 'partnering' relationships were found to be in fact, merely contractual relationships delivering to service level agreements (SLAs). Although this view was contradicted by questionnaire responses to whether the suppliers considered their relationships with EFM and the FMA a partnership of equals, it was supported by the accompanying comments. For example comments revealed that the FMA received instructions from EFM, whilst the suppliers received instructions from both EFM and the FMA which caused a few problems. The issue was also raised with respect to the FMA 'having the last say' even where suppliers disagreed with their view. These are not indicative of partnership relationships, but contractual relationships.

i2i was developed as a model for evaluating the relationships between supply chain partners. Its basis lies in industrial dynamics and supply chain / network systems. It is essentially looking at the issues involved in managing a supply chain including people and knowledge management. i2i views innovation in knowledge management terms across the supply chain(s), and adopts a 'portfolio' approach, i.e. innovation can be located at different levels depending on the nature of the relationship. It proposes that achieving the right balance should be the key objective in supply chain relationships, rather than developing all supply chain links to the top level.

This thesis views integration as an important aspect of SCM. The i2i model was developed to evaluate supply chain relationships in the construction industry. Although it did not measure the level of integration between supply chain partners, it did evaluate their level of interaction. This thesis examined the model not only in its evaluation of these relationships, but also in its support for the development and improvement of the supply chain. These ranged from the management process in case study 1, to the procurement process in case study 2, and the improvement of relationships in case study 3. The case studies findings demonstrate the applicability of the model in these areas, within the constraints of the relevant sector.

The public health sector was found to be the most susceptible to external constraints. These came primarily from central government and central government health agencies or authorities, and limited their flexibility or capability to adopt a holistic approach to SCM. Some of these constraints included the political agenda of the government in power, prioritisation based on political decisions rather than business needs, and rigid bureaucratic regulations. Internal constraints included the organisational structure which fragmented service delivery, thereby preventing a

holistic approach to FM and SCM. It also included the cultural issues centred on the predominance of 'hard' FM over 'soft' FM issues, and the lack of necessary resources and senior management commitment to a holistic approach to FM.

The main constraint identified from the second case study was that SCM was cost driven. As such innovation and SCM strategy was geared primarily towards the creation of cost efficiencies, rather than quality improvements. The adoption of a total outsourcing FM strategy has also resulted in all effort being concentrated at the procurement stage, with responsibility for supply chain improvements shifted to the supplier.

In comparison to case study one, the central government department that was the subject of case study three was not restricted by a similar level of constraints, despite being closer to the base of government than the Trust. This in the researcher's opinion is because the public health sector is more open to scrutiny from the media and the electorate. The government therefore exercises more control over this area, setting its priorities.

The main constraint identified in the study was related to the need to demonstrate best value, which in most cases meant lowest cost, driven by the need for public accountability. There were also cultural and organisational constraints specific to the civil service. For example, the duplication of in-house staff and the FMA identified as an issue in the study is a constraint imposed by the inability of the civil service structure to be rationalised, as was undertaken by Company A in case study two.

The three case studies demonstrated various aspects of the supply chain management process identified earlier in this study, to a limited degree. They did

not explicitly set out to evaluate the competitive environment that Stevens (1989) had described as the first stage of the process. This had been undertaken by the researcher through the generic background studies into FM and SCM. Instead the case studies focused on the last two stages, namely: the supply chain diagnostic review and development.

The two SCM stages that the research focused on involved an evaluation of the current supply chain relationships and their levels of interaction in relation to the i2i model, and where gaps were identified, the use of an improvement workshop to support the development of a more efficient and effective supply chain.

The gaps were primarily based on the mismatch between clients' perceptions of requirements and performance, and suppliers' perceptions of the same in line with Harland's model. However a further relationship could be drawn to Harland *et al*'s (2004) conceptual model for the creation and operation of supply networks. This identifies the network context, inputs, enablers, constraints and outputs for research into supply networks. The activities and variables identified by Harland *et al* (2004) are similar to the i2i model and the findings from this research thesis.

The thesis findings demonstrated that the i2i model is applicable as a tool in SCM in FM, as it represents a means to an end. An integrated, efficient and effective supply chain represents the end result (or the output in relation to Harland *et al*), whilst the framework and principles of good practice exemplified by the model represent the means. This framework was found to be applicable both in terms of application as an SCM model in practice, as undertaken in case studies 1 and 3, and also in the evaluation of an organisation's SCM strategy as observed in case study 2.

The research further demonstrated that the SCM principles were applicable both in the public and private sectors of the FM industry. These findings were not only interesting, but also very important to FM practice and research. In the first instance, it contributed new knowledge to FM practice through translating the benefits of SCM into FM, and a demonstration of benefits to the FM industry. It also contributed new knowledge about SCM to the case study organisations, and the wider FM community through dissemination.

The model identified areas where there was room for improvement within the case study organisations. It however did not give guidelines on how to make those improvements, nor link prioritisation with the organisations' objectives. The researcher overcame this in the third case study, by using the focus group workshops to identify the priority areas, and linking the supply chain objectives to the organisation's objectives in follow-up studies (CFM 2003c; 2004b).

Senior management commitment is very important in the implementation of SCM as demonstrated by the three cases studies. In case study 1, there was no senior management commitment to the finalisation and implementation of the model, and as such the issues were abandoned. The second case study organisation had senior level commitment to the entire SCM programme, with the necessary resources made available to the strategic and implementation teams. As such the organisation was able to pursue a holistic approach to SCM and identify both medium and long term benefits from the programme. The organisation also demonstrated through its spend / risk matrix, that longer term gains (total cost of ownership) are to be considered in SCM rather than short term quick wins, in order to be sustainable.

Case study 3 had senior management commitment within the FM department to the review and redevelopment of the SCM strategy. It has started gaining other departmental commitment, and is slowly gaining momentum in bringing more senior management into the programme. This study identified that there were limits imposed on improvements which could be undertaken as a result of the lack of senior management commitment to an overall SCM programme for the directorate. For example, issues related to internal alignment and consolidation could not be addressed as it was outside the remit of the EFM department.

Case study 2 also identified that the i2i framework could be populated with an organisation's own criteria in addressing the issues of strategic importance and capability of the suppliers. The current criteria listed in the framework are merely a guide for the organisation to see if they are in keeping with good practice from industry.

This case study further revealed another dimension to the second part of the framework. In the pilot case study, the ITDC had been used to determine the strategic importance of supply chain partners. In this study, links were found between this dimension and the risk model in use in Company A.

The PIDC was successfully applied in the evaluation of the FM supply chain relationships in case study 3. It identified the key areas for improvement, supporting the supply chain in its ownership of its continuous improvement process. Issues highlighted included partnering and contract management, communication and transparency of processes, time scales, bypassing correct procedures, over-specification, and the necessity for the development of a long term relationship. Trust was a major issue as both the PIDC and workshop discussions showed that there was little transparency in the processes or information.

This lack of transparency and adequate communication resulted in the suppliers not understanding the criteria for measurement and approval of contracts, and also why decisions were taken. To complicate matters even further, each supplier had a different system of measurement as there were no standardised or shared performance measurement systems in place.

This thesis also highlighted gaps in FM research in this field. One of these has been taken up by another researcher now conducting her PhD, based on the gaps in the performance measurement system identified by this study. Furthermore, it demonstrated the applicability of the action research process in undertaking a PhD thesis, and the relevancy of mode 2 or real world research in FM.

10.2 Reflection on the Research Process

To advance as a management profession, FM must promote 'reflective practice' (Schon, 1983), to support innovation and learning in the pursuit of 'business excellence' (EFQM, 1999). This reflection should not only be concentrated on the findings from research, but also on the research processes undertaken.

This thesis adopted the action research methodology to enable the researcher learn not just from the application of the model in practice, but from various aspects of the research process. It aided in the development of the researcher both as an academic, and as a reflective practitioner.

In relation to the five attributes of action research summarised by *Argyris et al* (1985), this thesis demonstrated:

- A change in the researcher's experience and knowledge which influenced the final case study, and led to change within one of the case study organisations, with regard to its performance measurement system.
- The identification of a requirement for a model to address SCM issues in FM, identification of a relevant model, and the application of the model in practice. This application was both an evaluation of the applicability of the model as well as the implementation of the model in FM practice. This cycle was also undertaken with each case study in this thesis.
- Changes in both the knowledge and perception of the researcher, as well as changes in the understanding of SCM issues within the case study organisations.
- A challenge to the current SCM processes in two of the case study organisations through their participation in the study, and the performance management system in the third case study.
- Simultaneous contribution of new knowledge to FM research and practice.

Reflective practice has its basis in phenomenology. In line with Easterby-Smith *et al's* (1991) philosophical paradigms, this research leans more toward the phenomenological philosophy than positivism. The ontological assumption of "reality as a contextual field of information" (Morgan and Smircich, 1980) and the use of explanatory studies make up a novel way of undertaking action research. The thesis is based on the four stage action research process. However the case studies it is based on are made up of two applied research studies, and a descriptive case study. On their own, each stands up to scrutiny as a valid, reliable and relevant piece of research using the case study approach. However, each is also the part of a sum. The philosophical stance of this thesis is described as follows:

- Reality as a contextual field of information – SCM is investigated within the FM context. The issues and benefits relating to SCM are different for each business sector, although some may be applicable or transferable to others. One of the demonstrated purposes of this thesis is to gain an understanding of SCM in FM. Information gathered from SCM initiatives in other industries were translated into new knowledge in FM.
- Man as an information processor – The role of the researcher throughout this thesis was to be an objective and unbiased participant in the evaluation of the i2i model and its application in practice. Information from other industries, FM and the original use of the model were processed and new knowledge created was disseminated to the relevant stakeholders through the case studies.
- The epistemological stance was to map contexts – In this case to relate the findings from the research studies on the applicability of i2i to FM.
- The method was a contextual analysis of Gestalten – Each case study represented an element of the whole study. Each element contributed to an understanding of the various dimensions of the i2i framework, and together, to the full understanding of the applicability of the model in FM.

This was particularly relevant as the thesis is not involved with theory building, but with evaluating various aspects and dimensions of SCM. Likewise the explanatory case study approach incorporating the use of questionnaires and semi-structured interviews was best suited for this investigation as it involved the testing of the model. The Delphi method was considered inappropriate for this study, as the aim of this thesis was not merely to collect data from experts to support decision-making.

The case study approach enabled the researcher to investigate each organisation on its own, whilst using the action research methodology supported the researcher in learning from these experiences, and incorporating lessons learnt in subsequent studies. The best example of this practice is the use of the ITDC in the first case study, but the use of the PIDC in the third. Terminology proved to be a major issue in the first study, which was addressed with the development of the PIDC.

This thesis also demonstrated some of the benefits and difficulties earlier identified with undertaking case study research. However, Amaratunga's (1998) assertions that case study research usually only reports on positive aspects, and generally do not seek to analyse issues, were disproved. Case study evidence show that they all reported on both the positive and negative aspects of the relevant subject matter. Evidence also reveals that analysis was a very important aspect of the case studies, and the thesis as a whole.

In judging the validity and reliability of these case studies (Yin, 1994), the researcher employed the use of:

- Multiple sources of information and a review, and confirmation of draft case study reports by the participants to ensure construct validity (Creswell's member check).
- To ensure internal validity, explanation building through the problem-solving theory (Yin, 1993) was relevant. Although the social-interaction theory (Yin, 1993) was also applicable, as the researcher interacted with representatives of the organisations to fine tune the enquiry and the research tools, pattern building and a analysis of rival theories was not undertaken. This would be undertaken at a later stage when the model has been fully developed into a commercial tool based on the knowledge-driven theory (Yin, 1993).

- External validity was undertaken through the application of knowledge from each case study experience in the next study. The use of replication was not considered appropriate at this stage as the object was not to undertake a comparative analysis of the findings from the studies, but to build on knowledge from these analyses.
- Reliability was ensured through the use of a case study protocol in the presentation of the case studies in this thesis. Reliability would also be ensured in further studies through the use of the CFM case study framework for descriptive studies, and the PIDC for further i2i assessments.

Other methods employed in ensuring validity and reliability (Creswell, 1998) included triangulation, and peer review through publications. The concept of triangulation in social science research was introduced by critical realists that recognised that observation is fallible, has error, and that all theory is reversible. They therefore emphasised the need to use triangulation across multiple error sources to get a better understanding of the phenomenon. Care also needed to be taken that the researcher's interpretation is of what is observed, and not what the researcher would like to observe.

The methods of verification employed in this study including follow up discussions after the interviews, confirmation of the report and its contents by the participants, and clarification through workshops were found to be effective means of triangulation. The key issues identified in each study were confirmed by the organisations either because they had previously been aware of them, or because on reflection, after the presentation of the findings, they realised that these were actually the key issues.

The verification processes also brought to the forefront responses which were not corroborated or that were in actual conflict with other responses. For example, responses from case study 3 revealed that some suppliers, who considered their services as very important to the department, felt that a significant failure in their service provision would only be quite harmful to the department, rather than extremely or very harmful.

Still from case study 3, there was also the issue of perception of partnership. The questionnaire responses had the majority of suppliers agreeing that they had a partnership of equals with both EFM and the FMA. However, the accompanying comments by the respondents contradicted this view as explained earlier. These issues were raised in the workshop, and are indicative of the requirement for corroboration.

This leads to a reflection on the data collection tools employed in this thesis, namely: literature and document review, interviews, questionnaire and focus group workshops. Each technique was found to have its advantages and limitations.

Literature and document review proved invaluable in collating data, where such existed. However as SCM in FM was a relatively new area of research, related literature were not always available.

The use of questionnaires in social science research has generated a lot of debate over the years (Foddy, 1993). Three guidelines were earlier identified for structuring a questionnaire (Peterson, 2000). The ITDC questionnaire though relevant, was found to be confusing for respondents contrary to the first guideline of easy administration. The variations in responses proved that it was not a reliable source of data. In order to ensure its reliability, the researcher held another set of meetings

with both respondents to reach a consensus. This has only been made possible in a small research study. It also brought to the forefront the arguments in social science research about the dependence on questionnaire surveys (Foddy, 1993). Examples of such arguments identified in this study include:

1. The relationship between what respondents say they do and what they actually do is not always very strong. For example, respondents perceived that they had a relationship of equals with EFM and the FMA in case study 3, whereas through their own words, they demonstrated a highly unequal contractual relationship.
2. Respondents' attitudes, beliefs, opinions, habits, interests often seem to be extraordinarily unstable. For example, respondents made a u-turn over some of their responses in the questionnaire at the workshop.
3. Respondents commonly misinterpret questions. This was in evidence in case study 1. The researcher was required to explain every question in detail to the respondents;

As such questionnaire responses needed to be validated through other means such as follow up interviews and workshops. In addition, the questionnaires generated a wealth of rich data from the comments of the respondents. These were found to be extremely useful not only in gaining a deeper understanding of the issues, but in bringing these issues out for discussion in the open forum.

The use of the CFM case study framework enabled the researcher to undertake a descriptive study, which when analysed, revealed links with the i2i framework. The CFM framework would enable similar studies to be conducted in the future gathering the same level of information from organisations, to undertake comparative analysis of the findings.

Data analysis tools were also adapted for this study. The semantic differential scale was employed in the original i2i study. However feedback from project participants was that this scale was not clear to them. In adapting the scale to make it more relevant to the organisation, the researcher looked 'outside of the box' and developed an itemised scale, which although took in the principles of the semantic differential scaling, also adopted the advantages to be found in other types of itemised scales. This necessitated the researcher to develop or adopt a relevant method of data analysis, which in this case was the use of a matrix.

The research study's use of content analysis also did not follow the traditional approach of first setting up a list of categories for analysis (Stockdale and Standing, 2002). The approach adopted by this study was to start with a blank sheet and develop an analysis grid based on the responses from the questionnaire (Gillham, 2000). These were further analysed and grouped under criteria from the respondents. This method was found to have reduced bias in the research findings, which has made the results more relevant.

In terms of the role of the researcher throughout this process, Stake (1995) identified various characteristics to be demonstrated by a case study researcher.

The researcher believes these roles were fulfilled as follows:

- Teacher – Through dissemination of new knowledge in SCM in FM, and supporting the case study organisations in gaining a deeper understanding of the issues in their organisations.
- Advocate – Through dissemination of the findings of the research through publications, seminars and workshops.

- **Evaluator** – Through the interpretation of the models strengths and weaknesses, and also the strengths and weaknesses of the research process.
- **Biographer** – The cases studies provided a snapshot of organisational strategy and SCM in FM in the three organisations at a specific point in time. Subsequent case studies can revisit these to identify improvements in SCM through time.
- **Interpreter** – Through the interpretation of the findings from the second case study and creation of links to the i2i model. These demonstrated that the framework was a guideline for good practice, with identifiable links to organisational strategies in SCM in FM.
- **Constructivist** – Through the presentation of the facts of the case studies, and constructive analysis of the findings. These created a basis for the audience to conduct their own analysis of the findings.
- **Relativist** – Through the belief that the relevancy of the model is subject to constraints and barriers in the industry sector.

10.3 Personal Reflection

The last two sections have detailed the researcher's reflections on the output of the study and the method of the study. This section explores the personal reflections of the researcher on the PhD process. It will therefore be written in the first person form.

If I start from the beginning, my expectations of what a PhD is and should be at the beginning of process, was that it should be a highly intellectual process which

should produce a brilliant piece of new work that would make everyone gasp and stand in awe. I believed that if the candidate knew what they were doing and applied their selves to it, it should be completed in less than no time. The reality was five years of hard work. It was in understanding FM practice and topical issues driving FM and SCM in FM in particular. It was in understanding organisational cultures and how they impacted on practice. It was doing research which was currently relevant to industry. This gap between expectation and reality was an issue I had to grapple with throughout the period of the research.

Many a time, I asked myself WHY? Why was I doing this? Why was I doing it this way and not that? I had to keep reminding myself of the benefits from this undertaking, some of which have been documented (Heath, 1984). The PhD process itself could be mapped and shown in logical sequence. However within these logical phases lie a host of activities, issues, constraints, barriers, opportunities and most of all learning.

"We learn by doing and realising what came of what we did" (Dewey, 1938). This quote from an unknown source aptly describes some of my thoughts on the PhD process, with Revans (1991) stating that this is "nothing new". Most of my learning has come out of doing and listening, and reflecting on those activities. This reflection came in terms of individual reflection, as well as group reflection through action learning set sessions. The latter is 'officially' recognized as action learning as it involves a group (Inglis, 1994).

Learning has not only been centred on new knowledge gained about the subject matter of my research and academia, but also on myself; on my abilities, my strengths and weaknesses. This knowledge supported and developed my skills as a researcher and contributed to my personal development throughout the PhD

process. I have learnt about determination, perseverance, diplomacy, patience and most of all belief in myself and my abilities. I have gained confidence through the validation of my research through publications seminars, and the trust placed in me and the outputs of my research by top level FM practitioners.

Learning comes not only through doing something but reflecting on what has been done. Formal reflective practice may rarely occur, however in many ways we demonstrate reflective practice in our work. *“Reflective practice is complex and challenging, particularly when used for public accountability”* Beaty, L (2000). Undertaking an action research PhD I found was a good test of complexity. This was partly due to the time constraints involved, but also the challenges faced at various stages of the process. For example in gaining access to case studies, and getting the commitment of resources from the organisations to see the studies through to their natural conclusions.

It is not for me to judge how successful I have been in learning. I may reflect on my successes and failures, but find that accountability plays an important role at the end of the ‘official’ PhD process. I say official, as my PhD may be conferred after the presentation of this thesis, but the learning process continues forever. However there comes a point where my ‘learning’ will be formally judged, which is the point I am currently at in this process.

As part of my reflective process however, I considered Race’s (2001) list of five factors for successful learning, namely:

- Learning by doing;
- Learning from feedback;
- Wanting to learn;

- Needing to learn;
- Making sense - 'digesting'.

My whole approach to my PhD study was on learning through action. The action taking place within the organisations I worked with, and my actions as a researcher. This represents the learning by doing aspect.

I learnt from feedback from various sources. One source was the case study organisations themselves. This feedback came in various forms, both formal and informal, and on various issues including the methods used, the output, and my conduct as a researcher and facilitator of learning within the organisations.

Feedback was also provided by my academic peers through interviews and discussions, seminars and workshops, refereed publications, and through the action learning set. The set supported me in clarifying issues related to methodology and research methods employed. It however also supported me in understanding research issues which may have caused a dilemma (a problem shared is a problem halved), and how various influences shaped my research and methods.

These influences include my background in property management, my earlier role in academia as co-ordinator of The Process Network and the researchers I met through this, the move of the CFM from the University of Strathclyde to Salford, other projects I was involved in and with through the process of the research study, workshops and seminars I attended or facilitated, and discussions (both formal and informal) held with various academics and practitioners.

Learning also resulted from my wanting to learn in general, as well as to develop in the field of SCM in FM. This led to a need to acquire knowledge on the subject

matter and related issues. Lastly, learning came from ingesting and digesting knowledge gained throughout the PhD process, and applying it towards growth in my professional and personal development.

My reflection on my development through this process show different phases I went through, and how my thoughts were developed, shaped and finally my own stamp of what I believed in. These are mapped out in the various publications I produced over the course of the PhD study.

The PhD process I see as my development as an investigator and a scholar. I had previously discussed the roles of a researcher and my reflections on those in the last section. I will now explore what it means to be a scholar.

Scholarship is defined as academic learning or achievement (Encarta, 2004). A scholar may be defined as a learned person (an expert in a field), or a student (Encarta, 2004a). I see myself as a student of research. My subject areas may change or I may become more knowledgeable in a particular area, but will remain constantly seeking to learn new things, the essence of research.

Several important aspects of scholarship have been identified (Glassick *et al*, 1997), namely:

- Does the scholar critically evaluate his or her own work?
- Does the scholar bring an appropriate breadth of evidence to his or her critique?
- Does the scholar use evaluation to improve the quality of future work?

Critical evaluation as a means of improving the quality of work or for self development as can be seen is an important of scholarship. I have undertaken this critical evaluation in various ways as earlier described to validate not just the output of my research, but my methods of research as well.

Glassick (2001) went further in describing various forms of scholarship, which I interpret in the following ways:

- Discovery – Seeking to find new things or innovation;
- Integration – Bringing together existing ideas or methods;
- Engagement – Taking theory out into practice, i.e. implementation and use;
and
- Teaching – Dissemination and transfer of knowledge through learning.

Standards need to be set and maintained in scholarship so that the award of degrees and other academic accolades can be seen to be meaningful. These standards (Glassick, 2001) include:

- Setting Clear Goals;
- Adequate Preparation;
- Use of Appropriate Methods;
- Significant Results
 - Are the goals achieved?
 - Does the work open up an area of research?
- Effective Presentation
 - Are the results presented to an appropriate audience?
- Reflective Critique.

In addition Glassick (2001) added that a scholar must have certain attributes namely:

- Integrity;
- Perseverance; and
- Courage.

These attributes I believe have been demonstrated through my completion of this thesis, as I viewed the completion of the thesis as an achievement in starting and completing a task, and a test of my determination.

A challenge arose which contributed to the limitations of this PhD study, as there was a change of my supervisor six months before the submission of this thesis, due to my original supervisor leaving the university. I had previous to this, been caught between the views of my original supervisor, my second supervisor who is also my employer, and my views of where my research ought to be focused. This was eased with the change in supervisor, though not completely eliminated.

Lastly, as part of your (the reader's) reflection, I would ask that this thesis is viewed not as the work of a clever person who tells you what she knows and tries to explain it to you (although this may seem to be what my thesis represents in order to meet the academic requirements), but as the work of the 'wise', which encourages you to discover it for yourself (Revans, 1980).

10.4 Summary

The adoption of the action research approach by this thesis, has contributed to a better understanding of the phenomenon that is SCM in FM. The thesis

acknowledged its accountability to the stakeholders involved in this research study. It also acknowledged the state of the art contribution of knowledge in SCM in FM to both FM practice and research.

Generic background studies into SCM in FM provided the context in which the applicability of the i2i model was evaluated. Findings from the three case studies revealed that although the i2i model is applicable in FM, it is subject to limitations imposed by external and methodological drivers.

This research process has been a learning experience, both in terms of direct experience gained first-hand by the researcher, and indirect experience gained from the actions or inactions of others.

As a reflective practitioner and scholar in FM research, this journey has proved highly informative and supported the development of the researcher both as a researcher and practitioner in the field of SCM in FM. It has also led to a better understanding and further development of the use of applied and action research in FM, contributing to the originality of the study.

The thesis has benefited from the exploration of a new area of research, as well as the novel and innovative use of research methods for data collection and analysis. However, the study is by no means complete. Further development is required in terms of the methodological tools to ensure repetition of the model's application. This is in true keeping to the action research methodology which is an iterative process. A full cycle of planning, acting, observing and reflecting has now been undertaken which should inform the next cycle of action.

Chapter 11 Conclusion and Recommendations

This thesis takes an action research approach to understanding the applicability of the i2i model in SCM in FM. This approach was judged the most appropriate as it enabled the researcher to evaluate the model in practice through action, observe the results through analysis and reflect on the results and the processes undertaken in the research.

Its philosophical stance lies in between phenomenology and positivism (and subjectivism and objectivism), viewing reality as a contextual field of information. This stance was particularly appropriate to investigate a model with a knowledge management basis. The stance involved the investigation of the phenomenon as a set of elements whose sum made up a whole. The three case studies were elements of this research whose findings and analysis contributed to the evaluation of the applicability of the model.

This research grew out of a gap identified in research in this subject area, and the growing need for a model to address SCM issues in FM. It identified that this need, driven by business, was brought about by a number of factors including:

- Changing market conditions which encouraged innovation in gaining competitive advantage,
- Changing work practices and organisational forms,
- Changing legislation and regulation especially driven by European directives,
- Increasing need to demonstrate best value,

- Ever increasing employee expectations, and organisations' need to win the war on talent,
- Increasing cost of space on organisation's balance sheets, and the need to improve shareholder value.

Some of these drivers have been enabled, and in some cases driven by advances in information technology, whose role cannot be overemphasised. The thesis further identified that FM as a discipline has evolved over the past years from its traditional building services maintenance role moving towards a business infrastructure support role. In order to justify its added value to the organisation and be regarded as a strategic discipline, FM needed to move away from traditional perceptions of it as an overhead, to a position where it can demonstrate its strategic capability. This is made even more important by other research identified in the thesis which show that facilities account for the highest proportion of the balance sheet in terms of assets, and also the profit and loss account in terms of expenditure next to the human costs.

This research identified many ways in which FM can demonstrate its strategic capability (Williams and Roberts, 2000; Grimshaw and Cairns, 2000; Cassels, 2000; Nutt, 2000; CFM, 2002; CFM, 2003). It identified that SCM has developed in its own right as a strategic discipline from its logistics and purchasing roots, within the manufacturing, retail and automobile industries to name but a few. This drive has been due not only to the adoption of the principles of lean philosophy and advances in technology, but also to the shift in knowledge management in work practice.

It also identified that demonstrable benefits of SCM in these industries can be translated into FM. This has been made more urgent by the drive towards FM outsourcing and the need for the management of a complex network of

organisations, rather than a previously predominantly in-house network of departments.

11.1 Achievement of Aims and Objectives

Although the importance of SCM in FM has now been recognised, very little research is being undertaken in this field. In addition, very little documentary evidence exists of SCM initiatives or successes in FM.

The aim of this thesis was to evaluate the applicability of the i2i model in SCM in FM as a means of bridging some of the gaps identified in this field by a preliminary study. The thesis explored literature on SCM in other industries and sought to understand the implications and the benefits to be derived in FM by adopting this approach. It went on to identify SCM issues in FM, and document SCM initiatives in FM and actual benefits derived by those organisations.

These set the context for the evaluation of the applicability of the Integrate to Innovate (i2i) model, (which had been developed for the construction sector) in SCM in FM through the use of case studies. The thesis identified that other well-established models are currently in use in other sectors, and undertook an evaluation of three supply chain models including the i2i model, to identify the most appropriate for application in FM. The evaluation revealed the inadequacy of one model, as it was related only to the design stages of a project, and the inappropriateness of another, as it necessitated a dependency on performance measures which are still immature in FM. Neither of these two addressed 'soft' issues which are a major facet of FM.

The thesis adopted an explanatory approach to case study research to investigate: if the i2i model was applicable, how it was applicable, what barriers and constraints impact on its applicability, and what opportunities the model presents for SCM in FM. It addressed its research questions as demonstrated below:

11.1.1 Is the i2i model applicable in the FM industry?

The i2i model is a representation of the various levels at which supply chain relationships take place, whilst the framework is a representation of principles to be considered in 'good practice'.

The case studies demonstrated that the model is applicable in both the public and private sectors of the FM industry. It represents a series of guidelines or principles to be followed in SCM rather than a prescriptive model which instructs on steps to take. The model itself describes the levels of interaction necessary to deliver FM. This could be directly related to the FM tasks at strategic, tactical and operational levels.

The framework provided a guide to the three principles involved for successful supply chain partnerships, namely: "Could we work together", "Should we work together", and "How do we work together"? The case studies demonstrated that the model was compatible with current practice in FM, but acted more as a benchmark for organisations to measure their SCM. This measurement is not in terms of fiscal measures, but in terms of process measures. These are qualitative measures which look at what other organisations are doing and how they are doing it, and learning from both success and failure of those organisations initiatives.

The three case studies evaluated the applicability of the model at various levels of SCM. At strategic level, they investigated issues relating to the development of supply chain objectives and policies, the composition of the FM supply chain and the organisational structure necessary to achieve integration. They identified that a holistic approach was required to undertake SCM initiatives. This may be done in phases but the impact of action or inaction in one area needs to be assessed as part of the whole process.

At tactical level, the case studies identified some of the resource issues related to SCM in FM. This included the creation of the right organisational structure to support SCM initiatives, as well as organisational and supply chain alignment. It also included supply chain integration.

At operational level, they examined the systems and processes necessary for successful SCM. These included the procurement, monitoring, management and performance assessment processes.

They identified that a number of variables are important for the successful implementation of the i2i model in FM. These are senior management commitment, adequate resources, trust and transparency, a supply chain culture which accepts change, and ownership of the attendant change process by the supply chain partners. They also identified that supply chain culture is as important as individual and organisational cultures. These are closely related to previously listed criteria for successful SCM identified from literature review.

In terms of the three stage process of SCM, this thesis explored the last two stages, namely: supply chain diagnostic review and development. It did not undertake a detailed study of the applicability of the model in the evaluation of the competitive

environment. It however addressed the research questions to which the researcher was seeking answers to in the following ways:

11.1.2 How can it be applied?

The thesis demonstrated through the case studies, that the application of the model is not prescriptive. It may be applied using the research methods or tools adopted by the original study, or by the new tools such as the i2i assessment or the partnership interaction diagnostic checklist developed in this study.

Its application is more related to using the framework as a measure of good practice, and developing or adapting of current organisational tools to address the issues highlighted by the framework. Various research tools have been employed in this thesis for both data collection and analysis. These include the use of literature and document review, questionnaires, interviews and workshops for data collection. It also adapted data collection and analysis tools to make them more relevant to the study and improve the reliability of the results.

11.1.3 What are the barriers or constraints impacting upon its application?

The most important constraints which emerged from the research across sectors were the issues of resources and senior management commitment. In the public health care sector political, financial and regulatory factors were identified as placing constraints not just on the application of the model, but on SCM in general.

Another constraint to its implementation identified by the thesis is the lack of a defined set of research tools to ensure the repeatability and reliability of evaluation

studies. One of the main criticisms earlier voiced about the approach to this study was the use of various methods for each case study. It had been suggested that in order to ensure rigour, the same methods should be applied in each study. However, as this study is an explanatory study, it was not only very important to test various methods in the course of fact finding, but to see how best they could be applied on a sort of 'trial and error' basis. This added rigour and relevancy to the study, by testing various options open to the researcher.

11.1.4 What are the opportunities it presents?

The research identified a need for standard set of research tools to be employed in the application of this model, which presents an opportunity for future research to develop standard tools to be employed for various purposes as adopted in this thesis. This would provide a guide for organisations to match tools to purpose.

The research also identified that the model presents an opportunity for FM organisations new to the concept of SCM, to undertake a diagnostic review of their supply chain, and to provide a guide for the development of their supply chain.

11.2 Limitations to the Study

The first limitation to the study is the vastness of the subject area; both FM and SCM cover a vast area of subjects and specialisms within their core. In order to adequately deal with the research and complete this thesis, it was important that whilst addressing the issues raised in a holistic manner, there remained a true focus for the study. It is therefore important to discuss the limitations to the study based

on the identified scope of the research in Chapter 1. The identified limitations to this study are:

- The need to explore demand chain versus supply chain issues, and their relevance to FM. This, although very important to FM, has had to be examined in the context of the subject matter of the research.
- The need to focus on either the client view or the service delivery view, as they differ greatly. In FM, the client view frequently varies from the suppliers view. Although SCM issues in FM have been identified from both the client and supplier viewpoints, this research has been undertaken with client organisations. They are however reflective of supplier viewpoints, as the case studies are undertaken not with the business itself, but with the in-house and outsourced FM service providers.
- Although there was the temptation to delve into the need to justify the strategic benefits of FM to the organisation, this could not be exhaustively dealt with as it was not the main purpose of the research. Instead, it would attempt to justify the strategic benefits of addressing SCM issues in FM.
- Limitations imposed by accessibility to full details regarding the models.
- The researcher was unable to test each model or technique in a case study to justify the selection of the i2i model.

- Likewise, the researcher was unable to test the whole of the framework for the model in the same organisation mostly due to resource issues for the participating organisations; or with organisations in the same sector.
- The time scale for the delivery of a PhD thesis had its limitations on the extent of the research.

Access to the required information (some of which are business sensitive and cannot be disclosed or published) also influenced this study. Some of the details will be published confidentially and not as part of this thesis as agreed with the case study organisations.

11.3 Contribution and Recommendations to Research

The contribution of this thesis to the research community revolves around its exploration of its philosophical and methodological stances. It demonstrates a new approach to the use of explanatory case studies in undertaking an action research thesis, based not on action research case studies, but applied research. The action being investigated and contributed to is that of the research process and the researcher. This is however based on the actions undertaken within the case study organisations.

This methodology supported by scholars (Zuber-Skerritt and Perry, 2002), enables the researcher to explore and learn from both the findings of the research and the process of the research. The thesis found that this was particularly useful when undertaking an explanatory case study research as it enabled each study to be

undertaken and reviewed as a single study and brought together through the action research process. This was in line with the adopted philosophy of viewing the individual elements of the research and bringing them together as a whole.

It employed the use of several research methods and tools adapting them to the purpose of the research. Data collection and analysis tools were used in novel ways in this study to better understand the phenomenon being examined, and contribute to the reliability and validity of the study. For example, the original i2i study employed the use of a semantic differential scale in the questionnaire. This was adapted by this thesis, with the adaptation although remaining an itemised scale, not falling within any of the traditionally used types.

The thesis also employed several forms of verification to ensure the reliability of data. These included follow up discussions after the interviews, confirmation of the case study report by participating organisations, and workshops to discuss the issues raised by the study. This contributed to an understanding of how these various means of verification add reliability to the results of a research study.

Recommendations to research include:

- Do not be afraid to go out of the 'box' and explore new ways of using existing tools;
- Think holistically but see the individual elements which make up the whole as being just as important;
- Ensure reliability of data by using several methods not just for data collection and analysis, but verification as well;
- Explore the phenomenon with as much objectivity as possible even where emerging results are not what was expected, or where it is contradictory.

11.4 Contribution and Recommendations to FM Research

Research in SCM in FM is still in its infancy. Very little documented evidence of success or unsuccessful stories exists publicly in this field. This thesis has contributed to knowledge in this field through its explanation of the background of SCM in other industries and the transferability of lessons learnt to FM.

It has also contributed to documenting evidence of SCM initiatives in FM. Its approach has not been singular, i.e. simply looking at cost benefits, but taking a systems approach to addressing SCM issues. It has contributed to an understanding of what issues organisations are concerned with in SCM in FM. In addition, it has contributed a guide to 'good practice' in FM SCM through its exploration and clarification of the applicability of the i2i model.

This thesis also highlighted the different drivers and constraints in different FM market sectors to SCM. In the two public sector organisations, we see the impact of different levels of central government regulations and policies in the implementation of supply chain initiatives in FM. The public health sector is subject to more regulation and political influence than the central government department. Although the commercial FM market had a different set of drivers, it was still dealing with similar issues in SCM to the public sector organisations, including achieving best value, consolidation and rationalisation and ensuring selection of the right calibre of service providers to mitigate associated risks.

Last but not least, it identified new areas of research for FM, and created the opportunity for another researcher to undertake her PhD in the development of a shared performance measurement system identified in case study 3 as the priority

area. This PhD research is currently ongoing and will lead to the generation of new knowledge in FM supply chain performance measurement.

The ensuing performance measurement project commissioned by EFM, has also led to the generation of new knowledge in FM performance management, which the researcher is taking forward as part of a wider FM service partnerships project with the CFM Foundation.

Recommendations to FM research include to:

- Take forward issues highlighted in this thesis and identified future research.
- Adopt either an applied or action research approach to FM research to gain a deeper understanding of FM as a discipline, and add relevancy to FM research.

11.5 Contribution and Recommendations to the Case Study Organisations

The first and third case studies were undertaken as applied research with the participating organisations. In these two cases, specific problems had been identified, which the research aimed to address. The understanding and identification of areas of improvement were in the first instance the contribution of this study to these organisations.

Specifically, in case study 1 the research contributed to a better understanding of the supply chain relationships in the Trust, undertaking a diagnosis of where they currently stood, and where they wanted to be. The discussions brought to the

forefront underlying issues which had been ignored. These issues had serious consequences not just for the supply chain, but in some cases for the individuals involved in the event of failure.

It also highlighted some of the frustrations being faced by the Trust in SCM resulting from political, legislative, regulatory and resource constraints imposed on the organisation. These were identified as barriers to the successful implementation of holistic SCM initiatives in the Trust.

In case study 2, the research contribution to Company A involved the capture of their FM procurement project as a case study. This enabled the organisation not only to get a clear picture of their process, but also to see how it compared with the i2i framework representing good practice. It provided a confirmation to them that they were addressing the right issues, and helped them to identify gaps in their current strategy.

Case study 3, in so far as this research study is concerned was a success. It was a success in terms of the application of the i2i model to identify areas of improvement in the management of the organisation's FM supply chain. This study led to the commissioning of a two-phase project by the EFM department to review their current performance measurement system and develop a shared measurement system in line with the i2i thinking, and gave the researcher the opportunity to participate in the implementation of the model. Hence the applied research has moved a stage further into action research. This project has recently been completed and the researcher has been asked to draw up a proposal for the implementation of the recommendations.

It was also a success in the application of lessons learnt from the previous two case studies and the joint development of a new questionnaire, the partnership interaction diagnostic checklist, which evaluated all three dimensions of the framework relevant to the organisation.

Recommendations to the case study organisations are contained in the individual case study reports presented to the organisations. Further recommendations from this thesis include to:

- Implement continuous improvement initiatives in SCM.
- View initiatives not as one-off exercises but in the context of the long term business strategies.

11.6 Contribution and Recommendations to FM Practice

This thesis has demonstrated that SCM is not just a buzzword or fad in FM. It shows that though it is taking a while to sort the wheat from the chaff, there are growing examples of good practice in this field now emerging. It also identified that although SCM could create a 'win-win' scenario, it should not be addressed on its own, but in the context of the FM demand and value chains.

The i2i model was found to be a representation of good practice in demonstrating added value to business organisations from undertaking FM initiatives. The thesis has helped to identify the relationship between the different dimensions of SCM and FM tasks at strategic, tactical and operational levels. It has also identified how the i2i model can be applied to develop and generate improvements in SCM.

It has brought to the forefront issues related to managing not just increasingly complex networks of organisations, but increasingly complex levels of knowledge. With the identified trend in FM towards the management of uncertainties and intangibles, knowledge management becomes an increasingly important aspect of FM. Knowledge resides within and across the supply chain which needs to be captured and managed to improve efficiencies and effectiveness, as demonstrated by this thesis.

Recommendations to FM practice include to:

- Invest more in research into SCM in FM.
- Share knowledge and experience in this field, in order to improve competitive advantage as a profession against other professions encroaching into FM functions.

11.7 Suggestions for Future Research

A number of areas were identified for future research in this field. This list excludes current ongoing research identified through this study, but includes to:

- Investigate how SCM tools such as ERP, CRM etc can support the implementation of the i2i model. As there are numerous tools in the market to support SCM, there is a need to investigate their compatibility with the use of the i2i model, and see how they can enhance and improve its application.
- Develop tools for measuring the severity of impact of failure of suppliers on the organisation in this field. In order to prioritise relationships, this study found that it was important to understand the severity of the impact of failure. It recognised a need to identify current tools used in these measurements and to investigate their application in the i2i model.

- Evaluate the causal links between supplier failure or underperformance, FM performance and business performance. This thesis identified that it was not only important to measure the severity of impact, but also to link supplier failure or underperformance ultimately to the business performance to demonstrate the added value of FM to business performance.
- Develop a set of research tools for SCM evaluations and identify links to various aspects of supply chain evaluations. The thesis further identified a need to develop a standard set of research methods to be employed for the evaluation of specific supply chain processes, in order to develop the model into a tool to be actively used in industry.
- Advance knowledge through the action research process. The thesis also identified the need for further action research in this field to advance and disseminate emerging knowledge in this field.

11.8 Conclusion

This thesis achieved its aim to explore the applicability of the i2i model in SCM in FM in the United Kingdom through its application in three different FM sectors using the case study approach. The selection of the sectors was limited by the relevancy of the study to organisations within the period of study.

The study investigated various ways in which the model could be applied, and identified that it may be used to evaluate supply chain relationships at strategic, tactical and operational levels of SCM in FM. The main advantage of its application was found to be in the discussions it generated in identifying SCM issues in FM, and taking forward supply chain improvement initiatives.

The research found that its relevancy in FM is limited by the constraints faced by SCM in different facilities sectors. However it also revealed that without the constraints, the model was applicable in evaluating supply chain strategy, developing the supply chain and managing the relationships.

The case study approach was found to be most appropriate for this study as it enabled the researcher to investigate the phenomenon and the research methods employed in real world settings. The adoption of the action research methodology for the development of the thesis enabled the researcher to learn from the findings and the process of the research, and implement these in successive studies.

Lastly, the research identified that one advantage of the model lay in the fact that it was not prescriptive which enabled its translation into FM. This however also proved to be a weakness which needs to be addressed by the development of a set of standard research methods to be employed in its future application.

Appendix 1 – FM Scope

THE ROLE OF FACILITIES MANAGEMENT

BUILDING OPERATIONS AND MAINTENANCE

- Electrical
- Fabric
- Fittings
- Grounds
- Mechanical
- Specialist equipment

SUPPORT SERVICES

- Catering and vending services
- Cleaning
- Courier services
- Events Management (conferences etc)
- Furniture management
- Housekeeping
- Internal moves
- Landscape internal
- Laundry
- Library
- Mail room
- Office support services (reprographics, printing etc.)
- Porterage
- Reception
- Security
- Shops/Retail
- Travel

INFORMATION TECHNOLOGY & TELECOMMUNICATIONS

- Cable management (structured, ad-hoc)
- CAFM systems (CAD, PPM, GIS, DSS, etc.)
- Call Management (telephone answering service etc)
- Computer/server/data centres (Labs)
- Customer response/support - Helpdesks
- Information services - staff
- IT advisory services
- IT Research & Development
- Management information systems
- Network & telecommunications software
- Network services & management (LAN, WAN)
- Systems administration & management
- Technical services (installation/operation/maintenance.)
- Telecommunications services (voice and data)
- Telecommunications systems

TRANSPORT

- Fleet management
- Site transportation
- Vehicle renting and leasing

PROPERTY MANAGEMENT

- Asset management
- Design / Construction
- Disposals / Acquisitions
- Management Consultancy
- Project management
- Relocation management
- Space planning

INFRASTRUCTURE

- Utilities (Gas, water, electricity)
- Road

ENVIRONMENTAL MANAGEMENT

- Energy management
- Health & Safety
- Hygiene services
- Pest control
- Recycling
- Waste management

BUSINESS SUPPORT SERVICES IN THE CLIENTS' ORGANISATION

- Administration
- Contract Management
- Disaster recovery
- Finance
- Human Resource Management
- Insurance
- Procurement
- Provision of serviced accommodation

Appendix 2 Interaction Type Diagnostic Checklist

Issue Description:	
Supply chain interaction characteristic	Operational <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Strategic
Rarity	Not Rare <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Very Rare
How frequently do interactions occur?	Notes:
Radicality of Consequences	Not Radical <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Very Radical
How far is the interaction likely to change things within the organisation?	Notes:
Seriousness of Consequences	Not Serious <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Very Serious
How serious would it be for the organisation if the chosen supply chain interaction went wrong?	Notes:
Diffusion of Consequences	Not Widespread <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Very Widespread
How widespread are the effects of the supply chain interaction likely to be?	Notes:
Endurance of Consequences	Not Long <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Very Long
How long are the effects of any supply chain interaction likely to remain?	Notes:
Precursiveness	Not Precursive <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Very Precursive
How far is the solution of the supply chain interaction likely to set parameters of subsequent decisions?	Notes:
Number of interests involved	Few Parties <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Many Parties
How many parties, both internal and external to the organisation, are likely to be involved in the solution of the problem?	Notes:
Summary:	

Appendix 3 Interaction Type Diagnostic Checklist Version 1

Issue Description:					
Supply chain interaction characteristic	Operational			Strategic	
Rarity	Daily	Weekly	Monthly	Yearly	Rarely
How frequently do interactions occur?	Notes:				
Radicality of Consequences	Little Impact		Medium Impact		High Impact
How far is the interaction likely to change things within the organisation? E.g. Would it produce fundamental changes?	Notes:				
Seriousness of Consequences	Not S	Some D	Serious	Serious D	Very S
How serious would it be for the organisation if the interaction went wrong?	Notes:				
Diffusion of Consequences	EBME	Est. Services	Operations	O. Dir	Widespread
How widespread is the impact of the interaction likely to be?	Notes:				
Endurance of Consequences	Short Term		Medium Term		Long Term
How long are the effects of the interaction likely to remain?	Notes:				
Impact on future decisions	No Impact	Little Impact	Medium Impact	High Impact	
How far is the solution of the interaction likely to set parameters of subsequent decisions?	Notes:				
Number of interests involved	EBME	Est. Services	Operations	O. Dir	Outside Trust
How many parties, both internal and external to the organisation, are likely to be involved in the solution of the problem?	Notes:				
Summary:					

Key: Not S – Not Serious, Some D – Some Disruption, Serious D – Serious Disruption, Very S – Very Serious
 EBME – Electro/Bio-Medical Dept., Est. Services – Estate Services, O. Dir – Other Directorates

Appendix 4 Interaction Type Diagnostic Checklist (ITDC) Version 1 Results

SERVICE DELIVERY RELATIONSHIP													
Characteristic	Customers			Collaboration for Service Provision				Suppliers			Manufacturers		
	Theatres / ICU	Wards	Other depts.	Other trusts	Estate Services	Hotel Services	Hotel Services- With Gases	Supplier A	NHS Supplies	Manufacturer A	Manufacturer B	Manufacturer C	
Rarity	O	O	O	O	O	O	N	O	O	O	S	S	
Radicalism	S	S	S	S	S	O	N	O	S	S	S	S	
Seriousness	S	O	O	S	O	O	N	O	S	O	S	O	
Diffusion	S	S	O	S	S	S	N	S	S	S	S	S	
Endurance	S	S	O	S	S	S	N	S	S	S	S	S	
Percussiveness	S	S	S	S	S	S	N	S	S	S	S	S	
Interests	S	S	S	S	S	S	N	S	S	S	S	S	

Appendix 5 i2i Assessment - EBME

SERVICE DELIVERY RELATIONSHIP	Current Position	Desired Position	Difference	Priority
Customers				
Theatres / ICU	3	3	0	
Wards	1 / 2	3	1 - 2	x
Other departments	2	3	1	
Other trusts	3	3 / 4	0 - 1	
Collaboration for Service Provision				
Estate Services	3	3	0	
Hotel Services	1	2	1	
Hotel Services - Gases	1	3	2	x
Suppliers				
Supplier A	3	4	1	
NHS Supplies	3	4	1	
Manufacturers				
Manufacturer A	3	4	1	
Manufacturer B	3	4	1	
Manufacturer C				

Appendix 6 i2i Assessment – Hotel Services

SERVICE RELATIONSHIP	DELIVERY	Current	Desired	Difference	Priority
Customers					
Departments		2	2	0	
Patients / Visitors		2	2	0	
Customer A		2	2	0	
Customer B		2	2	0	
Collaboration for Service Provision					
Estate Services		1, 2, 3	1, 2, 3	0	
EBME		2	2	0	
Other Directorates		2	2	0	
Portering and Domestic service provider		2	2	0	
Suppliers					
NHS Supplies		1	1	0	
Supplier B		1, 2, 3	1, 2, 3	0	
Supplier C		1, 2	1, 2	0	

Appendix 7 i2i Assessment – Service Provider

SERVICE DELIVERY RELATIONSHIP	Current	Desired	Difference	Priority
Portering	2,3	4	1 -2	
Domestic Services	2,3	4	1 -2	
EBME	1	1	0	

Appendix 8 – CFM Case Study Framework

CFM Case study framework

1. Introduction

General information about the company

- Corporate structure, business idea, business areas, location pattern and basic figures of turnover and employment.
- Relationships between business idea, market strategy, products, technology, organisation, personnel policy, location and building design policy.

Company Strategies

- Global – National – FM
- How the strategies are induced to FM strategies
- The drivers of change in strategies
- What is the life span of business strategies?

Organisational Change

- How many corporate changes are there in 5 years time?
- When did the recent change begin?
- Is the company still implementing an organisational change? What phase is it in implementing the change?

- Is FM aware of the business changes in advance? How far in average?

FM Organisational Structure

- How many FM staff are there?
- What is the organisational structure like? Responsibilities?
- Where does FM report?
- What are the other business units that FM interacts with? HR, IT? Are there any future plans to integrate these functions? How?
- How is information flow managed between the facilities team. Is it formal, or informal? Describe.
- How is information flow managed between the facilities staff and contractors?
- How is the information flow between the clients and facilities team?
- Define FM staff cost £/area.
- Define reactive – Proactive role of FM in different situations, if available

Function

- Nature of work
- Work process and equipment
 - Need for change
 - Technical complexity

- Degree of automation (call centre for example)

2. General information of the case studied

- External and internal motives to initiate the supply chain management project studied.
- Is there a problem to be solved?
- Typical or untypical features of the case, as compared to other productivity projects of the company.

The company's general view of the issues addressed in the Network

- What are the key issues for the company concerning supply chain management?
- What are the drivers for the key issues?
- What need is there to understand better and to improve supply chain management?

3. Supply Chain Management

- What supply chain initiatives have been introduced into your organisation?
When?
- Has there been a change in the organisational structure to support the new supply chain structure?
- What role does in-house FM now play in the new structure?

- Are there any defined criteria for the selection of suppliers? If so, what are they in order of importance?
- Are service level agreements in use?
- Is performance management undertaken?
- What are the major risks identified in this undertaking?
- What were the major risks identified under the old regime?
- Have any improvements been identified and / or measured since the introduction of new measures? Please give examples?

4. Processes

- What are the processes in managing a churn project?
- Conventional project management has 5 phases:
 - Initiating
 - Planning
 - Executing
 - Controlling
 - Closing
- How do you manage the processes in each of these phases?
- What are the processes in each of these phases?
- What is the time involved at each of these stages?
- How is the information managed between different business units, and between different stakeholders?
- What parts of the procedures and routines are usually documented

- Define the information processes for each of these 4 bases :
 - Information Distribution – distributing the needed information to stakeholders in a timely manner.
 - Information Planning – determining the information that the stakeholders need. Who needs what information and when and how information will be given
 - Performance Reporting – collecting the performance information and reporting. This may include progress reporting, the direction of the project; budget, quality and time measures.
 - Dissemination Information – generating the collected information to update the status to administration, accountancy and other operations.
- Are operational processes/measures linked to organisational strategy?

5. Special features

Standing procedures and routines

- Established routines or ad-hoc organisation of supply chain management?
- How are project phases identified and documented?
- At what levels of management are supply chain management decisions taken?
- Investment limits at different levels in the organisation?
- Are there any profitability criteria for investments for improving supply chain management

- Are there any incentives for improving supply chain management?
- Who is responsible for managing the FM supply chain

Documentation

- What parts of the procedures and routines are usually documented?
- Evaluation and feedback
- Between which levels of the organisation does feedback usually take place?
- Routine or ad hoc?
- Formal or informal procedures?
- Documented or personal knowledge?

Characteristic features

- What are the characteristic features of the case
- What future improvements are expected?

6. Case summary

- What happened and when?
- Who did what and why?
- To what extent did the project follow standard procedures?
- What was different from other comparable supply chain management initiatives inside or outside the company?
- Crises and conflicts?

- Workshop - evaluation and feedback?

7. Conclusion

- What were the main lessons learned from the project?
- Where do you (researcher and the interviewee(s)) see value in this research?
- Research and development needs

Appendix 9 Partnership Interaction Diagnostic Checklist

Partnership Interaction Diagnostic Checklist

Service Provider Name:

Please tick only one box for each question. Insert your tick below the heading that you believe best describes the answer to the questions.

1. Does having a direct contract with the Department and being managed by FMA help or hinder the partnership you have with FMA?

Very Helpful	Helpful	Neither helps nor hinders	Hinders	Greatly Hinders

Comment on your marking:

2. Do you feel that you have a partnership of equals with FMA or do you feel that you are just expected to do as you are told?

Full partnership of equals	Partnership of equals most of the time	Some partnership aspects but also expected to do as you are told	Do as you are told most of the time	Do as you are told all the time

Comment on your marking:

3. Do you feel that you have a partnership of equals with EFM or do you feel that you are just expected to do as you are told?

Full partnership of equals	Partnership of equals most of the time	Some partnership aspects but also expected to do as you are told	Do as you are told most of the time	Do as you are told all the time

4. Comment on your marking:
Is contact with FMA frequent enough?

Contact too frequent	Could do with a little less contact	Frequency of contact about right	Could do with a little more contact	Contact not frequent enough

Comment on your marking:

5. Is contact with EFM frequent enough?

Contact too frequent	Could do with a little less contact	Frequency of contact about right	Could do with a little more contact	Contact not frequent enough

Comment on your marking:

6. Do you feel that you can offer ideas and influence the service you provide in order to improve it?

All ideas welcome and able to influence	Most ideas welcome and some influence	Some ideas welcome and able to influence on occasions	A very limited number of ideas accepted and little influence	Not able to offer ideas and no influence

Comment on your marking:

7. Do you feel that you are an important service provider to the Department?

Very important	Important	Quite important	Not very important	Not important

Comment on your marking:

8. Do you feel that a significant failure in your service provision would be harmful to the Department?

Extremely harmful	Very harmful	Quite harmful	Not very harmful	Not harmful

Comment on your marking:

9. Do you feel that a change to the contractual relationship with the Department, such as extending the contract period, would have a beneficial effect on your services?

Extremely beneficial	Very beneficial	Beneficial	Not much benefit	No benefit at all

Comment on your marking:

10. Should you have more or less interaction with other service providers?

Much more	More	About right	A little less	Much less

Comment on your marking:

11. Does EFM/FMA use your specialist expertise?

Expertise invariably sought	Expertise sometimes sought	Expertise sought on some occasions	Expertise not sought very much	Expertise ignored

Comment on your marking:

12. If your specialist expertise is sought is the most made of it?

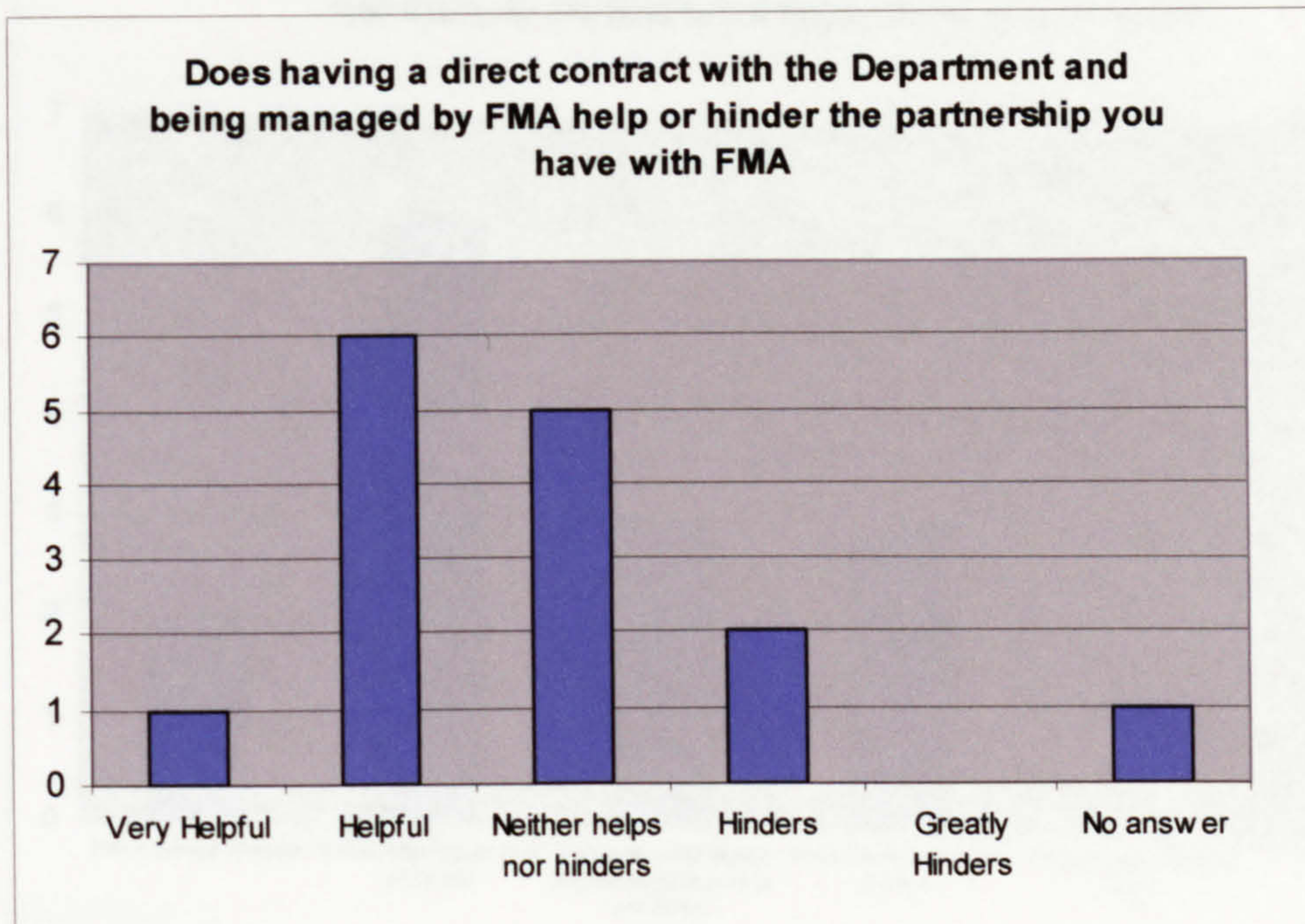
Expertise fully exploited	Expertise exploited	Some use made of expertise	Little use made of expertise	No use made of expertise

Comment on your marking:

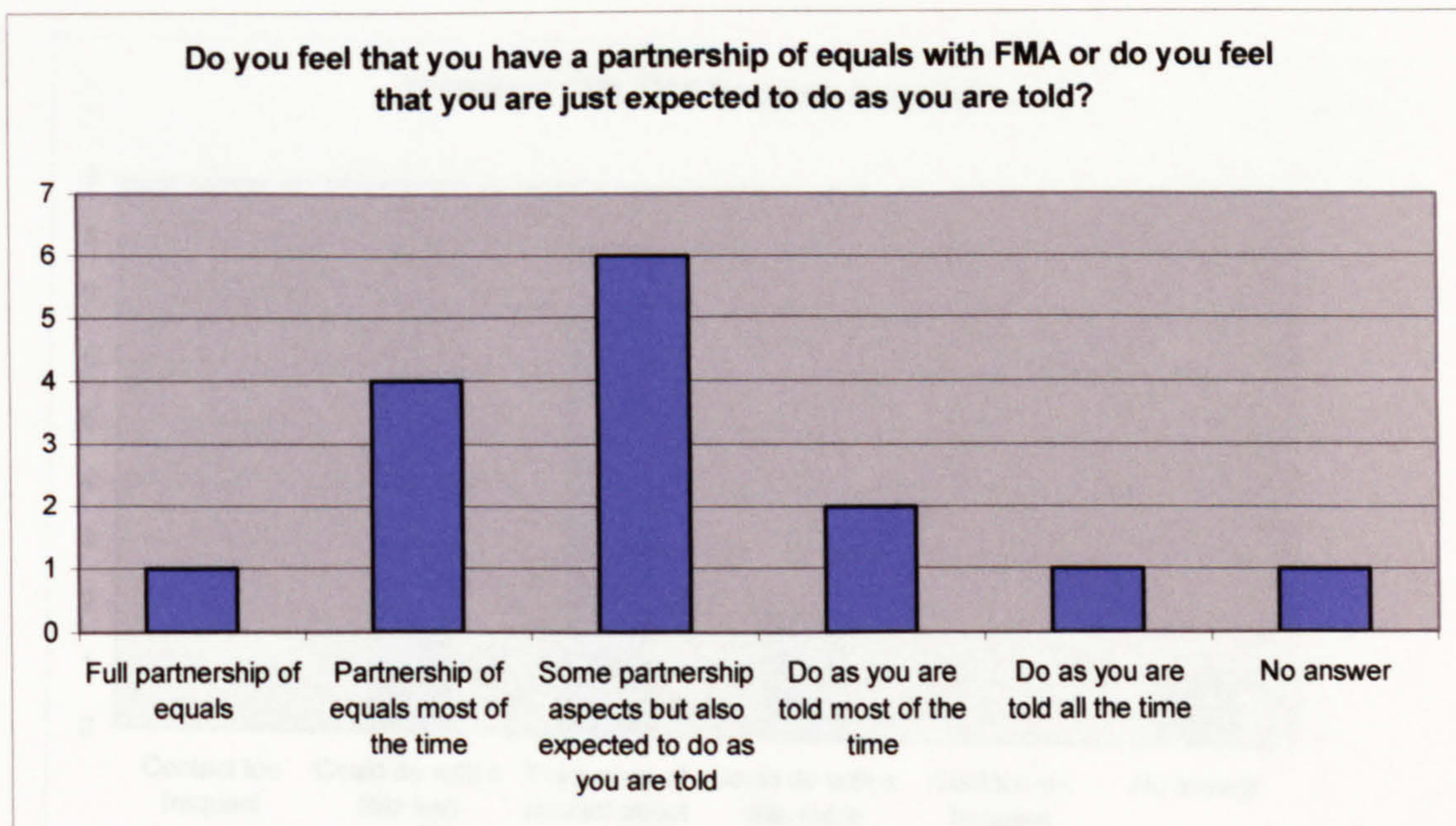
Any other comments:

Appendix 10 Responses to the PIDC

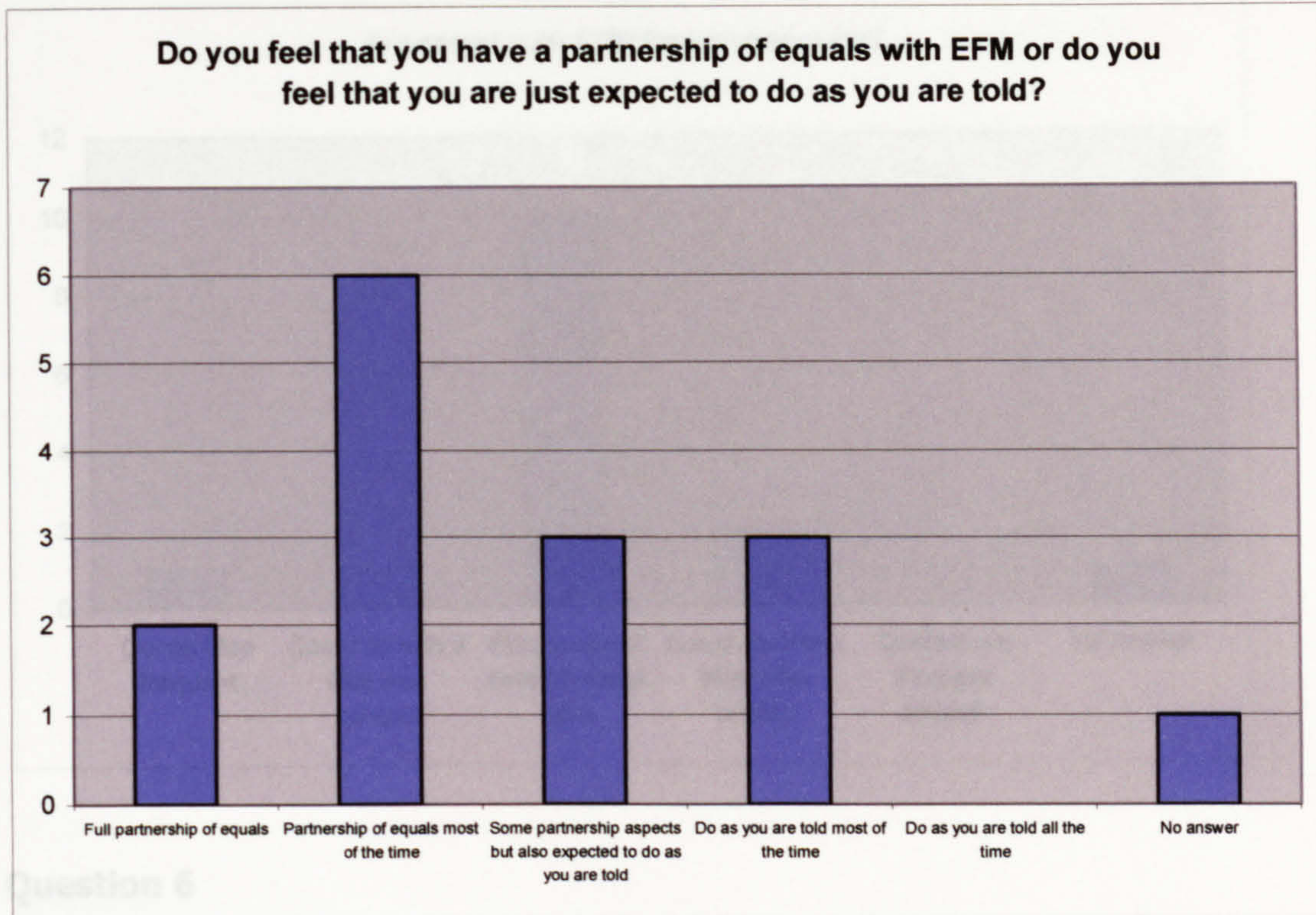
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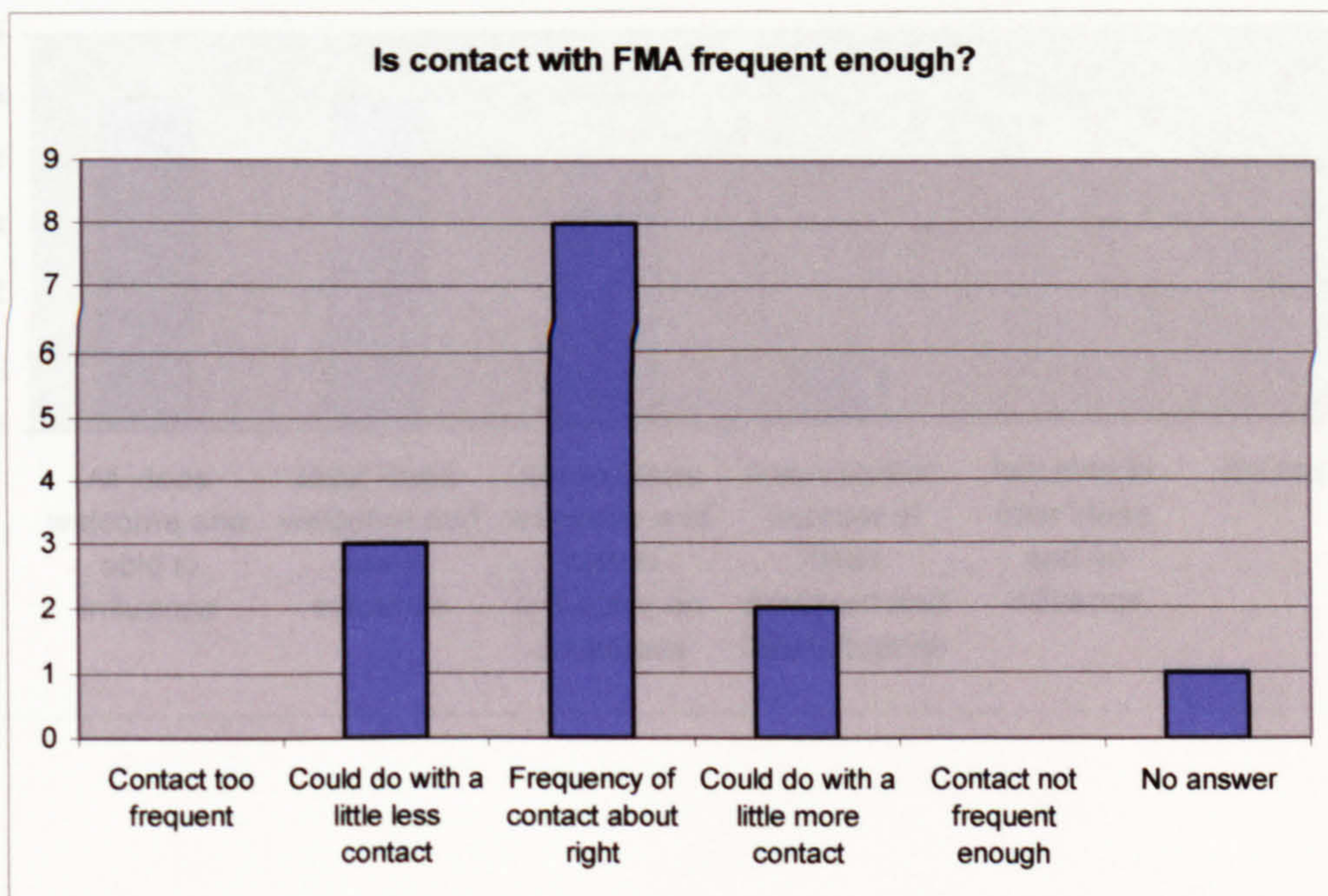
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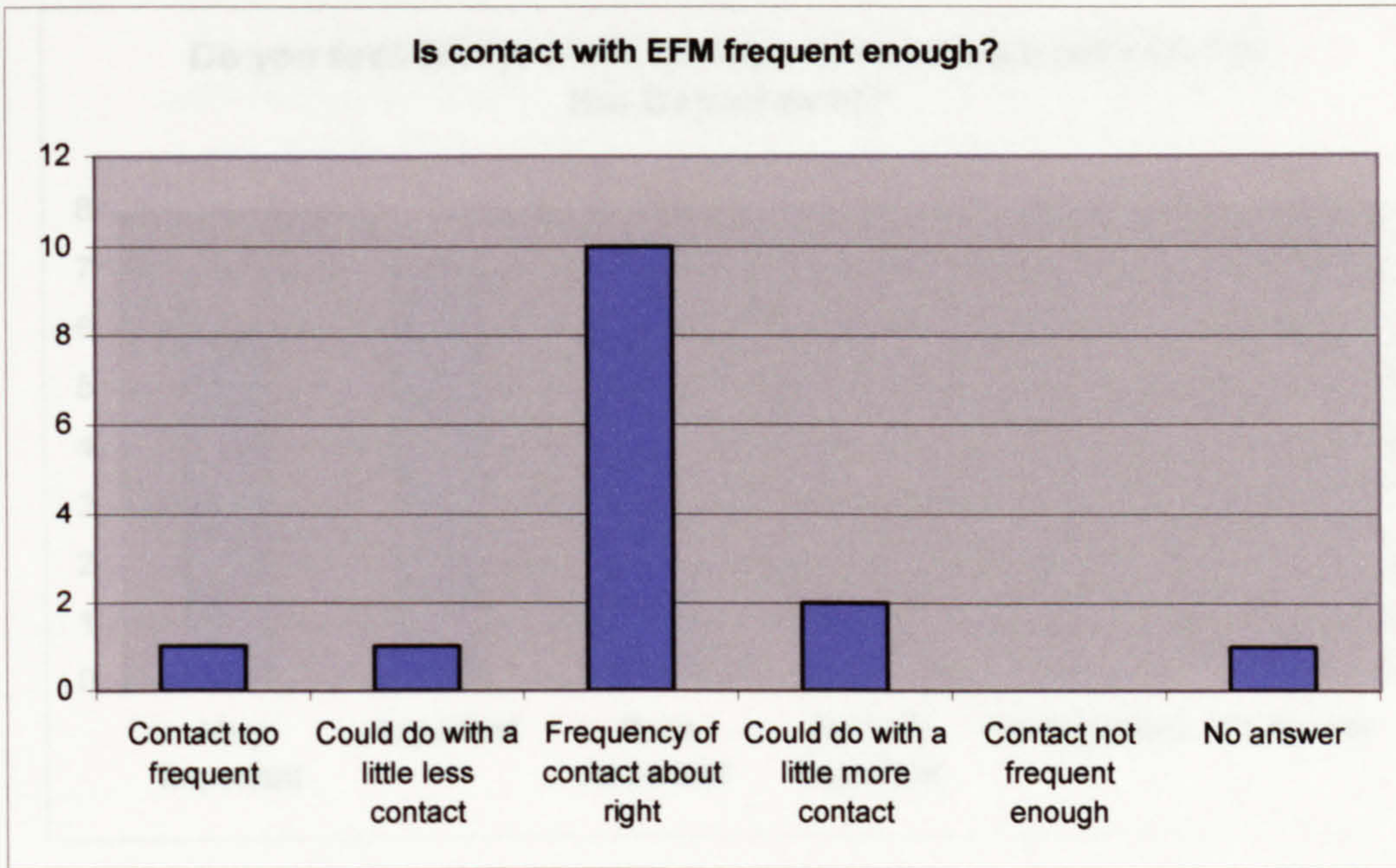
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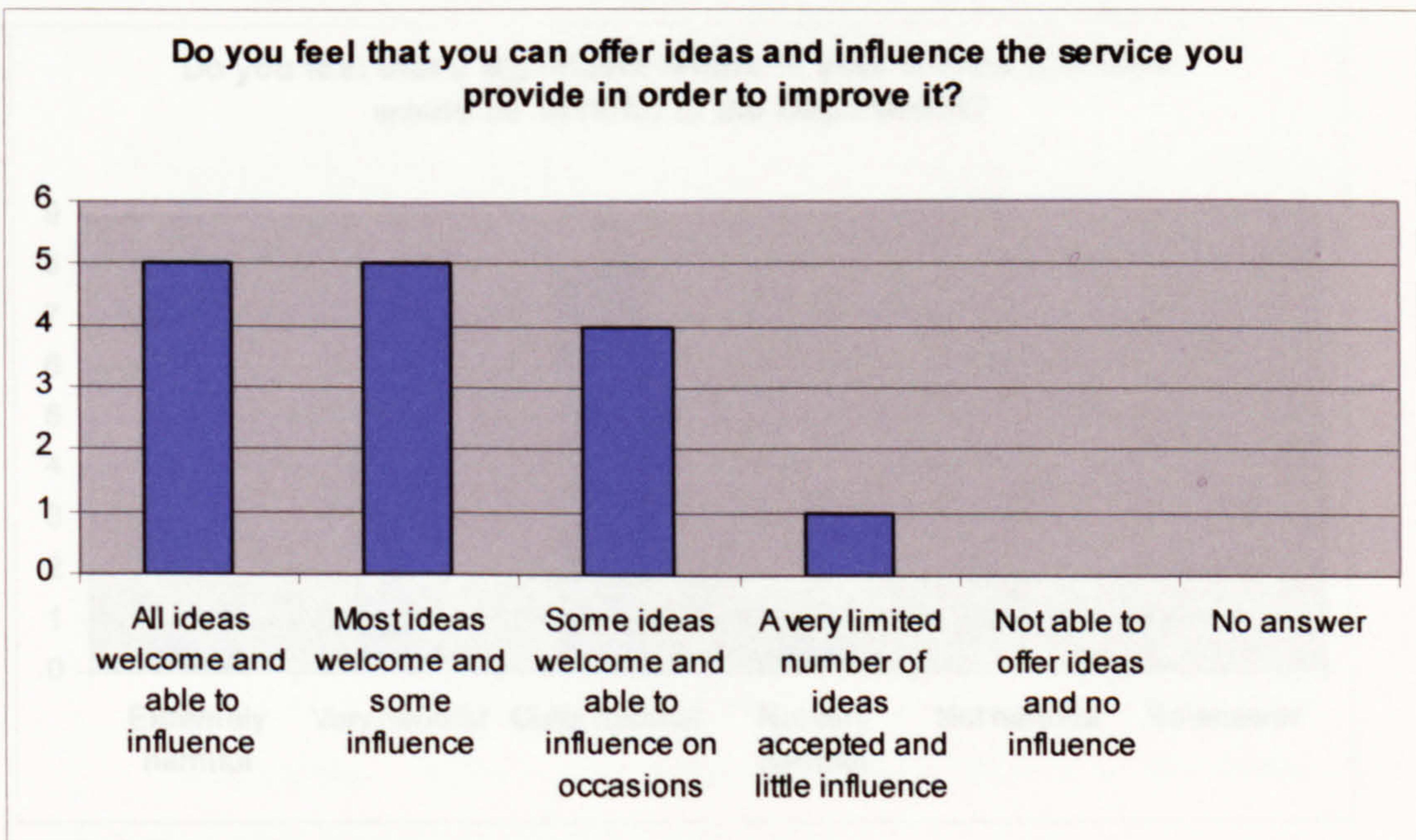
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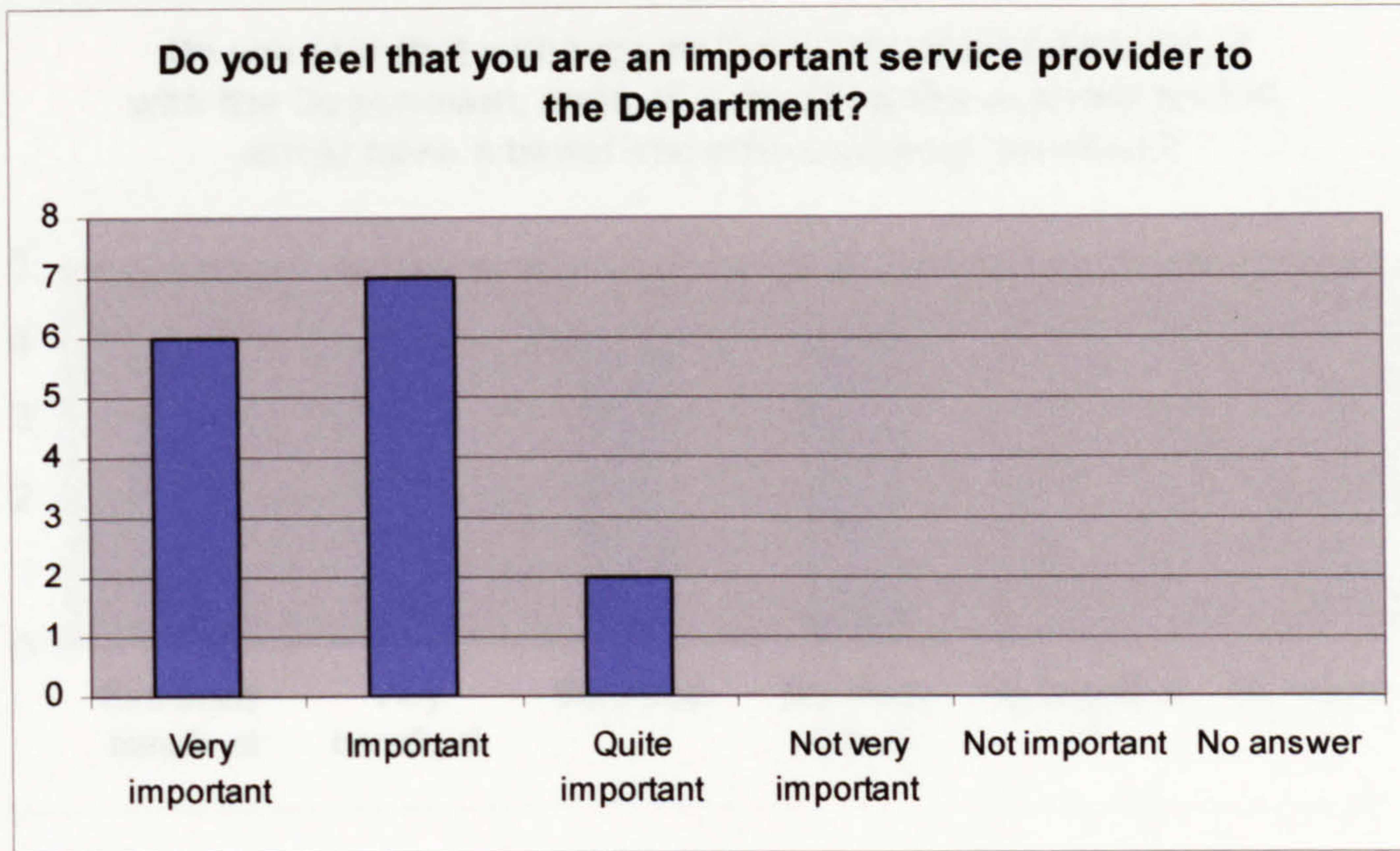
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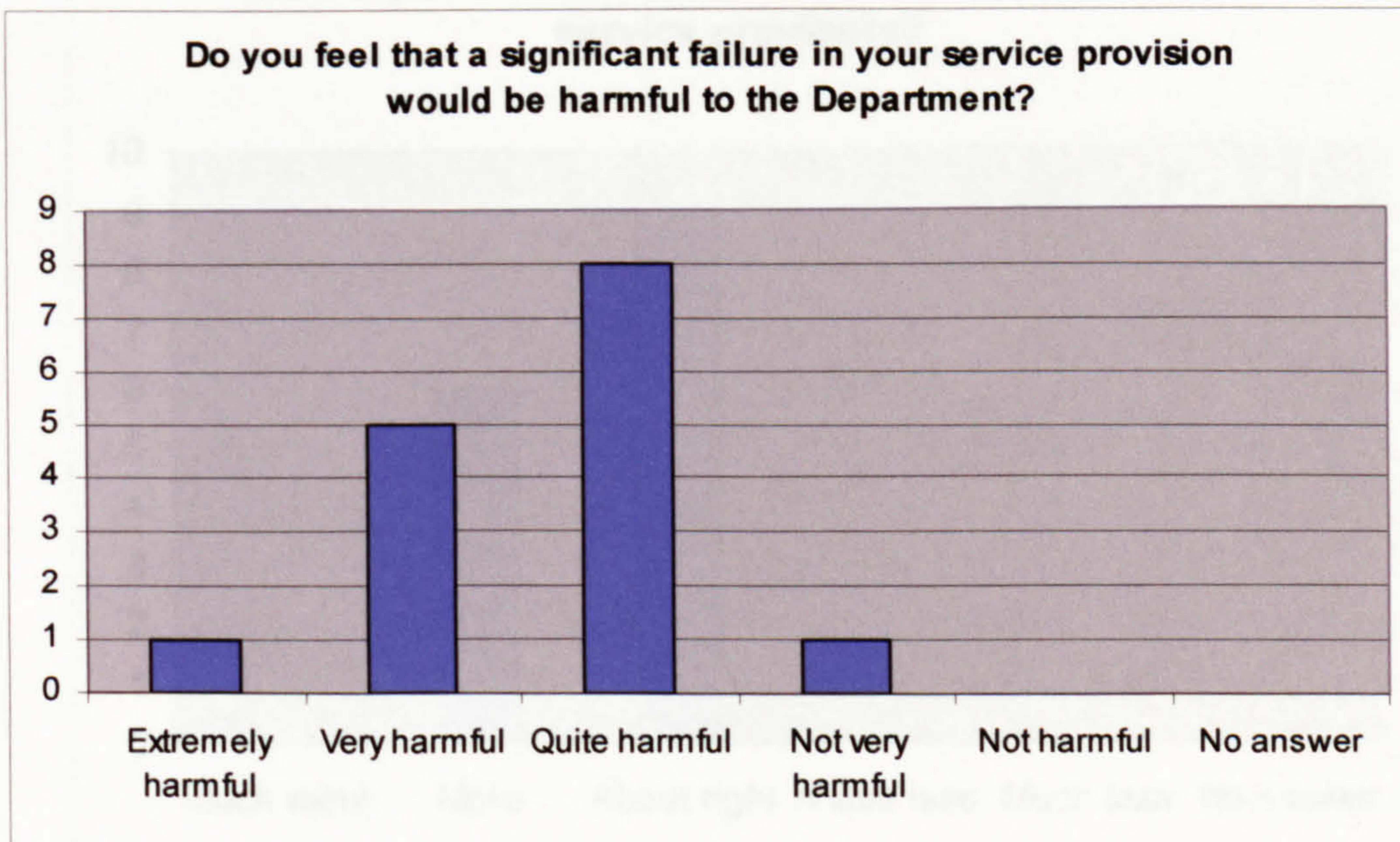
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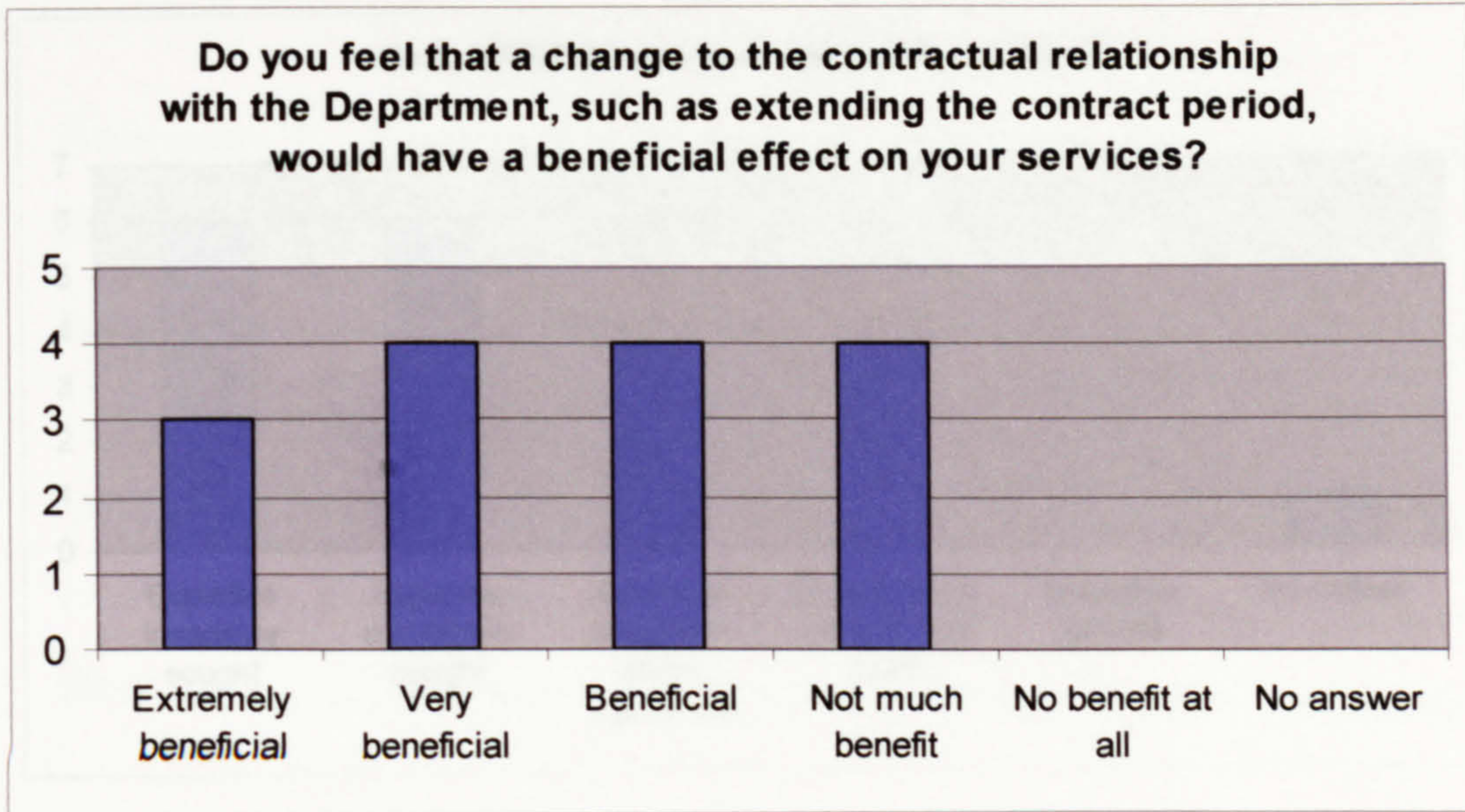
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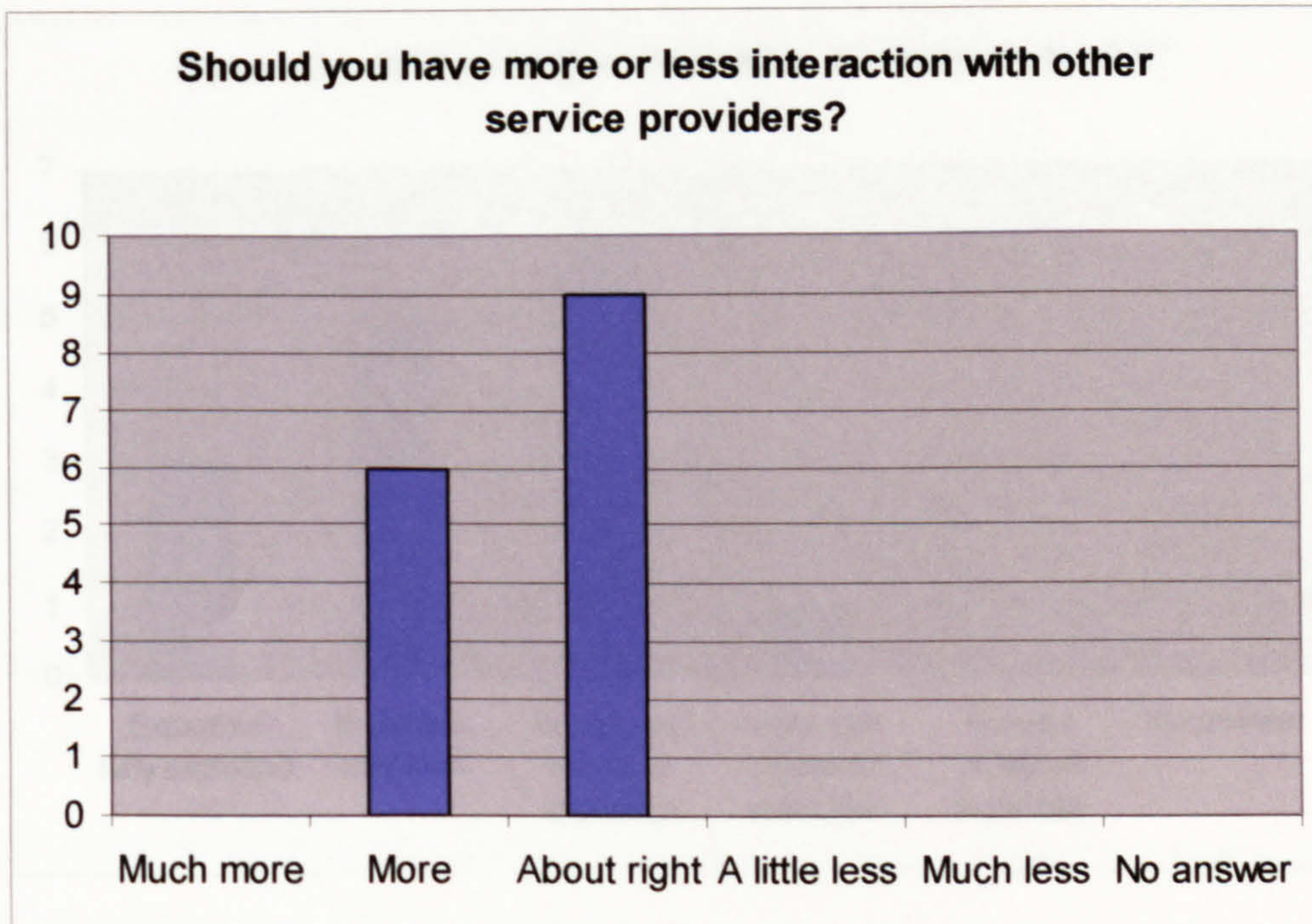
Question 8



Question 9

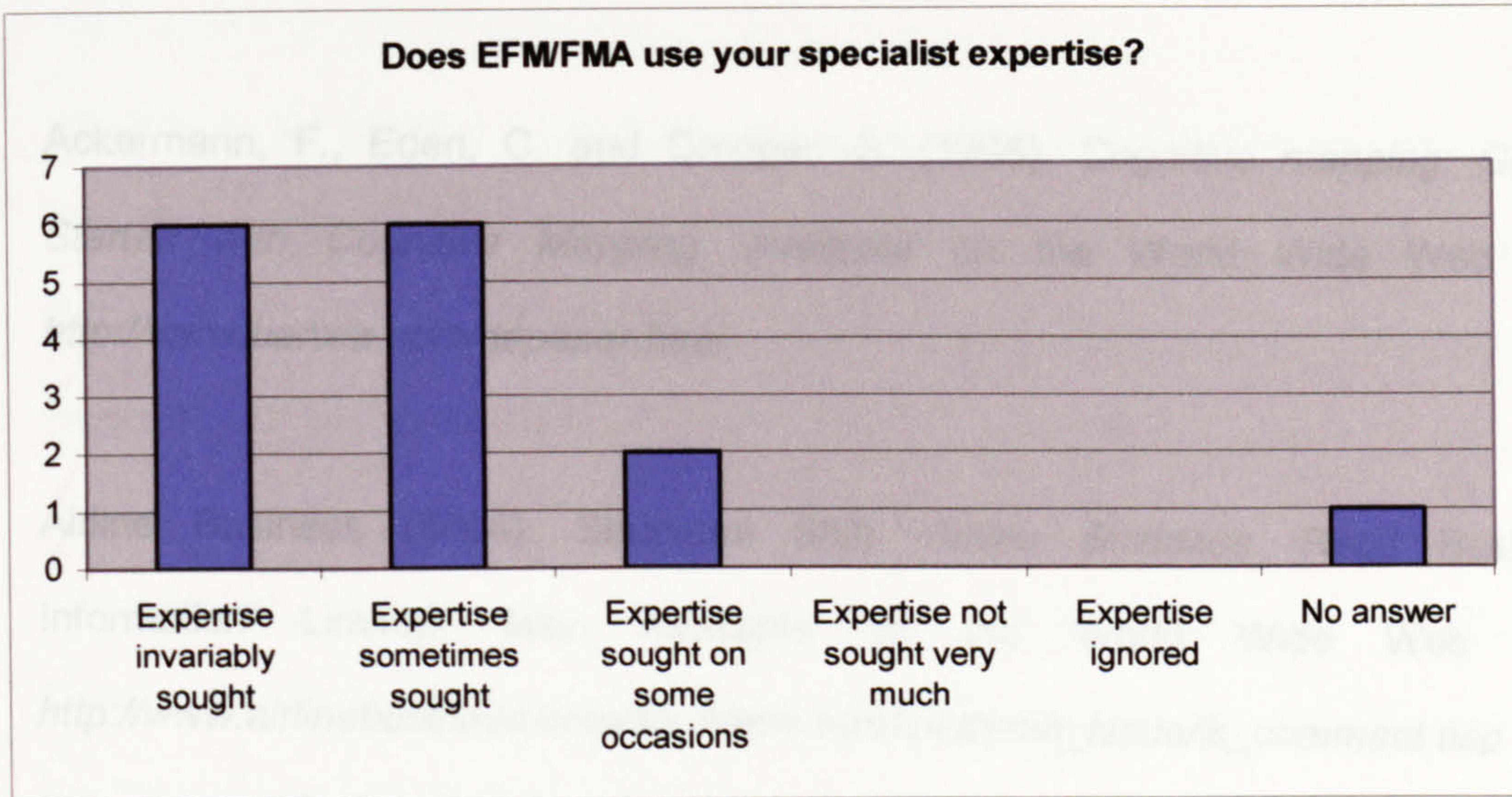


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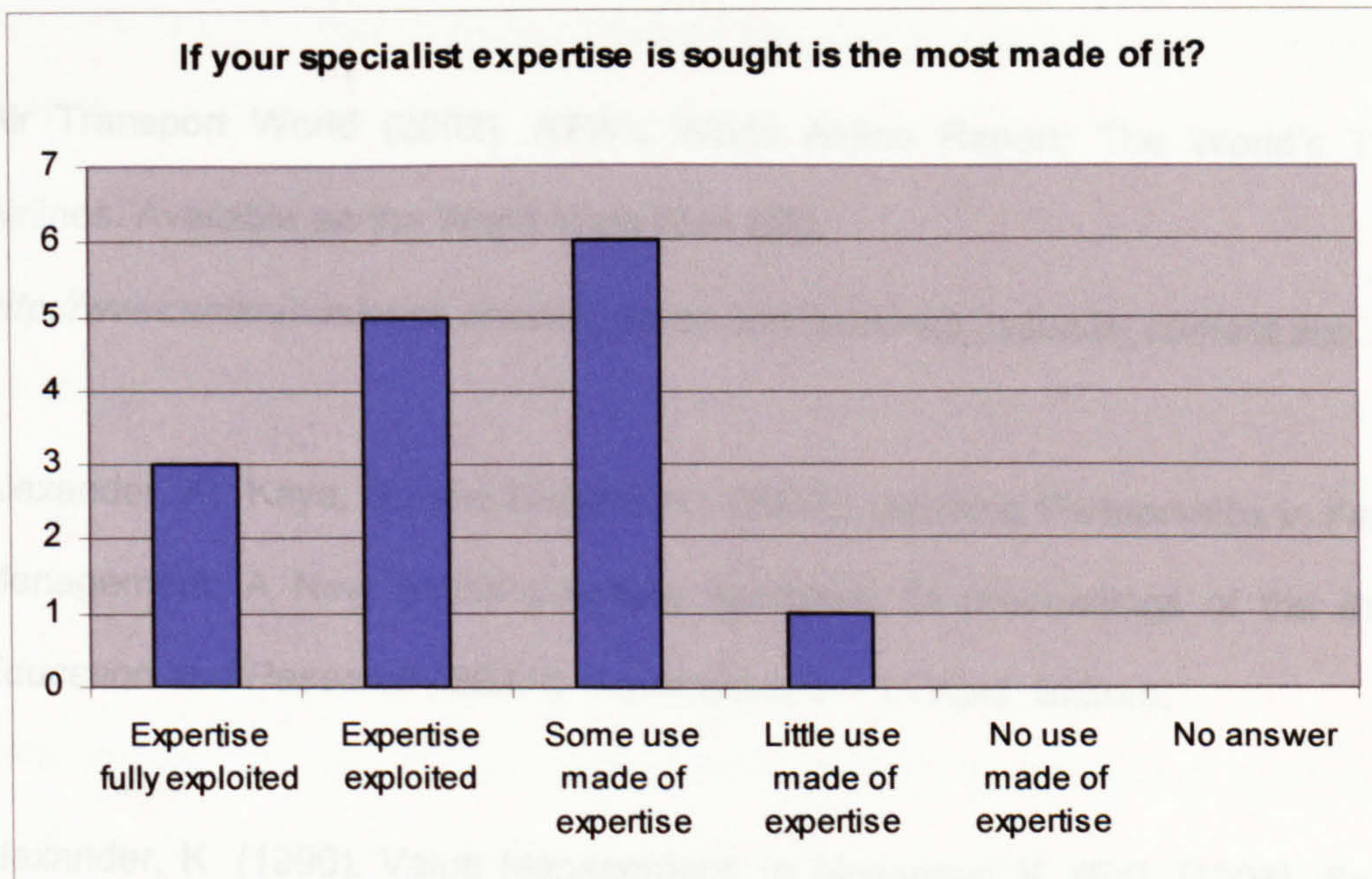


Question 11

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Question 12



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