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***Information Behaviour in the Customer-Focused Small
Manufacturing Company***



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Degree of Doctor of Philosophy

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Abstract

This thesis explores the nature and management of information in customer focused small manufacturing companies. Small manufacturing companies (SMCs) face increasingly changing and wider customer demands. They are often power cultures, with informal information and communication flows. Informal information is no longer enough in the face of growing complexity. Formal information is often about co-ordinating processes, for example, BS EN ISO quality standards, or simply recording customer information instead of relying on memory.

Academic approaches to the management of information are traditionally based in case studies of large companies and are driven by sophisticated electronic information systems. An alternative approach to identify and analyse information is adopted for small manufacturing companies, for a richer exploration of both informal and formal information. The process of data collection is explained in depth, and the findings illustrated in a conceptual model.

The nature of information is discussed, showing that there are two dimensions - activities and interpretations. The findings show that information is highly systemic, and requires a qualitative, flexible approach to identifying and understanding it. The final outcomes show that informal information maintains flexibility, but there is an increasing need to support this with formal information, for traceability. The management of an information culture is crucial to this, manifested in the behaviour of people.

Most significantly, it shows that there is a contention between the prevailing power culture and the uncertain and complex customer demands, and these factors sometimes prevent the effective management of information behaviour.

The research explores a previously overlooked aspect of small companies - the apparent chaos and informality they operate in every day, and the vital contribution that this may play in their survival in the growing knowledge economy.

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Glossary of Acronyms

DTI: Department of Trade and Industry
SME: Small to Medium-sized Enterprise
SMC: Small Manufacturing Company
IM: Information Management
ISM: Information Systems Management
KM: Knowledge Management
COFP: Customer Order Fulfilment Process
ICT: Information and Communication Technologies
IT: Information Technology
OEM: Original Equipment Manufacturer
IS: Information Systems
BPR: Business Process Re-engineering
MRP11: Manufacturing Resource Planning
CORE: Co-Operation of Regions in Europe
ASLIB: Association for Information Management

Author Biography

The author originally came from a musical background. She was trained as a classical violinist at the Royal Scottish Academy of Music and Drama, and the Royal Northern College of Music. She played with Scottish Opera and the Scottish Baroque Ensemble before travelling to play professionally in South Africa and Italy for a number of years.

She then taught in Spain for a year, and after that came back to do an M.Sc in Information Management at Strathclyde University. She continued to do research in the area of managing change in manufacturing at Sheffield Business School for three years, during which time she also lectured in information management and organisational behaviour.

Following this, she came to Cranfield University to work on the Adapt/C.O.R.E. project, and she successfully ran a series of learning clusters for the SME sector for two years. During this time, she was able to develop her main research interests through her Ph.D programme, which revolved around interpretive, cultural approaches to information systems.

She has recently worked as a part-time researcher in Knowledge Management at Westminster Business School, and at the time of writing this biography, is about to take up a full-time post as a Research Fellow in Semantic Integration Environments in the Department of Information Systems and Computing at Brunel University.

The author's hobbies include flying - she regularly flies light and microlight aircraft, and her ambition here is to do solo aerobatics.

Publications

Directly related to this thesis:

Managing Information Processes in Small Manufacturing Companies

Authors: Valerie Ratcliffe-Martin and Peter Sackett

(Submitted to 'Knowledge and Process Management')

Information: the Forgotten Element in Knowledge

Authors: Valerie Ratcliffe-Martin and Peter Sackett

(Submitted to 'Technology Analysis and Strategic Management')

Information and Small Companies: Chaos with Intent

Authors: Valerie Ratcliffe-Martin and Peter Sackett

(Journal of Artificial Intelligence and Society, Vol 15, Issues 1 and 2, 2000)

Focusing Through the Information Fog

Authors: Valerie Ratcliffe-Martin and Peter Sackett

(Manufacturing Engineer, Feb-March 1999)

This paper has won the Manufacturing Engineer Premium for year 1999.

Managing Information Intensity in the Customer Focused Small Manufacturing Company

Authors: Valerie Ratcliffe-Martin and Peter Sackett

(Proceedings of the Second International SMESME Conference, March 1999, Plymouth University)

Information Resources Management for Customer Focus in Small Manufacturing Companies

Authors: Valerie Ratcliffe Martin and Peter Sackett

(Proceedings of the IFIP Conference, Troon, August 1998)

Information Resource Management for the Customer Focused Small Manufacturing Company

Authors: Peter Sackett and Valerie Ratcliffe-Martin

(Proceedings of the ASI '98, the Annual Conference of ICIMS-NOE, Bremen, Germany, June 1998)

Others:

Knowledge Management Issues in Universities

Authors: Valerie Ratcliffe-Martin, Elayne Coakes, Gill Sugden
(Vine, Issue 121, April 2001)

Enhancing Knowledge Acquisition And Transfer In The University Sector

Authors: Valerie Ratcliffe-Martin, Elayne Coakes And Gill Sugden
(Proceedings of BIT 2000, Manchester Metropolitan University, November 2000)

Issues of Knowledge Management and Learning in Universities

Authors: Valerie Ratcliffe-Martin, Elayne Coakes And Gill Sugden
(Proceedings of the 1st European Conference on Knowledge Management, Bled School of Management, October 2000)

Integrated Business Support for SMMEs

Authors: Geoff Nelder, Valerie Martin and Alexandros Skandalakis
(Proceedings of the First SMESME conference, Sheffield University, April 1998)

Achieving World Class Manufacturing Through Facilitated Clusters

Authors: Geoff Nelder and Valerie Martin
(Proceedings of the 13th National Conference on Manufacturing Research, Glasgow Caledonian University, September 1997)

Whatever Happened to MRP11?

Author: Valerie A. Martin
(Proceedings of the Conference on Managing Integrated Manufacturing, Leicester University, June 1996)

The Role of MRP11 in Computer-Integrated Manufacturing

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(Proceedings of the British Academy of Management Conference, Aston University, September 1996)

Regenerating Competitive Performance: Strategy or Capability Building?

Authors: Stuart Smith, David Tranfield, Sue Whittle and Valerie Martin
(First European OMA Conference, Churchill College, Cambridge, June 1994)

Cognitions and Capabilities in Manufacturing Change

Authors: Sue Whittle, David Tranfield, Stuart Smith and Valerie Martin
(Proceedings of the EIASM 2nd International Workshop on Managerial and Organisational Cognition, Brussels, May 1994)

Strategies for Regenerating Manufacturing Competitiveness - Management by Perception

Authors: Valerie Martin, Sue Whittle, Stuart Smith and David Tranfield

(Proceedings of the IEE Factory 2000 Conference, University of York, October 1994)

A Thematic Approach to The Regeneration of Manufacturing Competitiveness

Authors: Stuart Smith, David Tranfield, Sue Whittle and Valerie Martin

(Report on EPSRC/ACME Grant GR/J/21316 Jan 1995)

The Role of Production Managers Today

Author: Valerie.A. Martin

(Proceedings of the British Academy of Management conference, Lancaster University, September 1994)

PART 1

INTRODUCTION TO RESEARCH AND LITERATURE REVIEW

This part introduces the research programme, and covers the multi-disciplinary literature review.

Chapter 1 explains how the research transpired, what led up to it and the author's knowledge, thinking, aims and objectives. It clearly outlines the research domain and problem area, the objectives, deliverables and contribution to knowledge. The chapter continues with the author's research background, and explains why the author became interested in the areas of the management of information, customer-focus and small manufacturing companies. The research questions are clearly laid out, and guidelines are given for reading the thesis. The author points out that each of the three parts was not conducted in a linear fashion, but in parallel throughout the research programme.

Chapter 2 introduces the subject of customer-focused small manufacturing companies, and why they must adapt to their uncertain and complex environment. The literature in the areas of small manufacturing companies, what they are, why they have a need to maintain customer satisfaction and build loyalty, their significance to the economy and their differences to large companies is reviewed in depth. It clearly defines a small manufacturing company for the research purpose, showing that they are naturally more geared towards being customer-focused through their size, product, structure and production processes. This makes them more vulnerable in the supply chain, therefore research on these companies may prove valuable to this weaker section of the economy.

The chapter goes on to define what customer retention and satisfaction is, and focuses on the activities in the customer order fulfilment process and the link with information. The reason information is important towards the achievement of customer satisfaction in a knowledge-intensive economy is explained, and examples from large companies are used to do so.

Chapter 3 explores the area of the management of information, what it is, its importance to small manufacturing companies and the knowledge economy, and attempts to understand

and manage it. It explores whether information is simply a manifestation of information technology, or whether it transcends this paradigm and is a naturally occurring phenomenon which flourishess irrespective of technology. The author discusses the nature of information in organisations, and explores paradoxes in the area of its management, especially with regard to terminology.

Traditional literature in the area of the management of information is reviewed, and the author shows how this approach is not an appropriate way to explore the nature of information in small manufacturing companies. An alternative approach based on the premise that information begins with people and the informal and formal systems they create is proposed. This approach also proposes that an information culture emphasises and recognises the rich dynamics and complexities of information, and realises that there may be a conflict between the achievement of this and the traditional power culture in customer-focused SMCs.

The author suggests that information is a subject to be studied in its own right. It is not simply about technology, it is a dynamic and active part of knowledge, enacted through the behaviour of people.

Chapter 1.

Introduction, Background, Aims and Objectives

1.

- Customer-focused SMCs may respond to their customer demands through the activities and behaviours of their people in the customer order fulfilment process
- They face growing information challenges, formalising information, but keeping flexibility through informal communication

2.

- The author's interpretive approach to information prior to beginning the research programme is explained.
- The structure of the thesis is highly qualitative, and the literature review, methodology and data analysis is interlinked.

1. Research Domain

Small Manufacturing Companies (SMCs) which are customer-focused may adapt and respond to their customer demands through the activities and behaviours of their people. They face growing information challenges, manifested in the need to formalise information, while still maintaining the flexibility and informal communication activities in the customer order fulfilment process. How these companies do this is the subject of this research.

This section presents the research domain. Section 1.1 presents the problem area, the area the research sets out to investigate. 1.2 presents the research objectives, 1.3 presents the deliverables and 1.4 presents the contribution to knowledge that the completed programme of research provides.

1.1 Problem Background

UK businesses now function in the growing global knowledge economy (DTI 1998 (a)), and small companies form a significant part of the UK economy (DTI 1998 (b)).

In the current business environment, small companies are in danger of losing market share as their customers place increasing demands on them to supply greater variety and service quality in the overall product while reducing costs, improving quality and improving delivery time. The trend for original equipment manufacturers (OEMs) to rationalise their supplier base exacerbates this risk. For these type of companies, customer retention is imperative to their survival, making customer satisfaction a priority.

Storey (1994) refers to three groups of small companies - fliers, trundlers and failures. The fliers have the ability to offer a basis for competition which ensures their future survival. The trundlers survive, and they are the ones who are vulnerable in the turbulent business environment. Small companies whose products are components, or part of the original equipment manufacturer's or first tier companies' finished goods rather than finished goods of their own are more at risk (Browne 1995). They usually have little product development capability, making them less able to compete and win new customers with new products. These types of companies are naturally more customer-focused, as they are closely tied-in with their customers but have little real power over them. In addition, these types of companies which are make to order/engineer to order systems of production are even more tightly tied in with their customers (Duty, 1999).

A recent programme delivering services to companies under 50 employees found that this was indeed the case (Adapt/C.O.R.E. programme 1999, Appendix A). In a study of twelve companies which took part in a series of learning clusters on this programme, several aspects stood out in relation to customer-focus and survival: the need for customer loyalty and retention in the threat of a competitive environment and the threat of rationalisation (Section 2.3). Eight of these companies could be described as second tier, component suppliers and did not own their products. They were also engineer-to-order, and most of their customers were industrial customers as opposed to consumer markets. Of these eight, three had BS EN ISO 9002 quality standards registration (Martin 1999). These three were not only surviving, but had done so for decades, in one case, eighty years, and they all displayed significant customer retention over a number of years. Two of them were even planning future expansion. This was not true for all the other companies on the programme. One went into liquidation during this time, as this company had not been able to retain customers. Interestingly, this company had no BS EN ISO registration. These three companies could be described as customer-focused.

Further study as part of this programme revealed that all three were single-site, owner managed family firms and were traditional 'power' cultures (Handy 1994). They all exhibited informal communication, within the company itself and spreading outwards with customers. They were all coping with much formal information, in the shape of an increasing need for IT especially, as well as the BS EN ISO quality standards in their procedures. This was occasionally cited as a challenge (Section 2.3).

The Adapt/C.O.R.E. programme acted as a catalyst for this specific research programme, in combination with the author's background knowledge (Section 2). The author became increasingly aware of the challenges facing these companies in regard to customer satisfaction and retention, and information. It was for these reasons that these same three companies were selected for more in-depth case study research.

The author's background in a multi-disciplinary approach to the management of information highlighted the potential significance of the information and communication aspects in these companies (Section 2.2).

Problem statement: The management of information in customer-focused small companies may be more about informal communication and information flows, rather than sophisticated electronic-based systems. This is reflected in the activities and behaviours directly involved in the customer order fulfilment process, which co-ordinates activities from the order to the delivery of the product or service (Chapter 2, Section 3.3). However, there is evidence, from both theory and practice, that these companies are dealing with more formal information than ever before, and that this may conflict with the naturally informal communication processes and behaviours which they are used to, both internally and with their customers. There is little research on how information is managed in the face of these challenges, but there is evidence that the management of information in these companies relies not only on senior management policy, but to a large extent on the behaviours of its people.

There is a need to understand how customer-focused small manufacturing companies manage information. The author sets out to explore and gain a better understanding of the variety and richness of the information which enables customer satisfaction in customer-focused small manufacturing companies. Through the customer order fulfilment process, she explores the nature of customer satisfaction, the relationships these companies have with their customers, and the demands imposed on them by their customers. She also explores the link this has with information, the nature of information, informal conversation-based and formal electronic, through the way people behave and enact information activities in the customer order fulfilment process.

The research explores, above all, a previously overlooked and taken-for granted aspect of small companies - the apparent chaos and informality they operate in every day, and the vital contribution that this may play in their survival in the growing knowledge and information-intensive environment.

1.2 Research Objectives:

The author initially proposed seven research objectives:

1. Review and evaluate the literature

- Review and evaluate the literature in the area of customer-focus, and satisfaction, the customer order fulfilment process, small to medium-sized enterprises and small manufacturing companies, and the management of information, especially the link with customer satisfaction.
- Review also alternative approaches to information which include the softer, more interpretive and behavioural approaches, and put the management of information in the context of the current interest in knowledge management.

2. Identify, describe and understand customer-focused small manufacturing companies

- Identify, describe and understand why it is important for the UK economy to understand more about small manufacturing companies.
- Identify the type of small manufacturing company which is described as being customer-focused, for the purposes of this research, which is to be studied through this research, and why it is important to research this type of company.

3. Identify, describe and understand the nature of customer satisfaction in these small manufacturing companies

- Identify, describe and understand how these companies achieve customer satisfaction through their customer order fulfilment process.

4. Identify, describe and understand the function and nature of information in these companies, and the link with customer satisfaction

- Understand why information and its management is important to these types of companies, what the links are between customer satisfaction and information, and why information in these companies is not necessarily technology-driven.
- Identify, describe and understand the nature of the information which is characteristic of these particular companies, through the customer order fulfilment process.

5. Explore and understand the management issues

- Explore the management issues surrounding the facilitation or impeding of information in the customer order fulfilment process in these companies, especially the issues of senior management policy to customers, and how the issues of culture and structure may affect information in these companies.

6. Show how the methodology was developed to answer the research questions

- Show the extent to which the literature from the above academic areas can provide answers to and knowledge about the research questions and problem domain.
- Develop an appropriate methodology to carry out further research, following on from the literature review, and define clearly the purposes of the methodology related to the research objectives and deliverables.
- Analyse the research findings, showing the extent to which they can provide answers to and knowledge about the research questions and problem domain.

7. Present the research findings

- Present the contributions to knowledge through both descriptive text and theoretical models, showing both the weaknesses and strengths of the findings, and indicators to possible further research.

1.3 Deliverables

The deliverables of this research programme will be:

1. A written thesis which will:

- Explain and describe the above objectives and how they were achieved, complete with full descriptive chapters of the research process.
- Present the large variety of literature available in relevant areas.
- Present a clearly laid out methodology which clearly shows how the research questions can be explored in detail.
- Describe lessons learned from industry about the management of information which enables these small manufacturing companies to provide customer satisfaction and maintain customer focus, taken from case study research material.

- Present theoretical models which will define what customer-focus means for small manufacturing companies, the link with information, the nature of information and the management issues.
 - Provide an explanation of how the findings contribute to knowledge.
 - Present indicators to a possible continuation of research in this area, through the generation of hypotheses.
2. Research findings disseminated through a variety of publications in journals, both academic and practitioner, conference papers and reports.
 3. Research findings also disseminated through reports to the collaborating companies.

1.4 Contribution to Knowledge:

The contribution to knowledge will be a clear understanding of the ability of these particular customer-focused small manufacturing companies to respond to the uncertainty and complexity of their environment and their customers requirements through an in-depth understanding of:

- Customer satisfaction - what wins orders for these companies, and what operational activities in the customer order fulfilment process actually win those orders for them repeatedly.
- The nature of the information that enables these order-winners, and why this information may help them to achieve customer satisfaction, through the customer order fulfilment process.
- The management of information, and how senior manager policy facilitates or impedes the overall effectiveness of information.

2. *Methodological Background*

This section describes the author's knowledge and thinking prior to beginning the research programme, and illustrates why the problem area is significant and relevant to small manufacturing companies in today's knowledge economy. The author points out that the structure of the thesis is highly qualitative, and the literature review, methodology and data analysis is inextricably interlinked, not necessarily intended to be read in a linear fashion.

Sections 2.1 and 2.2 describe the author's ontological background with which she came to the beginning of the research programme in 1996, and the epistemological background to the research. 2.3 continues this through explaining the major challenges which the small companies she had been working with faced, and how these ideas, combined with her background knowledge, eventually became broad research questions. 2.4 provides guidelines to readers for the reading of the thesis, explaining that the qualitative approach should be borne in mind at all times.

2.1 Ontological Background

The author's previous relevant academic background had begun with an M.Sc in Information Management, based on themes which were mostly of a rational, technology driven approach. Previous research experience to this thesis was gained on a project on managing change in manufacturing industry, through which she gained useful knowledge of interpretive approaches to organisations such as organisational behaviour, organisational development, culture and systems theory¹.

This previous work provided the impetus towards a philosophy which views information as all encompassing and abundant in organisations, and the author came to this view through a combination of experience and practice. Information is a much wider concept than IT. It is in everything - in activities, behaviours, paper, technology, meetings, conversations and telephone calls, and is driven by people's behaviour, rather than technology. Information is at the heart of how people build knowledge, learn and work co-operatively in teams. Information is manifested in the way people communicate, such as through speech or written down in books or instructions. It may come in the form of idle gossip or spoken orders, explanations or stories, and is at the heart of how societies build knowledge, both individually and collectively.

It is the author's view that information is a dynamic, alive phenomenon. It takes a variety of forms and changes constantly. It is not separate to people, it is entirely bound up in their behaviour. People not only use information, they transfer it, store it, process it and interpret it.

Beniger claimed that all living systems rely on information, and information processing, communication and control are the basis of living systems. He bases his approach on open systems theory, which relies on a free flow of vertical and horizontal information throughout the organisation. This flow relies on information not simply being processed, but also *communicated*. The twin concepts of information-processing and communication are interdependent (1986). Voice, paper and information and communication technologies (ICTs) are all used to pass information from one mind to another, and to be part of the larger systems of human learning, team-working and knowledge accumulation which is an everyday part of the flow of organisational life. To confuse information with information and communication technologies is to ignore the fact that people have always processed and communicated information.

Communication can take a variety of forms - the database being accessed, the book being read, the students listening to their lecturer, the group of engineers discussing an electronic component quietly discussing how to mend it, an email, an instruction manual. The value of this information is highly subjective, and depends on culture, language, values, beliefs, intelligence, knowledge and intuition within the context of the organisation. An

¹A *Thematic Approach to The Regeneration of Manufacturing Competitiveness*
EPSRC/ACME Grant GR/J/21316 August 1993- January 1995

information culture is one in which people share information - they understand the need for it, share meanings and language. This provides organisational integration. In an information culture people behave in such a way that uses and recognises the value of all forms of information to achieve company objectives (Davenport 1994).

Information and communication is important in today's economy, but this importance is not caused solely by technology. Technology has simply helped to bring the subject of information to the fore, including informal information. Analogous to this argument is Scott-Morton's claim that the recent emphasis on information has come about as a result of the development of information technology, although not purely caused by it. He claims that ICTs are not causing global change, simply facilitating it (1991).

The term 'informal' derives from 'information'. Looking at information from this perspective, informal information is the genuine information system, and this argument is supported by Liebenau and Backhouse (1990) (Chapter 3, Section 3.2). It is not simply about technology, but about people - their culture, manifested through their behaviour.

2.2 Epistemological Background

Management theory and practice has emphasised the rational, technology driven approaches to the management of information, and the extent to which it can be manipulated for competitive advantage. The common view of the management of information is *positivist*. This stance assumes that information is separate to people, and that one can easily observe cause-effect relationships with clarity and in a detached manner. It is relatively easy to 'observe' tangible information and communication technologies and paper-based systems and to measure their efficiencies in terms of cost-savings, quality and generating new business.

Small manufacturing companies often rely on informal communication, and memory, and because of their small size they have little need for sophisticated information technology, and usually cannot afford it anyway. Yet their information and communication is complex and highly flexible. They reveal that there is more to the management of information than technology.

The rational, technology-driven view of the management of information has been explored recently by Checkland and Holwell, who believe that the thinking about information systems literature is still based in ideas about organisations from the 1960s. They explain that these ideas are based on the belief that organisations seek to achieve goals and information systems provide the formalised information upon which managers can base their decision making. One of the most influential writers in this area, Simon, conceived a three-stage process: problem identification and data collection, outlining alternative solutions and their outcomes and selecting a solution and monitoring its application. Each stage could be supported by different types of information systems. It was a highly formal

and rational way of viewing organisations, rooted in the 'hard' systems tradition deriving from Durkheim (Simon 1960, from Checkland and Holwell 1998).

An alternative perspective on the subject of information is one of the research objectives in this programme of research (Section 1.2). The research commences on the supposition that information is a much wider concept than that recognised by the vast accumulation of rational management theory. This perspective may be appropriate to the study of the customer-focused small manufacturing company, as they have more informal information and communication processes and behaviours, both internally and with their customers.

The research problem proposes that people, not technology, are the driving force of a value-added policy to the management of information. This is in effect an *anti-positivist* argument, based on the assumption that information is only as effective as the way in which it is understood, interpreted and enacted by people. The current interest in 'tacit' knowledge management, and the variety of views in this area, reflect to an extent the growing interest in interpretive approaches. The Information Resource Management (IRM) Network, the special interest group of ASLIB (the Society for Information Management), of which the author has been a regular member, started out focused on information resource management, and has increasingly focused on knowledge management over the last several years. (Appendix B).

Vickers was influential in the 'soft' or 'interpretive' approach to information systems. He rejected the 'goal-seeking' model, claiming it did not take account of the richness of life as people experience it. His view was that organisations are rooted in their own context and previous history, and they strive to maintain relationships. Checkland and Holwell claim this puts him firmly in the 'interpretive' tradition, which sees social action as sense-making (Vickers 1965, from Checkland and Holwell 1998 op.cit).

The full richness of this stance was realised in the work of Winograd and Flores (1986). They held the view that organisations are networks of conversations, and language helps to enact this, with computers as a support. They adopt a view similar to the interpretive tradition, also known as the anti-positivist movement. This was described by Burrell and Morgan in 1979:

"For the anti-positivist, the social world is essentially relativistic and can only be understood from the point of view of the individuals who are directly involved in the activities which are to be studied."

(p 5)

If the management of information relies on the smooth flow of information in an organisation, then it must be understood and interpreted in the appropriate context to be effective and add value. The term 'conversation' illustrates the reality of the anti-positivist

stance, showing that information cannot be separated from individuals - it is firmly established in their *behaviour*.

2.3 Research Questions

When the author began working with small companies as part of the Adapt/C.O.R.E project at Cranfield University in 1996, she realised that they would provide a platform to study the informal aspects of information. They often appear to be informal and rather chaotic in their operations.

One of the research objectives was to investigate the nature of information, especially concentrating on the divide between the formal and the informal. Finding a way to do this was a major methodological problem. The author had the idea that informal information could be observed, especially the conversations and meetings. There were also scribbled notes and email, which, although more tangible, also have an informal element in the way they are used. There was certainly something interesting concerning information and communication in the companies observed. There had been indications that information and communication was linked to customer satisfaction in these companies through:

- *Informality of operations:* The author was able to observe operations close up. From this it was realised that operations in these companies include much verbal communication. Staff would stand around in small groups, discussing products or projects. These small groups would frequently change. Senior, middle management and sales staff would be frequent visitors on the shopfloor, informally discussing and enacting scenarios with their staff.
- *Customer satisfaction:* These activities contributed to a background understanding of customer satisfaction, and the factors which contribute to this in small manufacturing companies. For example, most of the small manufacturing companies were working towards BSI EN ISO quality standards registration, and a few were already registered. This factor was frequently cited by SMCs during a cluster focused on customer satisfaction. As well as this, they frequently cited the flexibility they must have towards their customers at short notice, and the speed with which they must deliver, else they could risk losing customers through dissatisfaction. They were well aware of the threat of rationalisation in the supply-chain.
- *The management of information:* Traceability frequently appeared to be a problem - poor paperwork management was cited by senior managers. One MD cited the problems of an outdated computer system. There was realisation that formal information was not what it should be. There was however no realisation of the management of information as an integrated concept, especially in regard to customer focus and the informal information system. Informal information seemed to be a taken

for granted part of the organisation which needed no management at all. The subject of customer-focus did not appear to be realised as an integrated concept. The clusters seemed to bring forth an awareness of these subjects, which was an appropriate point at which to begin the research.

The main methodological problem was finding a starting point. The methodology had to be formulated clearly, and the research questions had to be stated. At this early stage, they were kept as broad as possible:

1. What is a customer-focused small manufacturing company, and why is this type of company worth investigating?
2. What is customer satisfaction?
3. What is the nature of information in the customer-focused small manufacturing company, and how is it linked to customer satisfaction?
4. How does management facilitate/impede their ability to maintain customer-focus through information?

2.4 Guidelines for Reading this Thesis

The literature review was continuous throughout the entire course of the research programme, including the data collection, analysis, presentation and conclusions. However, it is presented separately to make structure and reading easier. As the research progressed, there were emergent issues, such as the realisation that these small companies were best analysed as 'power' cultures, rather than structures. At the point of this recognition, there was little in the literature review on power cultures, therefore the author reviewed and modified the literature review. Also, the change in title from 'The management of information' to 'Information Behaviour' should be borne in mind by the reader, and it will be noticeable to the reader that behaviour comes up more and more frequently as the thesis progresses, thereby showing the learning and change in thinking of the author. Therefore, it is not over-emphasised in the objectives and deliverables, but is reviewed in the final chapter. Research Question 3 is concerned mostly with this learning process, as the research reveals.

This type of methodology is at the heart of the qualitative approach - it is iterative and holistic in nature. Qualitative research methods are described in the methodology chapters. It is intended that the reader recognises this approach, and does not necessarily read this thesis with the assumption that it is linear. A qualitative methodology shows the learning involved in the process of carrying out the research, analysing it and writing up the findings. The author wanted a flexible methodology which could allow room for new and unexpected discoveries. The emergent issues of both the methodology and the data

analysis are summarised in the final chapter, and shown how they contribute to new knowledge. Similarly, the recognition that information was more about 'behaviour' that is, embedded in people and social networks, than an objective management phenomenon which could be planned and controlled, did not happen immediately. The author became aware of the work of Karl E. Weick towards the end of the research programme. His explanation of the crucial events in an organisation are processes, rather than tangible fixtures, and this helped to support the author's claim that information is about behaviour (1969).

The four research questions are referred to continuously throughout the thesis, and the thesis revolves around them. The three part structure of this thesis illustrates these points - although separate, they form one integrated whole, as illustrated in Figure 1.1.

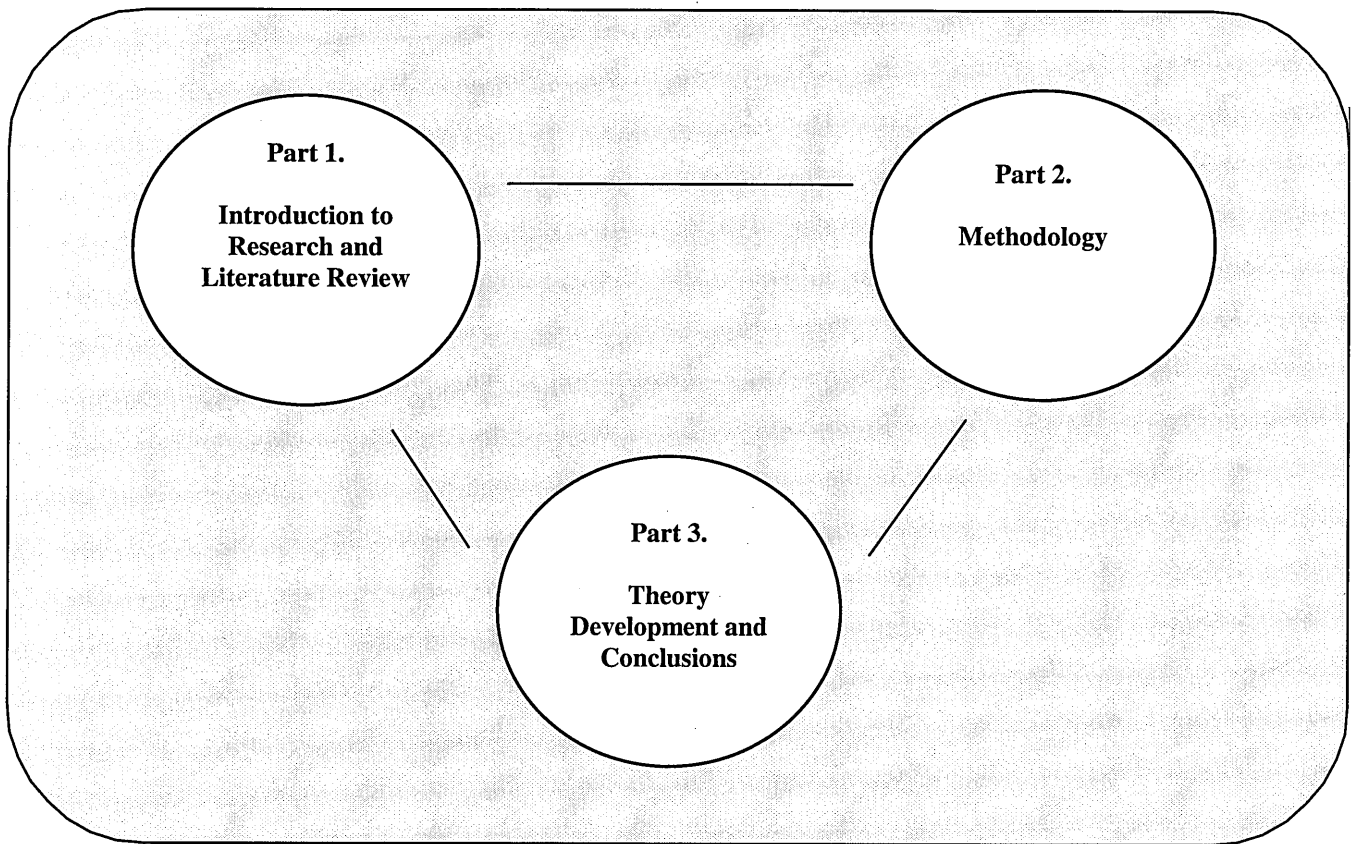


Figure 1.1: The structure of the thesis

Each of the nine chapters can be illustrated in a similar manner, and Figure 1.2 shows the circular way in which the main themes, or Chapters, are linked together.

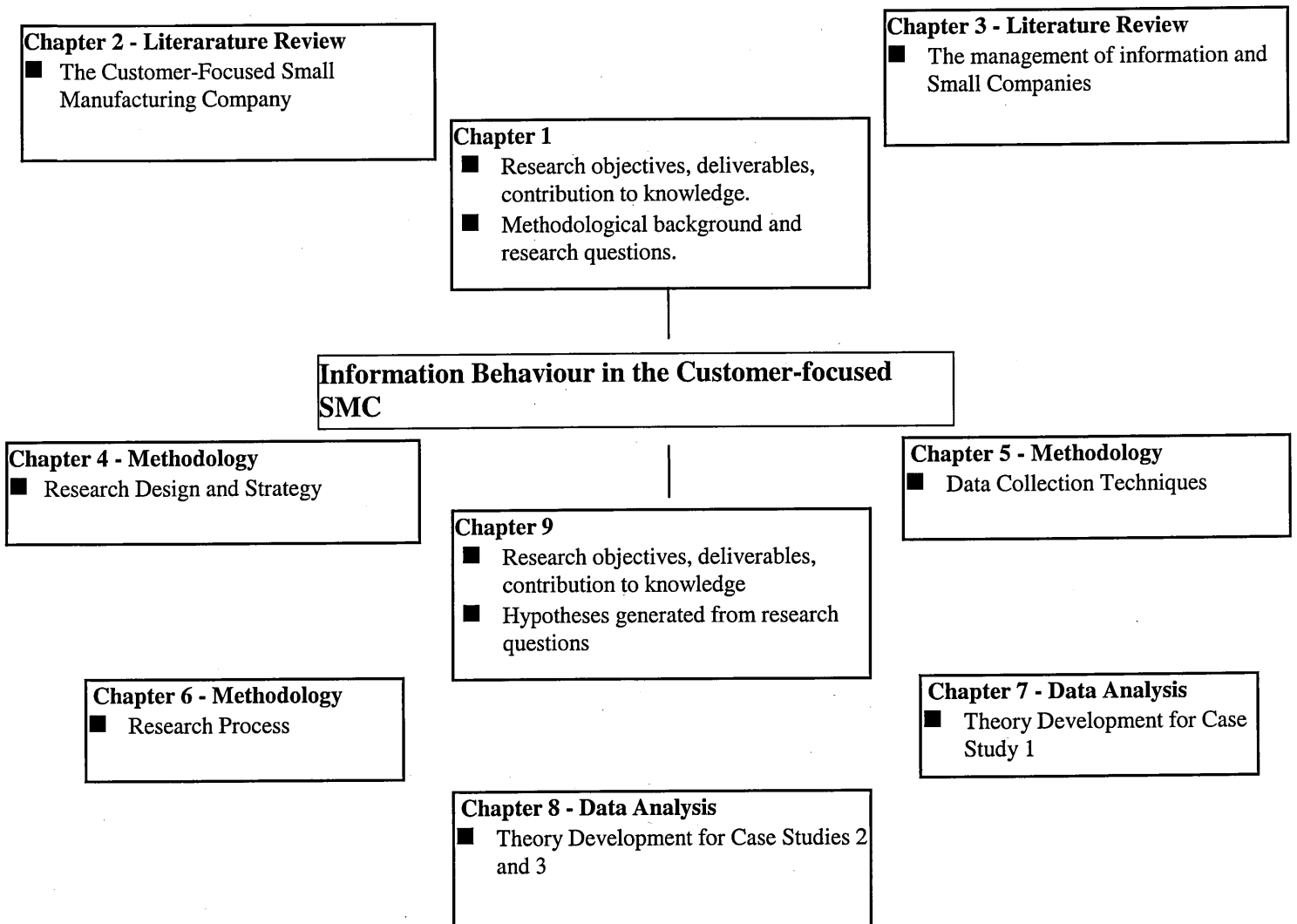


Figure 1.2: Circular nature of the thesis.

Summary of Chapter 1.

1. The research domain, problem definition, research objectives, deliverables and contribution to knowledge were presented.
2. The author's own ontological background, and the epistemological and methodological background was presented. These take the stance that information is anti-positivist in nature, opposing the traditional positivist views. It is systemic and based in the organisational culture.
3. In addition to the author's background, the ADAPT/C.O.R.E. Programme was the catalyst to this research. It helped to show that information is important to small manufacturing companies, though not explicitly realised as such, and that information and customer satisfaction are inextricably linked in today's small companies.
4. Four research questions were presented, and the literature review was seen as the next step to answering the questions.
5. Guidelines for reading the thesis were given, based on the author's assumption that it would be highly qualitative in nature. The change of title from 'The management of information' to 'Information Behaviour' occurred about halfway through the research programme, as a result of the learning process which is a natural part of research.

Chapter 2.

The Customer-Focused Small Manufacturing Company

1.

- Change, technological development and the knowledge economy are affecting all companies.
- Small Manufacturing Companies are highly important to the UK economy.
- A SMC may be considered as:
 - less than 50 employees (from classifications based on DTI/EU)
 - manufacturing, or manufacturing related.

2.

- A customer-focused SMC may be considered as:
 - component suppliers, with little product development capability of their own
 - make or engineer to order production processes
 - supplying industrial/business customers
 - family firms and owner-managed
 - demonstrating substantial customer retention.
- Customer satisfaction in these companies appears to be about providing flexibility to customers, in the form of an overall 'offering' rather than a tangible product on its

3.

- Information can integrate the processes, activities and behaviours which are a significant part of the customer order fulfilment process. Formal and informal information can cross over functional and cultural divides, and management of information can facilitate the satisfaction of customer demands through integrating the activities in the COFP.
- Customer-focused SMCs with information management challenges are:
 - Single site, power culture (i.e. not a 'virtual' company)
 - BS EN ISO quality standards registered
 - Implementing new information technologies.

4.

- The link between customer satisfaction and information in large companies shows that these tools can be helpful to analyse information in customer-focused small companies.
- The activities which make up the customer order fulfilment process can be linked through formal and informal information.
- Customer satisfaction is the ability of a company to organise its processes and activities to satisfy customer orders in an *integrated* manner.
- SMCs which are customer-focused are able to exploit their natural resources in an integrated manner, through information.

1. Small Manufacturing Companies and the UK Economy

This section covers:

- Change, technological development and the knowledge economy.
- SMCs and their importance to the UK economy.

This section starts to investigate the first research question, defining a customer-focused small manufacturing company, and the reasons this type of company is worth investigating.

Research in the area of small to medium-sized manufacturing enterprises (SMEs) has been largely confined to the study of start-ups, growth, surviving firms and failures (Storey 1994, Adams and Hall 1993, Hall 1995, Sackett and Nelder 1995, Fuller 1994, IEE 1993 and 1994, entrepreneurship (Bridge, O'Neill and Cromie 1998) or in the manufacturing sector, tools used mostly by larger companies scaled down to size for the use of small companies (Duty 1999, Childe, Maull and Bennett 1999). Also, much academic research in the SME sector focuses on surveys and statistical techniques. A leading journal in the SME sector, the *Journal of Small Business Development*, favours large scale statistical enquiries, and frequent DTI publications are based on cross-sectional surveys of SMEs (DTI 1998 (b)). Little is really understood on their everyday operations, processes and activities, especially those which go toward customer satisfaction, through the customer order fulfilment process (AMBITE 1996).

A SMC may be considered as:

- Less than 50 employees (from classifications based on DTI/EU).
- Manufacturing, or manufacturing related.

Section 1 shows that companies which have less than 50 employees constitute a substantial part of the UK economy in terms of sheer number of companies, workforce and turnover. The study of these companies is therefore highly significant and pertinent. Less is known about these small companies in particular as opposed to the rest of the small to medium-sized manufacturing enterprise (SME) sector. Sackett and Nelder claim that the problems SMEs face is exacerbated in these small companies (1995). This is explained in Section 2.

Sections 1.1 and 1.2 set the scene, showing that the global business environment is increasingly complex and uncertain, and is now often referred to as a knowledge economy. Sections 1.3 and 1.4 describe why the SME sector is important to the UK economy and defines what a SMC is.

1.1 Global Change, Uncertainty and Complexity

The last several decades have been characterised by change in the global business environment, for companies of all sizes. Munkvold claims that these changes include:

“.....increasing global competition, deregulation of markets, increasing customer selectivity on price, quality and service, environmental protection issues, and rapid

technological development e.g. the integration of information and telecommunications technologies.”

(2000, p 4)

These factors have helped lead to an overcapacity in sectors of manufacturing industry, and has caused industry in Europe and North America to lose its competitive edge (Schonberger 1996). This situation has not been helped by poor management practices in industry:

“...exacerbated by a combination of poor strategies and practices in all of the following functional areas; manufacturing, marketing, performance measurement, product design and development, supplier relations and human resource management.”

(Schonberger op.cit., p 14)

Increasing awareness of issues such as quality, the well-being of staff and the environment now means that companies have to deal with an increasing amount of laws and regulations in the forms of, for example, BS EN ISO quality standards, Health and Safety Acts, and Environmental Protection Acts, and European legislation is adding complexity to the uncertainty. These economic changes have been complemented by rapid developments in technology, both of products and processes.

Earl claimed more than a decade ago that the convergence of electronic information technologies such as data processing, communications and automation have opened up integration possibilities, and changing the ways of doing business (1989). Hardware and software have developed and become cheaper and easier to use. Firms have implemented IT solutions to help them differentiate and gain competitive advantage. The plethora of books, conferences and academic text on information systems management and the innumerable consultancies and vendors of IT solutions illustrate how popular a topic it is.

The business environment for both large and small companies is becoming more complex and uncertain. This provides new opportunities as well as threats.

1.2 The Knowledge Economy

Nearly 40 years ago Machlup pointed out the increasing number of knowledge workers in the workforce (1962), and Bell drew attention to the fact that increasingly the most important organisational asset was not capital but knowledge (1973). Ramkrishnan, Tenkasi and Boland have recently promulgated global change as relentless, especially in regard to market expectations and customers demands for new products. They claim these changes have led to the rise of knowledge intensive companies, replacing capital and labour intensive companies (1998).

Today, resources are people and information, rather than land, manufacturing plants and equipment. A T Kearney illustrate this through arguing that banks once competed on their ability to be close to their customers through the location of their branches, then they changed to deal with competition through more cost-effective ways. Now,

competitive advantage comes through their ability to use knowledge about their customers to offer better services. New information technologies enable more efficient ways of accessing, structuring, integrating and using knowledge in business processes (1999).

Bertels and Savage compared what they perceive as the old 'Industrial Era' thinking and practices to the new 'Knowledge Era' (2000). They claim that narrowly defined task and command and control hierarchies may work in stable environments, but not in the emerging knowledge era. These hierarchies have fostered a climate where people do not feel valued for what they know or what they can do. They claim that the biggest challenge for the knowledge era is cultural:

"The dominant logic of the industrial era is a barrier to reaching an understanding of the knowledge era."
(2000, p 205)

They point out that the main challenges of the knowledge era are new ways of thinking such as valuing and measuring ideas and intangible knowledge assets, and realising the value and abundance of information.

In the UK, the DTI White Paper on Competitiveness, 'Building the Knowledge Driven Economy', describes some of the effects global change has had on UK industry:

"Nations across the world are becoming progressively more sophisticated and well educated. All markets increasingly demand innovative and higher quality products and services."
(1998 (a) Part 1, p 1)

The paper cites global competition, innovative products, processes and services, electronic commerce, science and knowledge as being behind the pressure for change. The paper also states that knowledge, skills and creativity are what the UK needs to give it a competitive edge, and that businesses must ensure their staff develop skills continuously. The paper also points out the need for a focus on the small to medium-sized enterprise sector in particular.

Scarborough, Swan and Preston claim that firms have been brought into the information age, and they may have a broad focus on knowledge management or a narrow focus on research and development. They claim that knowledge has been:

".....freed from the old material and institutional constraints. Knowledge now acts upon itself in an accelerating spiral of innovation and change."
(1999, p 5)

Gibbons shows the changing modes of knowledge production. - Mode 1 where knowledge is produced in ivory towers and is academic and homogenous, to Mode 2 where knowledge is multidisciplinary and produced at the point of application (1994). Similarly, Dixon takes the view that nowadays much useful knowledge is not found

only in certain experts, or groups of experts, but is distributed throughout the whole of the organisation. She refers to her two models - the 'expert' model and the 'distributed' model.

She claims that the last ten years of work on organisational learning has resulted in a change in the way people think about who has knowledge. It is a shift away from the idea that it is found only in select groups of experts i.e horizontal drilling or refinery maintenance, product and process flow, what she refers to as the 'expert model'. In this model it can move downwards from manager to subordinates, or professor to students.

"Ten years of focus on learning and knowledge has begun to evolve a different mental model within organisations - one that views knowledge as widely distributed across organisational members rather than as residing in only a small number of experts. In addition, this newer model views knowledge as abundant rather than as scarce, and as possible to develop in-house rather than needing to be brought in from outside."

(1999, p 2)

Large multinationals are already using sophisticated knowledge management systems and techniques. Well-known examples are: Glaxo Wellcome, which after their merger developed a Learning Organisation, Price Waterhouse who have developed their International Business Language, and BG Technology who have implemented a three generation Knowledge Management programme.

The influence of these companies in helping to create a knowledge economy is considerable, and the competitive effects must eventually be felt by small companies at the far end of the supply chain.

1.3 The Small To Medium-Sized Manufacturing Enterprise Sector

UK companies are operating in an age of increasing uncertainty and complexity, in a knowledge and information intensive economy. This has considerable implications for small companies, especially those at the mercy of the everyday stipulations of their customers.

The Department of Trade and Industry showed that there were 3.7 million businesses in the UK of which SMEs (< 250 employees) are 99.8%, employ 56.8% of the workforce and attain 53.8% of the overall business turnover (1998 (b)). Of these, companies with less than 50 employees constitute 99.1% of all enterprises, and they also employ 44.7% of the workforce and 39.5% of the manufacturing turnover. They are important enough to the UK economy to deserve special attention, but these figures mean that on average they are less productive than large companies (1998).

The growing interest in studying the small to medium-sized enterprise sector was pointed out by the Institute of Electrical Engineers. They claimed that small to medium -sized manufacturing enterprises are vital to the economy - they provide new ideas, act as suppliers and provide seeds for new enterprises (1994). However, they have often been an overlooked sector of the economy.

1.4 Definitions

The term 'Small To Medium-Sized Enterprise' has become popular in recent years, although there has been confusion over the precise definition. This has led to literature in the area which is sometimes ambiguous. The terms 'Small To Medium-Sized Enterprise' and 'Small Company' are used interchangeably. Storey refers to 'small' companies (1994), and the IEE refer to 'Small To Medium-Sized Manufacturing Enterprise' (1993, 1994 op.cit.)

In the UK, the DTI has given a classification of companies according to the number of *employees*:

- Micro firm: 0 - 9 employees.
- Small firm: 0 - 49 employees (includes micro).
- Medium firm: 50 - 249 employees.
- Large firm: over 250 employees.

(Bridge, O'Neill and Cromie 1998, p 102)

North, Blackburn and Curran also use this definition of small firms in relation to quality management (1998).

Other measures used in the past have defined small to medium-sized manufacturing enterprises as having less than 500 employees (IEE 1993), and small manufacturing companies as less than or equal to 200 employees (Bolton Committee 1971, from Storey 1994).

The DTI definition has also been adopted by the European Commission, but they have also included turnover and balance sheet measures. Numerous other bodies have also used such measures as turnover and balance sheet to classify companies as small, medium or large: The Companies Act 1985, Bank of England, and Loan Guarantee Scheme have done this. Other measures have also been used, notably relative size within industry, and capital investment (Bridge et al. op. cit.).

Writers on small to medium-sized companies and small companies have not often made the distinction between the two. There is little research on the less than 50 sector by itself. It may be assumed that, unless otherwise stated, authors writing in the area of either SMEs or small companies are *not* specifically referring to companies under 50 employees.

1.5 Discussion

A small manufacturing company is classified here as having less than 50 employees. For the purposes of this research programme the classification according to employees is used as the number of people has a crucial bearing on information type, flow, usage and management, and this is explained later in this Chapter (Sections 2.3, 2.4).

This section has described the present turbulent economic environment, defined what a small manufacturing company is, and why they are important to the economy. This leads directly into the next section, which explains the more specific challenges these companies are faced with in regard to their customers.

2.1 *Small Companies and Customer-Focus*

This section continues to answer the first research question, on what a customer-focused small manufacturing company is, and why this type of company is worth investigating. It also delves into the second and third research questions, on customer satisfaction and the link between customer-satisfaction and information. It covers the areas of small manufacturing companies and customer-focus.

SMCs which have the following characteristics may be considered customer-focused:

- Component suppliers, with little product development capability of their own (They are more at the mercy of their customers demands).
- Make or engineer to order production processes (Again, they are more vulnerable to their customer's demands).
- Supplying industrial/business customers (Ford et al (1998) indicate that relationships with these customers are closer).
- Family firms and owner-managed (They do not have stakeholders apart from their customers).
- Demonstrate substantial customer retention (To retain customers, they must be able to satisfy them to bring them back again and again).

Customer satisfaction for these companies appears to be about providing flexibility to their customers, in the form of an overall 'offering' rather than simply a tangible product on its own.

Section 2.1 discusses market drift and difficulties SMCs have in the supply-chain. 2.2 explains the characteristics of a customer-focused small company for the purposes of this research. 2.3 describes the characteristics and vulnerabilities of the SME sector, and 2.4 describes SMCs in particular.

2.1

2.1.1 Supply Chain and Customer Focus

In the supply-chain, uncertainty and complexity has grown - customers have more influence than ever, and companies find it difficult to understand the effect of impacts further up the value chain. Business has a tendency to leak away from the company through these changing market factors (Vyadanam and Leppard 1995). Market Drift is

a term used to describe the effects uncertainty and complexity have on companies, especially in relation to small companies.

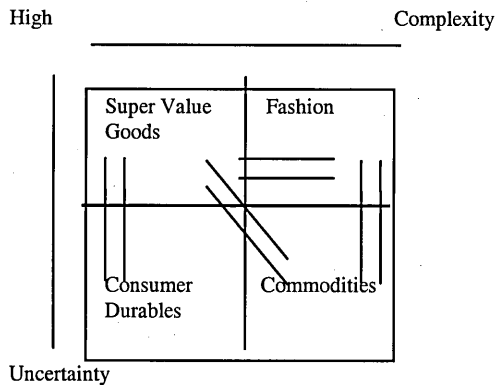


Figure 2.1: 'Market Drift' (Source: Puttick and Gillis 1995, p 14)

Market drift is the tendency for today's super value products to become tomorrow's commodities. As the pace of new product development quickens and becomes more technologically complex, large industrial customers, or original equipment suppliers (OEMs), expect more from their suppliers. Puttick and Gillis argue that companies, especially SMEs, cannot compete as lowest cost producers alone, they must find ways to differentiate:

"Companies have two alternatives in this climate of market drift. One is to follow the market down and try to become *lowest cost producer*. This would be extremely difficult for most manufacturers, particularly SMEs based in Europe. The second is to seek new forms of differentiation for their products and services."
(Puttick and Gillis 1995, p 14).

To do this, they suggest seven options companies can choose from:

- Add technology to differentiate
 - Reduce fixed costs
 - Alliances with selected customers
 - Add service features
 - Introduce new product range
 - Alliances with selected suppliers
- or
- Reduce time to market.

They say that companies need to take a proactive approach to the acquisition of *knowledge* in particular (Puttick and Gillis op.cit.).

Customer satisfaction in such an environment of market drift becomes harder for small companies. Large companies have always been able to influence the marketplace to a much greater extent than their smaller counterparts. They can benefit from economies of scale, and can deploy marketing expenditure to put up barriers to entry in their own industries (Porter 1980). They can also initiate the above with relative ease, for example, forming alliances with selected suppliers and customers. As they have more capital they can also afford to employ the best staff (Bridge et al op.cit.). This can give them more strategic choice in a complex and uncertain market. Small companies need to be innovative in their approach to differentiation.

2.2 Customer Focused Small Companies

2.2.1 Type of Products

The products of second tier (indirect) small companies are usually components, or part of the OEM's or first tier companies' finished goods, rather than finished goods of their own. Browne claims that there are basically two types of small to medium-sized manufacturing enterprises:

- Component manufacturers who are largely involved in supplying components and assemblies to larger companies and final assemblers.
- Producers of finished products.

He argues that those companies which are technically and financially weak are disadvantaged in being able to comply with what their customers want (1995). Component manufacturers are more likely to be technically and financially weak. They are also more likely to be closely tied in to their customers, and to some extent at the mercy of their demands.

2.2.2 Production Processes

Many small manufacturing companies are make to order/engineer to order systems of production, and display close relations with their customers because of this demand-pull system (Duty 1999). Make to stock producers tend to be further from their customers in terms of relationships (AMBITE 1996).

2.2.3 Type of Customers

Ford, Gadde, Hakansson, Lundgren, Snehota, Turnbull and Wilson argue that most marketing textbooks focus on consumer goods, and have an oversimplified view of business markets. This views customers as essentially passive and anonymous, as a variety of consumer goods are marketed at them. They pick and choose and have little or no personal contact with the manufacturers.

“This traditional view of marketing is a very incomplete picture of what happens in business markets, in which things like computer software, automotive components, re-insurance, airlines, banking services and copper wire are traded.”

(1998, p 4)

In reality small companies have a variety of customers, some of which are more important than others. For example, the SMCs which took part in the Adapt/C.O.R.E. programme supplied mostly business customers, as opposed to consumer customers. Even the companies which manufactured consumer goods such as cosmetics always sold their products to a distributor before going on to the final customers.

This distinction between business and consumer markets is salient to the subject of customer-focus. Ford et al. imply that companies may well be on more intimate terms with their business customers than their consumer customers (1998 op.cit.).

2.2.4 Associated Risks

Small manufacturing companies which fall into the above three categories are naturally closer to their customers, because they have to be. They must make sure they stay that way by offering what their customers really want. The rapid development of increasingly sophisticated short life products and new technologies has increased competition and made the satisfaction of customers higher up the value chain harder to accomplish. Larger organisations and original equipment manufacturers (OEMs) have the resources to adapt to fluctuations in the environment, for example, they tend to have more material resources such as finance, technology and skilled personnel (Rothwell 1989). Small to medium-sized enterprises are in a highly uncertain environment - in the value chain they tend to be the 'creatures' rather than the 'creators' of change (Joyce, Woods, McNulty and Corrigan 1990).

The small to medium-sized enterprises involved in the supply-chains of large automotive manufacturers find that the poor co-ordination of the extended supply-chain by the OEMs means 'demand variability' (changes in volume and/or mix) is amplified tremendously. The potential effects this has on SMEs, particularly those which are not first tier, are adverse (James, Griffiths, Laverick and Vu 1999). If these companies have other customers, then this is even more complex.

Eight out of the twelve SMCs on the Adapt/C.O.R.E. Learning Cluster programme were, to all appearances, naturally tied closely in with their customers, that is, customer-focused and matching all the categories described above. They appeared to have little choice but to compete on low value competitiveness, that is, low cost, reduced time to market and better quality products. They were, to all appearances, at the mercy of their customers (Appendix B). Out of these eight companies, only one did not have other customers. In addition to this, they had further complexities:

- Implementation of BSI EN ISO quality standards or similar, usually imposed on them by their customers.
- Although they are mostly in niche markets, a wide variety of product customisation was expected, with low volumes and fast delivery.
- These demands required more sophisticated technology to handle them - SMEs often do not have the budgets or knowledge to cover this.

(Ratcliffe-Martin and Sackett 1999, Adapt/C.O.R.E. Report 1999)

There is potential for these companies to compete through differentiation, in fact, they must do this to survive, and these additional factors also showed that some small companies were competing on aspects which went beyond the traditional order winners of time, cost and conformance quality. Product customisation and flexibility towards customers was recognised as important.

Christopher and McDonald recognised this problem, and they claim that customer satisfaction nowadays is a much broader concept than a tangible product. Giving customers what they want is no longer seen as simply delivering the product they have ordered - it is about providing *solutions to problems*. They refer to this as the 'offering' (1995).

Customer focused small manufacturing companies must find ways to maintain customer satisfaction in the face of these contending forces. Three of these companies appeared to display significant customer satisfaction, through their BS EN ISO 9002 registration and the fact that they all had retained important customers for ten years or more. At this stage, it could be assumed that their ability to 'add value' through an offering as opposed to simply a product may be responsible for this.

2.3 Nature of Small to Medium-sized Enterprises

2.3.1 Differences

Small companies are very different to large companies:

"Small businesses are not just smaller versions of big businesses. They have a number of distinctive features that are not always obvious to the untutored observer."

(Bridge et. al. op. cit., p 99)

2.3.2 Structure and Leadership

Bridge et al. argue that small companies are known to be much less formal. Being a small company as opposed to a large company is about:

".....being closer to customers, and being potentially more flexible and adaptable and having close and informal control structures and communication channels."

(1998 op.cit., p 104)

Also referring to structure, they also say that jobs tend to be generalised, rather than specialised, with fuzzy boundaries between functions and more flexible working practices.

Haksever, writing on the differences between small and large companies, realised that small companies are often owned and run by artisans as opposed to businessmen and

this more informal leadership tends to foster an organisation of few layers, a variety of tasks and greater flexibility (1996).

2.3.3 Resources

Small to medium-sized enterprises have fewer financial and managerial resources than larger companies. They encounter a greater depletion of experienced personnel, and are more likely to lose staff to larger companies (Skandalakis and Nelder 1999). The IEE refer to this lack of resources as barriers to growth for small to medium-sized manufacturing enterprises, and include technology in this. Technology, skills and finance are usually advantages of larger companies (IEE 1994).

The role small firms have in economic growth has been much debated over the years. The importance they play has been exemplified through the semiconductor industry in the U.S. Small companies developed new, innovative technologies through their entrepreneurial drive, and large companies were able to provide the finance and skilled personnel to actually develop, manufacture and market the innovations (Rothwell 1989).

These companies displayed what Rothwell calls 'dynamic complementarities'. Their mutual strengths complement each other. That is, small firms strengths are behavioural and more implicit. They have:

- Entrepreneurial dynamism
 - Internal flexibility
- and
- Responsiveness to changing circumstances.
- (1989)

2.3.4 Culture

Flood and Jackson claim that organisational culture is usually perceived as the fairly tacit, but well-embedded ways of thinking and behaving in organisations:

"...the often unspoken but familiar ways of thinking and acting that exist in all firms and enterprises."
(1991, p 11)

Handy presents a similar argument, based on thinking which is manifested in the organisational behaviours and routines:

".....sets of values and norms and beliefs - reflected in different structures and systems."
(Handy 1994, p 180).

Culture in small companies is closely related to their structure and resources - an informal, behavioural element. Haksever asserts that in a small company, power rests

in the owner/manager (1996 op. cit.). Small companies are often 'power' cultures. The idea of the power culture was originally contrived by Roger Harrison (1972), and later described by Handy as being often found in small entrepreneurial-type companies. It is foremost pictured as a web, with 'rays' of power and influence emanating from the person at the centre of the web - in the case of these small companies, the owner/manager.

"The organisation depends on trust and empathy for its effectiveness and on telepathy and personal conversation for communication. If the centre chooses the right people, who can think in the same way as it thinks, they can be left to get on with the job. There are few rules and procedures, and little bureaucracy."
(1994, p 184)

Handy refers to small companies as power cultures. He says that the power culture can often react quickly to threat or danger. They may be family businesses, and are limited through size.

Jones, though not referring explicitly to culture, clearly implies the nature of a power culture in small organisations, with special reference to informal information:

"In collectivities, including organisations, where the number of participants is small.....interaction is governed more by understandings, often implicit, of what is expected and what the consequences of non-compliance will be rather than by written rules and company manuals."
(Jones 1996, p 92)

In small companies, the simple, informal structure and behavioural, flexible, people-based resources appear to be a manifestation of the power culture, and this is useful for flexibility and customer satisfaction.

2.4 Differences and Risks

Small companies under 50 employees are especially at risk. These companies are not only short of material resources, they also have little opportunity to learn new techniques and ideas specific to their own needs, such as expertise to help them achieve best practice manufacturing techniques.

Companies under 50 employees are even more heterogenous than larger SMEs. Sackett and Nelder claim that manufacturing companies of this size see no benefits in new management techniques and think BS EN ISO 9002 a waste of time. Some of them do not find enough new ideas for innovation, and even those that do find ideas lack the resources to use them. They do little market research and often spend more on equipment than staff training (1995 op. cit.). Both the lack of material resources and advantage of behavioural resources, power culture and simple structure is likely to be exacerbated to a greater extent.

Small manufacturing companies are often family owned, owner managed power cultures.

Further study as part of the Adapt/C.O.R.E. programme revealed that these three companies were all single-site, owner managed family firms and were traditional power cultures. They all exhibited informal communication, within the company itself and spreading outwards with customers.

2.5 Discussion

Small companies need to find ways to differentiate according to the various demands placed on them by their customers. How they do this is not clear, especially for customer-focused small manufacturing companies. Their structure and culture is flexible - this may provide clues, as this flexibility is needed to provide customer satisfaction. Customer satisfaction and the activities involved in the customer order fulfilment process are based on the ability of these companies to be flexible towards their customers. Much of this flexibility is based on informal communication and information processes.

3. Information in the Customer-focused Small Manufacturing Company

This section explores the third research question in more detail, the link between information and customer satisfaction in small companies.

The author explores literature and practices for linking processes with customer demands. Information can integrate the processes, activities and behaviours which are a significant part of the customer order fulfilment process. Formal and informal information can cross over functional and cultural divides, and management of information can facilitate the satisfaction of customer demands through integrating the activities in the COFP. This is why it is important to any company, large or small.

Section 3.1 looks into the sparse literature on formal and informal aspects of information in small companies, and the links with customer satisfaction. The conclusions are that there are three customer-focused SMCs which the author is familiar with, and which have the management of information challenges related to customer satisfaction, in the form of:

- Their single site, power culture means their information is naturally informal.
- Their BS EN ISO 9002 quality standards registration and implementation of new information systems means they also have formal challenges related to the management of information

3.2 investigates the information issues in the customer order fulfilment process in large companies, from both the perspective of manufacturing and marketing. It goes on to explore how information, both formal and informal, can help to achieve customer satisfaction and customer-focused change through integrating activities and behaviours in the customer order fulfilment process. It suggests that techniques and tools for large companies may offer ways in which to research information in the customer-focused small company.

3.1.1 Information as a Resource in SMCs

There is little indication that information is thought of as a resource in small companies. Orna gave recognition to information as a resource in small companies, suggesting that small companies should utilise information as a resource on economic and practical grounds (1990). There are a few books on implementing IT in small companies, and this is often referred to as computerisation (Alty 1982, Raymond 1992). There is literature indicating that the SME sector in general suffers from a knowledge deficit, especially in terms of competitor intelligence (Skandalakis and Nelder op.cit.).

Yet there is indirect evidence that small companies can, and do, make use of knowledge and information resources, especially in their customer relations. The work done with small companies on the Adapt/C.O.R.E programme also revealed that such terms as 'customer feedback', 'communication' and 'good information' were important challenges in small companies (Chapter 1, Section 2.3). Time spent in one Company as part of this programme revealed and confirmed to an extent their information intensity - both formal and informal.

3.1.2 Informal Information

What was immediately apparent was the seemingly chaotic nature of their operations. There was much information transfer which took the form of conversation - face to face, in small groups and over the telephone. This was a manifestation of the power culture and simple structure based on behavioural resources, covered in Section 2 (Ratcliffe-Martin and Sackett 1999).

Bridge et al. have suggested this already in relation to small companies. They say a core skill often overlooked is communication, through the relating and exchanging of relevant information with the right people (1998 op.cit.).

Informality and communication was also a topic of interest for Haksever. In writing about TQM in small companies, he claimed that:

"Small companies have an advantage in customer satisfaction - they have frequent face-to-face contact. They also have directness and timeliness of information flow from customer to firm. Large companies may rely on marketeers or consultants. Small companies can add the 'personal touch' to all customers."
(1996 op.cit., p 16)

3.1.3 Formal Information

Formal paper-based or electronic information such as email and databases were also a part of this company's operations, though at first glance of less importance than informal information (Martin 1999). However, there are also indications from literature that formal information may be more important than is usually recognised. A study at Anglia Polytechnic University showed that there is a void between the level of reliance on loyal customers in the form of repeat business and referrals, and the use of

this evidence in tracking performance (Banks and Stone 1995). Similarly, Goh and Ridgeway state that small companies are unaware of the need for 'formal' systems to determine customer satisfaction (1994). The study of small business trends by Durham University Business School predicted that information and knowledge in the value chain would be a driver for change in the small to medium-sized manufacturing enterprises environment in the immediate future (Fuller 1994).

This increasing need for formal information was becoming apparent on the Adapt/C.O.R.E. Learning Cluster programme. Three of the eight customer-focused companies were BS EN ISO 9002 Quality Standards registered. Interestingly, these three companies also displayed significant customer retention. They were not only surviving, but had done so for decades, in one case, eighty years, and customer retention was frequently mentioned. Two out of the three were even planning future expansion.

BS EN ISO 9002 (formerly known as BS 5750) has a reputation for being both a benefit and a hindrance, but is needed for customer satisfaction, as in the majority of cases their customers demanded registration. North, Blackburn and Curran claim that the standard requires companies to define and record customer demands, and to make sure that the company has the ability to meet these demands (1998 op. cit.).

Arguments against it are numerous. Bannock asserted that the bureaucratic and formal nature of the standard, formalising the operating procedures, may undermine the natural flexibility to the market which small companies have (1991). Lloyd has argued both for and against:

“The argument for BS5750 is a strong one, systematically reviewing and documenting a companies current practice is an auditing process certain to raise important questions and produce benefits. It is when BS5750 is in place and the 'paperwork' aspect begins to encroach on normally *informal* working practices that people fail to see the benefits.” (Lloyd 1996, p 10)

Another fact was that they were all coping with much formal information, in the shape of an increasing need for IT especially, and this they often saw as either a problem or a necessity. Vague statements such as “Customers require IT” made the author more aware of the complex and little understood information flows and processing problems in these three SMCs, especially in relation to customer satisfaction.

The author recognised the need to explore the phenomenon of information in these customer-focused SMCs.

3.1.4 The Link with Customer Satisfaction

For SMCs, maintaining customer-focus is imperative in their current state of vulnerability in the supply-chain. They may do this through harnessing their natural resources - their people. Flexibility may come through their ability to communicate

informally and respond quickly to deal with uncertainty. However, increasing complexity may indicate the need to use formal information to support this.

The author realised that more understanding about information, both formal and informal, would indicate how customer-focused SMCs retain their customers over a long period. However, very little was known about information in SMCs, and the evidence was insubstantial. More knowledge about information for customer-focus needed to be gained before it could be assumed that it is an enabler of customer satisfaction.

3.2 Discussion

The first section of this Chapter has shown what an SMC is, and why they are important to the economy. The second section of this Chapter has defined what a customer-focused SMC is and why they need to be studied, and the third has defined to an extent why the study of information is both an interesting and important phenomenon in these companies. However, it has not defined why the study of information is linked to customer-focus, and the ability of these companies to satisfy their customers over a long period of time.

4. *Customer-focused Change and Information*

This section looks further at the link between customer satisfaction and information in large companies, and points out how these can be used to analyse information in small companies. Although large companies are very different to small companies in the ways cited in Section 2.3, there is recognition from some authors that information in relation to customer satisfaction may be more than simply sophisticated IT-driven tools. Cultural, informal approaches to information may be more appropriate for small companies, and customer satisfaction, and the activities which make up the customer order fulfilment process can be linked through formal and informal information.

Section 4.1 examines the significance of customer retention, 4.2 looks at customer-focused change in manufacturing. 4.3 looks at the role of information in this, 4.4 looks at the link between these views and the views of marketing, and 4.5 illustrates the role of information in linking manufacturing processes to customer satisfaction. Section 4.6 integrates all these themes, and 4.7 sums up the arguments.

4.1 Customer Retention

Holding on to important customers and building long term partnerships is often a matter of survival. Reichheld, referring to large companies, contends that because of competition, it is harder for companies to hold on to customers, but it is also more expensive in the long run to gain new ones. Long-term customer loyalty produces greater profits (1996). Reichheld contends that most companies are unaware of the effects of customer defections and do not understand how it happens:

“Good long standing customers are worth so much that in some industries, reducing customer defections by as little as 5 points, from say 15% to 10% p.a. can double profits”

(Reichheld 1996, p 56).

4.2 The Manufacturing View

An insight into the link between information and customer satisfaction can be gained from the experiences of large companies.

Large companies traditionally have a more hierarchical, centralised and functional structure than their smaller counterparts. This type is usually less able to maintain close contact with customers. It is also less able to maintain close contact with itself internally. Many of the tools and techniques which abound nowadays, such as Total Quality Management (TQM), Business Process Reengineering (BPR) and Manufacturing Resource Planning (MRP11) have to an extent been established in the belief that customer-satisfaction comes about through a *process*-based approach.

Attempts to downsize and to implement these ‘process’ oriented tools and techniques which cross functional boundaries to make the product more customer-focused have been prevalent in large companies. Davenport and Short wrote that a business process is:

“The logical organisation of people, materials, energy, equipment and procedures into work activities designed to produce a specified end result.”

(1990, p 12)

Childe, Maull and Bennett say that business processes have customers, cross organisational boundaries and are free of formal structure (1994) (Figure 2.2).

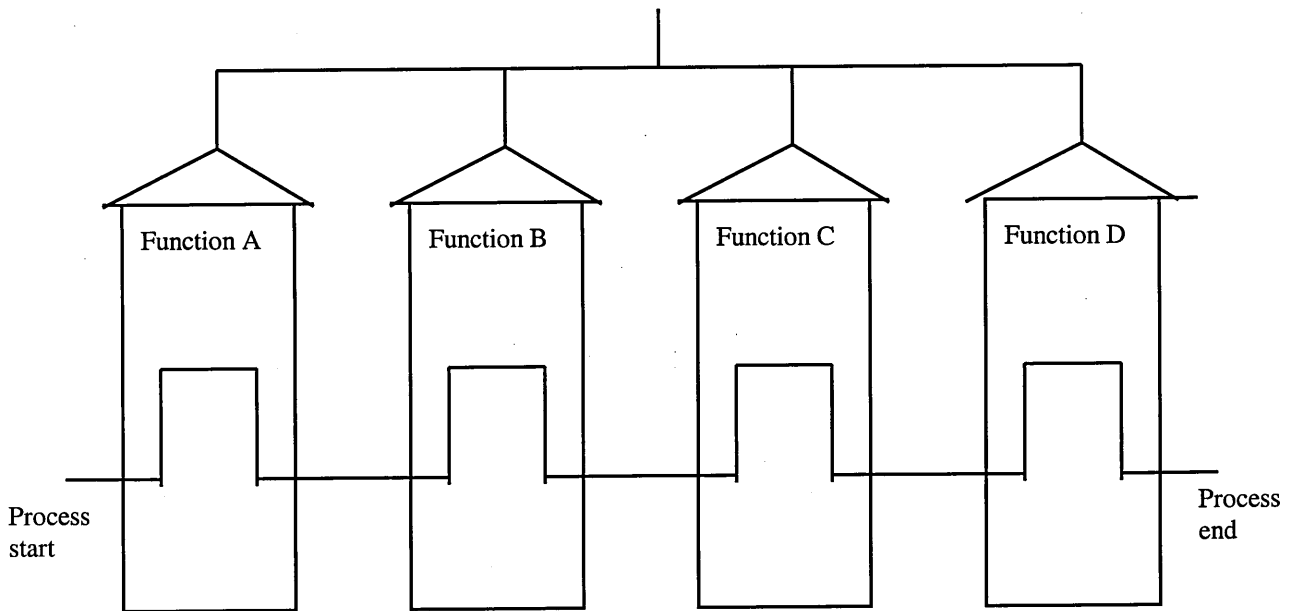


Figure 2.2: Processes and Process Initiatives in a Functional Organisation (Source: Childe, Maull and Bennett 1994).

These process-based approaches rely on the *integration* of organisational activities with customers in the supply-chain and also internally.

A project looking into the take-up and use of advanced manufacturing technologies in European companies developed a business model, built on what it described as the five macro business processes:

- the Customer Order Fulfilment process
 - the Vendor Supply process
 - the Manufacturing process
 - the Design Co-ordination process
- and
- the Co-engineering process.

The first of those, the customer order fulfilment process:

“.....contains all the activities directly involved with the planning, control and co-ordination of customer requirements with the manufacturing process and the delivery of the product to the customer.”

(AMBITE Final Technical Report, p 9).

This process shows the way in which manufacturing and marketing overlap in their approach to customer-focus. This research is centred on the investigation of the customer order fulfilment process, the activities and behaviours which satisfy the customer.

4.3 Information for Customer-focused Change

Business improvement tools and techniques which have been developed in recent years such as BPR, TQM and MRP, make explicit use of information to achieve customer satisfaction - information which integrates activities and processes.

Wight claimed that MRP11 was intended to overcome the difficulties of poor information in scheduling production, especially in an uncertain operating environment where customers often change their minds about orders and require products to be expedited (1981). Similarly, Bermejo, Calinescu, Efstathiou and Schirn recently claimed that poor information flow inhibits efficient scheduling in an uncertain environment (1997). Computer integrated manufacturing (CIM) was intended as a philosophy to achieve, amongst other benefits, simpler access to information (Kearney 1988), and business process reengineering (BPR) is enabled by information technology to provide a process-based tool for customer focus, that is, to improve the overall activities in the customer order fulfilment process. Chang and Powell claim that BPR involves a complex interaction of people, IT and new skills (1998).

Manufacturing-based tools for customer-focused integration are based on *formal* information - information which has developed from automation and information technology. Although most of these tools are process-based, designed to enhance customer-focus, they all too often tend to be utilised as tools simply to improve scheduling, which may result in lower costs, but provide little overall business benefit through better customer satisfaction (Martin 1996, Kearney 1988, Chang and Powell op.cit.).

4.4 View of Marketing

The concept of customer satisfaction as an integrated, organisational capability to manage change has been recognised by marketing writers also. Customer satisfaction is not just the responsibility of the sales and marketing function, it relies on the optimised efforts of the whole organisation in an integrated manner, similar to the ideas behind process-based change. Christopher and Macdonald state that:

“Marketing is concerned with customer satisfaction and with the focusing of the organisational resources to ensure that the customer is satisfied.”
(1995, p2).

They claim that customer service has three elements:

1. *Pre-transaction elements*: Corporate policies or programmes; for example, written statements of service policy, adequacy of organisational structure and system flexibility.
2. *Transaction elements*: Those customer service variables directly involved in performing the physical distribution functions; for example, product availability, order cycle time, order status information and delivery reliability.

3. *Post-transaction elements*: Supportive of the product while in use: for instance, product warranty, parts and repair service, procedures for customer complaints and product replacement.

These activities must be integrated for customer satisfaction. The transactional elements cannot be understood in isolation without the other two elements. The transactional elements are very similar to the customer order fulfilment process.

4.5 Information for Customer Satisfaction

Marketing-based approaches have hinted at more informal, interpretative, cultural approaches to information for customer satisfaction, stressing communication - information that makes sure the companies:

- Know what wins orders
and
- Can integrate activities to effect the satisfaction of these order winners, especially during turbulent times.

Hill suggests a number of what he terms 'order winners' - that which keeps the customers coming back. These must be understood and interpreted in a similar manner by not only marketing, but manufacturing and other functions also:

- Price
 - Conformance quality
 - Delivery speed and reliability
 - Colour range
 - Product range
 - Design
 - Brand image
- and
- Technical support.
- (1994)

Hill put a marketing perspective into manufacturing when he recognised the need for better information to link marketing to other functions:

"Relevant internal information which explains the company's manufacturing capabilities needs to be available within a business as well as the traditional information which is primarily concerned with the customer and the market opportunities associated with the company's products and addressed solely from the marketing perspective."
(Hill 1994, p 154).

He gives these three examples:

1. *Functional perspectives*: Marketing must identify order winners and qualifiers for products/services now and in the future. This information will provide input into

strategic debate. Manufacturing then reviews the implications for manufacturing processes and infrastructures support for the above, i.e. similar products may have very different order winners.

2. *Actual orders*: The real demands on a supplier are here. Tracing those in terms of volume, lead-times, margins etc. are key data for companies.
3. *Customer's views*: He implies not only a need to manage formal information but to understand the more informal elements - communication between functions through a shared language and culture.

On the same lines, Orna stressed the need to understand cultural differences to be able to communicate when she stated that all companies would benefit from an information audit, including manufacturing:

“to interpret market problem in terms of technological solutions, and translate the technology solutions into marketable items.”

(1991, p 75)

Parasuraman, Seithami and Berry argue that *communication* processes link the gaps in the customer service delivery model. These are:

- Research gap
- Design gap
- Implementation gap
- Communication gap

and

- Reality gap.

(1985)

They stress the need for understanding between customers and functional divisions. These gaps may be seen as cultural mismatches between customers and organisation functions.

4.6 Integration of Views and the Customer Order Fulfilment Process

These approaches emphasise the need to link processes and activities with customers in an *integrated* cycle. They also suggest that there is more to information besides technology. Terms such as communication, culture, language, knowledge, people-based skills and perspective imply a behavioural, more informal way of integrating processes. However, these come to no definite conclusions about informal information, they simply imply that there is an alternative approach.

Large companies, through these programmes, have been trying to do what SMCs can often do naturally, because of their smaller size - use information to integrate their activities, especially informal information. They are simply trying to gain closer contact with customers through a smaller simpler structure, thus gaining the benefit of integration and better response through informal communication.

Customer satisfaction is the ability of a company to organise its processes and activities to satisfy customer orders in an *integrated* manner. It is conceivable that SMCs which are customer-focused are able to exploit their natural resources in an integrated manner. This integration may cross functional and hierarchical boundaries and is more natural to an SMC due to their smaller, informal structure. This is what enables them to be flexible and provide fast response. Understanding more about the nature of information, both formal and informal, and its management, may reveal how they do this.

4.7 Discussion

This research concentrates on the *customer order fulfilment process* itself, while remembering that it cannot be understood in isolation from the other two levels. This shows the link between customer-focus and information, the subject of the third research question. The customer order fulfilment process is the focus within the customer-focused small manufacturing company. It will look at the concept of order-winners, and the activities involved in the satisfaction of the order winners within the wider context of the organisation, in this case the customer-focused SMC. It will also use models from this section to do so.

Activities can be integrated through information, both formal and informal, and this is why it is such a vital part of customer satisfaction. Customer-focused SMCs which are naturally informal, through their power culture, may be managing formal information to retain customers and satisfy them through integrating activities and processes.

Customer demands need to be explored in greater depth, and the link between them and information better defined. The second research question, the link between customer focus and information, has been better explored. Three customer-focused SMCs which display significant customer retention are:

- Single site, power culture (i.e. not a ‘virtual’ company).
- BS EN ISO quality standards registered.
- Implementing new information technologies.

5. Next Steps

The type of company to be studied in more depth is defined as:

- | | |
|---|--|
| <ul style="list-style-type: none"> ■ A small company (< 50 employees) ■ Manufacturing, or manufacturing related | <p>Small Manufacturing Company</p> |
| <ul style="list-style-type: none"> ■ Component suppliers, with little product development capability of their own ■ Make or engineer to order production processes ■ Supplying industrial/business customers | <p>Customer-focused Small Manufacturing Company</p> |

- Family firms and owner-managed
 - Display significant customer retention
 - Single site, power culture (i.e. not a 'virtual' company)
 - BSI EN ISO registered
 - Implementation of new information technologies
- Information Management
Challenges related to
Customer Satisfaction**

SMCs harness and develop more intangible, knowledge-based resources which are unique to individual companies. They are less obvious than raw materials, or the implementation of prescriptive performance improvement programmes or sophisticated IT systems which are easily imitated by competitors, though these could well be a part of this.

Approaches to managing change and customer-focus imply that it comes from the integrated knowledge and resources of the organisation, rather than an approach based on strategic positioning, or 'buying in' technologies. As information is a part of the knowledge resource, it is vital to customer-focus. Activities can be integrated through information, both formal and informal. Customer-focused SMCs which are naturally informal, through their power culture, may be managing formal information to retain customers and satisfy them through integrating activities and processes.

Information appeared to be important to customer-focused SMCs because:

- They are traditional, family-owned power cultures, and rely on much informal information and communication. Customer satisfaction is crucial to family firms because often their main stakeholders are their customers.
- Three of them were BS EN ISO registered, and they tended to mention the management of information as a challenge or a problem that they were aware of.
- These three are implementing new information technologies.

The concept of a combination of formal and informal information and integrated activities will be used as a model on which to base the research.

It is not possible to say that the three customer-focused companies identified with the management of information challenges are knowledge intensive in themselves. They have little product development capability of their own, and this is reflected in relatively low skills and formal education levels. However, they do function in an increasingly knowledge-intensive economy and supply chain. They can utilise their information resources, formal and informal, to deal with this, and this includes realising the value of their people.

The next step was to explore the area of the management of information to elicit more understanding about this, and to develop a tool for better understanding of information in these Companies. The tool can be started from the above areas, although they need

to be formulated more precisely. The study of the management of information may shed more light on this, and this is the theme of the next Chapter.

Summary of Chapter 2.

This Chapter has covered the following areas:

1. Global and technological change, increasing uncertainty and complexity, and the idea of the knowledge economy with new ways of thinking about more intangible assets
2. What a SMC is and why they are important to the economy. A SMC is defined as less than 50 employees, and they are a large part of the total workforce in the UK
3. Certain types of small companies are customer-focused in the supply-chain: component suppliers, engineer-to-order processes and supplying industrial/business customers
4. The SME sector, their vulnerabilities and resources. They have little influence over their environment, have few material and financial resources and even less time, but are often able to utilise the natural flexibility of their people. This is even more so for SMCs, due to their smaller size and simpler structure. There is an indication that informal information and communication may enable them to do this. However, they appear to be weak at utilising formal information, and this is a challenge for them.
5. Customer-focus has two main viewpoints - manufacturing and marketing. These two areas have built tools using formal information to manage customer-focused change, and have also recognised the need to be customer-focused through informal Information - cross functional understanding and communication based on culture and language sharing and understanding. The main thrust of these approaches is *integration* - customer-focused processes and activities can be integrated through formal and informal information, through the customer order fulfilment process.
6. Informal information is less easy to understand, but includes areas such as: knowledge, language, speech, culture etc. It is behavioural, rather than technology-based.
7. SMCs appear to use informal information. Customer-focused SMCs may manage both formal and informal to cope with uncertainty and complexity.
8. However, understanding of information in SMCs is nebulous. It is necessary to explore the discipline of the management of information to build an initial conceptual model which can be used to identify the nature of information in SMCs.
9. The type of company to be studied has been defined, that is, the customer-focused SMC which appears to use information in various forms in the customer order fulfilment process, which has significant customer retention.

Chapter 3.

The Management of Information

1.

- There are many ambiguities and confusion in terminology concerning information, and the management of information
- This appears to be a reflection of the lack of understanding of the nature of information

2.

- It is possible to view the study of information as a discipline in its own right.
- Although forming a crucial part of knowledge, it is nonetheless a phenomenon which covers the full richness of the way in which people communicate, process information, interpret and behave - both positivist and anti-positivist.

3.

- Typical technology-driven approaches to the management of information, epitomised through the information-processing and machine paradigms, have often not attained what they should.
- This may be because they have not realised the true, behavioural nature of information.
- The crux of this section is that the more sophisticated the technology, the more it appears to ignore people and the informal system. Such an approach is inappropriate to the study of information in SMCs - they need to start with the informal information system.

4.

- The *informal* system is about people, and how they can provide the behavioural resources which can enable flexibility and allow a customer-focused SMC to satisfy customers and adapt to the environment.
- Information is a systemic combination of:
 - Activities and behaviours
 - Interpretation and understanding
 - Formal and informal means of information processing and communication.

5.

- The underlying assumption this thesis takes to the study of information in all its forms is that an effective *information culture* is conducive to the ability of a SMC to integrate activities, manage change, satisfy customers and maintain flexibility.

1. Introduction and Background to the Management of Information

The management of information is a topic of great interest to academics, managers and consultants. This section shows that there is much confusion in terminology concerning information and its management, and this may indicate a general misunderstanding of information. Section 1.1 gives some insight into why the terminology is confused, and Section 1.2 provides a glossary and explanation of the terms relating to information and its management used in this chapter and throughout the thesis.

1.1 Ambiguities in Understanding of the Management of Information

In Chapter 1 it was shown that the computer has converged with electronic communication technologies, factory and office automation. The management of these technologies has produced a plethora of academic literature and terms such as 'Information', 'Information Technology Management', 'Information Systems Management' and 'Information Management' have become common titles for books, papers and conferences.

The management of information can cover a diverse range of subjects such as software, hardware, systems analysis, telecommunications, strategy, operations, people, training, design and implementation. Kempner (1987) implies that the term IT is a manifestation of the convergence of two technologies - computing and communications and Zuboff describes these technologies as:

“.....microelectronics, computer science, telecommunications, software engineering and systems analysis....”
(1988, p 415)

One of the key problems associated with the literature in this area is the lack of clarity and ambiguity of terms, and this has been identified by Willcocks:

“It is endemic to discussions on IT/IS strategy and evaluation for the relevant terms to be used in loose and unclear ways. Not only do different commentators use the same words but impute different meanings to them.”
(1994, p 34)

He suggests that it relates to the immaturity of IS/IT and information management as subject disciplines. This phenomenon may also relate to the practical, inter-disciplinary nature of those subjects (Willcocks op. cit.). In support of this, Ward also claims that IT has developed alongside change in organisations - information systems as a management subject is barely thirty years old (1995).

Earl edited a series of well known books on information management, which are really differing perspectives on the management of IT (1989, 1989, 1996). He traces major issues in the development and management of IT, from the technology dimension through the strategic dimension to the organisational impact. Scott-Morton refers to information technology and organisational transformation (1991), and Ward claims that

information management is simply one strand to the management of information systems (1995). Porter and Millar's landmark paper on information is about how IT can give competitive advantage (1985).

This interdisciplinary nature is the basis upon which much of the research question hangs, and a large part of the purpose of this thesis is to clarify the ambiguity of these areas, and in the process clarify the nature of information itself.

1.2 Glossary of Terms

The term 'information' is highly ambiguous and has many terms associated with it. It crosses over the areas of IT and Knowledge Management. Information is also highly complex - it is not simply about technology, but can also mean the dynamic flows of dialogue and language which bring an organisation to life. It is a complex mix of technology, people, processes, conversation, activities and flows which all take their meaning from the organisational context and culture. This chapter goes through and explores many of the terms associated with information, especially with regard to its meaning in organisations. It is important to clarify these terms so that the reader does not get confused when reading this chapter.

The following terms are all used in this chapter. They have a tendency to divide into nouns or verbs, or a combination of both. For example, the terms 'Management', 'Activities' and 'Design and Implementation' are used here as verbs more than nouns. The terms 'Strategy', 'Technology', 'Organisation and Interpretation', and 'Attributes' are used here as nouns, although some are more abstract than others. 'Strategy' for example, is more abstract than 'Technology'. However, the purpose of the glossary below is to clarify information somewhat and the different terms and meanings associated with it, rather than to rigidly categorise different aspects of information. It is not easy to break all these terms down into one category or another - they tend to be heavily reliant on one another. Strategy, for example, has much in common with management.

The examples below are terms used in the literature in this chapter, and the definitions are the authors' interpretation of what the writers mean by using these terms:

Management:

- Information Management (Blumentritt and Johnson 1999) (Earl 1989, 1996) A general term which can refer to the management of information in the broader sense, or the management of systems or technology
- Information Systems Management (Ward 1995, Earl 1989, 1996). A general term which usually refers to the management of IT/IS in the broader sense i.e. as a large system for manipulating information.
- Information Technology Management (Hanage 1996). Refers to the bottom level - that is, the technology itself, the hardware and software.
- Information Resource Management (Punnet and Sweeney 1989, Horton 1980). The management of the resource of information, that is, the view that information is a resource in the same way as manpower or capital is.

These are broad terms which refer to the management of information and technologies. The term 'management' here generally refers to the broad activities of managing information.

Strategy:

- Information Technology Strategy: (Scarborough et al. 1999). The planning and approach to the development of IT, that is, software and hardware.
- Information Systems Strategy (Willcocks 1994). The planning and approach to the development of IS, that is, the way in which information is processed and manipulated.
- Information Strategy (King et al. 1989). The planning and approach to the development of information in an organisation, as opposed to IS or IT.

These are again broad terms which refer to the general planning and approach to the development of those plans in organisations.

Technology

- Information Technology: (Oliff and Marchand 1991). The hardware and software. This normally refers to the physical artefacts, that is, the software and hardware which may be stand-alone or in the form of a network, and which can manipulate information.
- Information Systems: (Earl 1989). The way the hardware and software is configured to manipulate information.
- Information and Communication Technologies: The author uses this term to mean the overall combination of computers, networks and other forms of electronic information technology such as telephones, faxes etc.
- Management Information Systems: (Ward 1995, Checkland and Holwell 1999): this refers to the extent of management effectiveness through identifying their information requirements.

Activities

- Information Technology Activities: (Earl 1996). This refers to the fact that IT is usually in the hands of users. These terms refer to activities that involve the manipulation of information, often by people.
- Informating (Zuboff 1988). This term means the deeper understanding of the activities which computers can automate.
- Information Processes: (Choo 1996). How information is integrated, used and manipulated.

Organisation and Interpretation	<ul style="list-style-type: none"> ■ Information Behaviour: The author describes this as a manifestation of the organisational culture. ■ Information Culture: (Davenport 1994). An organisational culture which has an integrated understanding of the value of information. ■ Information Flows: (Hami 1989). The way in which information is transferred and shared within and across boundaries. ■ Information Processing System: (Simon 1960). This is a metaphor for an organisation which processes and manipulates much information. 	<p>The organisational issues which can enrich information, create it and add value. They normally involve people interacting with IT/IS.</p>
Types	<ul style="list-style-type: none"> ■ Informal Information: (Liebenau and Backhouse 1990). The information which is ad-hoc, often based in conversation. ■ Formal Information: Liebenau and Backhouse 1990). Information which is easily codified in electronic form or on paper. ■ Information Resources: (Horton 1980). Information which is viewed as a resource i.e. can add value, or be a means to an end. ■ Information Resource Entities: (Burke and Horton 1988). Potential information resources. 	<p>Descriptions of different types of information, or ways in which information can be viewed.</p>
Design and Implementation	<ul style="list-style-type: none"> ■ Information Systems Design and Implementation (Mumford 1979). The activities involved in the initial design of an information system through to the implementation of the system. 	<p>As before</p>

It is possible at this stage to see the holistic, systemic nature of information. Information Technology can only be made sense of when in an organisational context accompanied by people, management, processes and activities. They are all interdependent. This systemic nature reveals itself again and again as the research progresses.

1.3 Discussion

This section has presented the terms associated with the management of information in this chapter to explain and clarify them to the reader. It has shown that information is a complex and dynamic phenomenon, and cannot be explained by any one of these terms on its own. It can be something physical and tangible, something which is an abstract concept, something which is a behaviour or an activity or a management task.

2. Information and Knowledge

The third research question was aimed at exploring the nature of information in the customer-focused small manufacturing company.

The link between information and customer-focus and the reason information is important to the customer-focused small manufacturing company was explored to some extent in Chapter 2. It was seen that the knowledge economy was recognised as important. In this Chapter it is seen that knowledge management is a burgeoning area of interest to all companies, and information is a significant part of this. The knowledge hierarchy explained below in 2.2, illustrates the role and significance information has in knowledge creation, transfer and management. It also shows information in the fuller, richer sense of the term, and not simply confined to information technology. Information is an important and interdependent part of knowledge, therefore it is significant to all companies, large and small. As small companies make up such a large part of the knowledge economy, then information is highly important to the customer-focused small manufacturing company.

Using the knowledge hierarchy, it becomes possible to view the study of information as a discipline in its own right. Although forming a crucial part of knowledge, it is nonetheless a phenomenon which covers the full richness of the way in which people communicate, process information, interpret and behave in an organisation.

Section 2.1 looks at the way in which information is a vital part of knowledge. 2.2 points out that while information is interlinked with knowledge, it is nonetheless a separate phenomenon in its own right.

2.1 Interdependence

Knowledge and its management has become a major topic for management researchers in recent years, and covers a wide range of practices, technologies and texts. It is closely related to the writings on the knowledge economy cited in Chapter 2, Section

1.2. Some writers claim that information is interdependent with knowledge, and is a crucial part of the overall knowledge resource.

Nonaka and Tagueuchi developed the concept of knowledge creation, based on the concept of a dynamic flow of tacit and explicit knowledge, constantly recreating and reinventing itself. In their perception, information is a vital part of knowledge creation. Their view of information is dynamic and fluid:

“Information is a flow of messages, while knowledge is created by that very flow of information, anchored in the beliefs and commitment of its holder.”
(1995, p 58)

They believe there are two perspectives on information - ‘syntactic’ (volume of information) and ‘semantic’ (meaning of information). The second is useful to the creation of knowledge. They refer to Bateson, who argued that information is indispensable to the obtaining and creation of knowledge. He referred to information as a ‘medium’ or a ‘material’ for eliciting and constructing knowledge.

“Information provides a new point of view for interpreting events or objects, which makes visible previously invisible meanings or shed light on unexpected connections.”
(Bateson, from Nonaka and Tagueuchi op.cit., p 58).

Analogous to this argument is Berger and Luckman’s assertion that people constantly share information when interacting which then becomes social knowledge. In turn, this social knowledge affects the information which they share (1966). Both information and knowledge from these points of view are interdependent and highly systemic, and cannot be studied in isolation from each other.

2.2 Information in its Own Right

This thesis takes the view that information and knowledge are not mutually exclusive, but are still different phenomena. There is uncertainty as to whether any knowledge which is made explicit, whether in the form of conversation or codification into manuals or IT, is still actually knowledge when it leaves someone’s head. Blumentritt and Johnston claim a clear distinction can be drawn between information and knowledge:

“The former can be captured, stored and transmitted in digital form, the latter can only exist in an intelligent system.”
(1999, p 298).

Although paper-based systems could be added to the above, this thesis parallels the argument of Blumentritt and Johnston. Similarly, Courtney argues that:

“Information becomes knowledge when it is introduced into one’s mental model. When transferred to another, this knowledge reverts to information. In other words, knowledge is a personal thing.”
(1997, p 3)

This thesis takes the view that, with a diverse range of literature, 'information' is a phenomenon which deserves to be studied in its own right. It is neither knowledge nor is it technology, although it generally incorporates aspects of both. If knowledge in organisations is about the transfer and conversion of tacit knowledge to explicit knowledge and vice versa then conversation must be a part of this.

There is a middle ground between knowledge and information technology: At one extreme there is IT, and at the other lies knowledge. *Information* is the richer mix of formal and informal, including conversation-based communication. Conversation-based information is the real link with knowledge, as speech springs directly from people's minds, rather than being formally codified. However, this has rarely been recognised in management theory. Pan and Scarbrough claim knowledge must be realised as sealed in conversations and social interactions, as opposed to a resource to be exploited, hence linking knowledge to information in the richer sense of the word (1999).

Conversation-based information is at the heart of informal information, whereas electronic and paper-based systems are formal, as they are codified and recorded. The author thought that formal and informal information could be studied in detail through an expansion on the framework below for the purposes of this research. (Figure 3.1). In this, the informal system has both a positivist and an anti-positivist dimension - the observable conversations of people and the interpretations they have of information in the context of their world. (Chapter 1, Section 2.2).

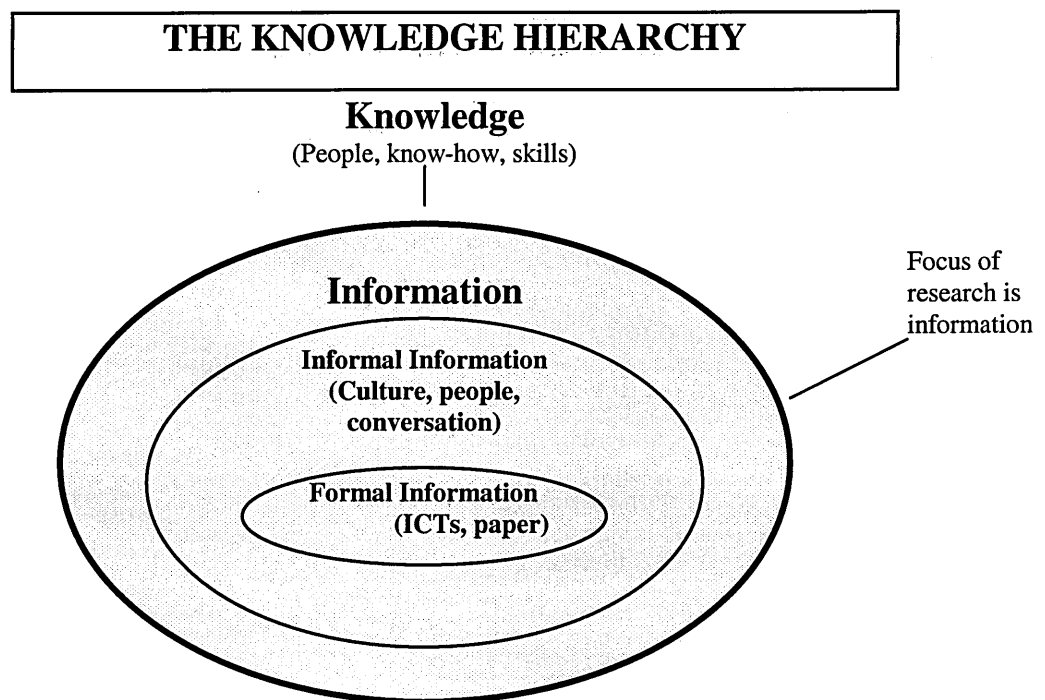


Figure 3.1 The Knowledge Hierarchy

Information becomes part of a knowledge hierarchy, and people and the culture they form is closely related to both the formal and informal information systems. Information is the focus, including technology, and it is inextricably linked with knowledge, through people and culture.

Blumentritt and Johnson round off by saying:

“If knowledge has to be translated back into information to be transferred between two intelligent system, to be then absorbed and translated back into knowledge, information management plays a role in the dissemination of information but is not a distributor of knowledge.”

(p 293 op.cit.)

Other writers in the area of knowledge management have also recognised knowledge and information as two separate phenomena, but interdependent. Choo covers three areas in which companies use information strategically - to make sense of change, to create new knowledge and to make decisions. He claims they are all complementary pieces of something larger, and the information behaviours analysed in each approach interweave into a richer explanation of information use.

Choo’s main question is: how do organisations use information? He claims that:

“Information is an intrinsic component of nearly every activity in the organisation, so much so that its function has become transparent. Without a firm grasp of how it creates, transforms and uses information, an organisation would lack the coherent visions to manage and integrate its information processes, information resources and information technologies.”

(1996, p 329)

2.3 Discussion

This section has shown that information is neither knowledge nor IT, but somewhere in between. It is a multi-faceted subject.

3. The Management of Information: Rational Approaches

The nature of information is explored further in this section through a study of traditional approaches to the management of information. Disadvantages of these approaches are pointed out in regard to their applicability to the study of information in SMCs. Typical technology-driven approaches to the management of information, epitomised through the information-processing and machine paradigms, have not attained what they were believed to have attained in many cases. This may be because they have not realised the true, behavioural nature of information. They are rooted in rational views of information-processing which are rigid and assume a stable environment. The increasing sophistication of ICTs seems to have exacerbated this problem, ignoring the human factors and informal system.

3.1 explains the more popular technology-driven approaches to the management of information, and how they have evolved over the years into a strategic tool which overlooks the rich and dynamic nature of information. 3.2 explores the disadvantages of these approaches, pointing out that the reason they so often disappoint is because, no matter how sophisticated they are, they are still based in the rational, information-processing paradigm which is not appropriate to the study of information in small companies. 3.3 describes the recent interest in IT-based tools for knowledge management, and claims that it is simply a further extension of the rational, technology-driven approach.

3.1 Technology-driven Approaches

3.1.1 Introduction

Modern approaches to the management of information assume that all information is manipulated by IT, and that 'information' and 'IT' are one and the same. The vast majority of academic text in the above areas share a technologically-driven origin. This is based on the belief that information and communication technologies are an inherent part of organisations, and that a company's information is best managed through these technologies. They assume that all information in an organisation can be managed through technology, and consultants and vendors of IT have been able to exploit this idea to their own advantage. This attitude is manifested in the ambiguity of terms which are used when writers refer to the management of information.

3.1.2 Development - from Data Processing to Business Support

Academics have traced and classified stages of development in information systems management over the last thirty years alongside the development and implementation of the technology in companies, and this approach is apparent from the seminal work in this area.

As early as 1979 Nolan developed a six stage model of data processing in organisations:

1. Initiation
2. Contagion
3. Control
4. Integration

5. Data Administration
6. Maturity.

At this time, the implementation of computers in organisations was concerned with what was known as data processing, rather than the more modern emphasis on information. This was because earlier computers were not capable of the vast array of tasks that they can do nowadays. They were generally only able to process raw data, usually in the form of numbers or statistics, for tasks such as record keeping and payroll.

Commenting on this model, however, Ward claims IT at this time was developing from simply a focus on functional cost reduction to an emphasis on reflecting information flows through organisational integration (Ward op.cit.). Therefore he was able to see the increasing uses to which computers could be put to, especially when they were able to be linked to each other and integrated through networks (1995 op. cit.). However, this increasing focus on information technology and information systems, as opposed to computers and data processing has brought about an increasing confusion in terminology. This can be seen in the following sections.

3.1.3 Strategic Advantage

McFarlan also realised that computer-based technology had moved away from a strictly supporting role in the back office to provide new competitive opportunities. Porterian in nature, he claimed in 1985 that:

“...a company can use this technology to build a barrier to entry, to build in switching costs, and even to completely change the basis of competition....”
(1985, p 98)

Although still only referring to technology, his focus moved away from data processing to a realisation that the technology could do much more than simply supporting roles. A familiar theme is the growth and change from a purely data-processing based approach, where early computers were used mainly to perform basic quantitative transactions such as record keeping, or were used to control CNC machines in factories, to a growing awareness that the convergence of information and communication technologies made them a valuable strategic weapon. However, the focus was still on technology, rather than information.

Also in 1985, Porter and Millar recognised the value of information itself to business, as opposed to simply recognising the value of data processing or technology. Their article on information and competitive advantage claimed that IT could not only support the business, it could actually be a strategic weapon, creating substantial and enduring competitive advantage. They viewed information as a valuable competitive weapon. However, in practice, they refer only to information technology. Their view recognises the increasing information component but their terminology restricts this information to what is encompassed in the technology only.

Later texts in the area have shown these recurrent themes, and also show the increasing ambiguity of terminology in these areas. In 1995 Ward classified three main eras in the development of information systems management:

- 1) Data Processing: automating operations for efficiency
- 2) Management Information Systems: management effectiveness through the identification and supply of Information requirements
- 3) Strategic Information Systems: changing the nature of business.

(1995, p 3)

Stage 2 is the stage at which it was realised that information was a valuable resource to support management and organisations, rather than simply support data processing. This, Ward claims, was carried through further into strategic information systems, where it was realised that IT/IS could be a competitive weapon in its own right. Ward recognises the value of strategic information systems and the way they can transform business, in the same way as Porter and Millar did, but their terminology is different. Porter and Millar referred to strategic information systems as information, even though the concept was the same - the manipulation of technology and systems which can provide ever more sophisticated information. Their focus was on the technology and the systems however, and not on the information itself. Ward, on the other hand, refers only to information systems, and not to information itself.

Similar ambiguities were developed by other significant writers in the area. In 1989 Earl defined three levels of strategy in IT:

Information Systems Strategy - (Applications level) - concerned primarily with aligning IS development with business needs and with king strategic advantage from IT.

Information Management Strategy - (Management level) - aims at 'putting the management into IT'.

Information Technology Strategy - (Delivery level) - concerned primarily with technology policies, architecture, vendor policies and technical standards.

He put the emphasis on strategy, and pointed out that management of IT/IS is crucial. He refers to information management, but in this case it is simply concerned with the management of IT/IS. Like the other writers, he makes little attempt to draw any distinction between IT/IS and information itself. He stressed that the three are not separate, but integrated (1989). This model is not an evolutionary depiction of the development of technology management, but an integrated management tool. It shows that all three dimensions are equally important, and holistically form a systemic management tool.

Hanage emphasises customers and supply-chain management:

- | | |
|-----------------------------------|---|
| 1. Information management | Information as a major resource. |
| 2. Information systems management | Manageable systems for collecting, storing, processing and disseminating the information. |

3. Information technology management Bottom level - technology to make information systems faster, easier better and more accessible.
- (1996)

This model clearly shows the distinction between the levels of IT, IS and information itself. Again, he uses the terms slightly differently. Information Management he sees as the most important, strategic level, unlike Earl. However, like Ward, this level is concerned only with the strategic application of IS, and not information itself.

These models are all slightly different. However, they all recognise the growing importance of IT/IS as a strategic tool. Hanage stresses information management as a major resource which extends into external contextual factors and helps to make sense of the environment in which the business is operating, whereas information systems are simply the more tangible means for processing the information. Earl sees information systems management as the strategic weapon, and information management as the level which simply puts the 'management' into IT. Ward sees management information systems as the level at which information requirements are identified and supplied, and strategic information systems are the level at which IT changes the nature of business.

Burke and Horton's five stage model illustration shows stages in between the development from the basic information processing era to the strategic level:

- 1) Paperwork Management
 - 2) Management of Automated Technology
 - 3) Management of Corporate Information Resources
 - 4) Business Competitor Analysis and Intelligence
 - 5) Strategic Information Management.
- (1988)

This model is similar to the other in that an increasing awareness of the strategic deployment of IS develops alongside the advancements in information technology itself. Burke and Horton see paperwork management as the precursor to automated technology, and business competitor analysis and intelligence as the stage between the achievement of functional integration and centralisation of IT, and the stage where IT can change the nature of business.

One slight difference is that their view on information resources and strategic information management does not pertain only to information technology or information systems. They imply a wider view of information, although they are not clear on what this wider view actually is.

Three dimensions of information management are generally recognised in these texts:

- i. Simple data processing for efficiency, often functionally based
- ii. Integrated information requirements for management effectiveness and
- iii. Strategic information systems deployment for competitive advantage and changing the nature of business.

3.1.4 The Organisational Dimension

Earl, in his book entitled 'Information Management - the Organisational Dimension' claimed that IT has brought about changes in how the organisation is conceptualised i.e. knowledge-based, intelligent, distributed, networked:

"The organisational dimension of IT may have a longer pedigree than the strategic dimension. Almost since computers first entered the commercial world, writers have been fascinated about whether computing and other information technologies would change the shape and functioning of organisations. Many of the predictions of the first 30 years have not materialised or are taking longer to manifest themselves than was expected."

(1996, p v)

He explains that his book is about 'organising IT activities', as information systems tend to be in the hands of the users, and the issues of implementing IT are usually organisation-based rather than technology-based.

This approach is technology-driven, and assumes that all information is stored, communicated and processed over IT. The author's aim here was not so much to contrast and compare different views of the management of information, but to show how the terminology is often ambiguous, although they are all unequivocally focused on the application and management of technology. This begins to reveal a lack of understanding of information, and what it actually is. It also shows that, in spite of what IT can do, that is, manipulate information large quantities faster and more efficiently than ever before, there is still the assumption that all information can be manipulated in this way. If this view is justifiable, then the divide between formal information and informal gets bigger.

3.2 Disadvantages of Technology-Led Approaches for SMCs

3.2.1 Disappointments

There have been disappointments and failures from technology-led solutions:

"Recent surveys suggest that 70% of all IS investments fail to deliver the expected benefits."

(Ward 1995, p xiii)

Beaumont and Sutherland claim that books on IT management have had too much emphasis on technology and are not 'real world' enough, and that it is the 'quality of management' rather than the 'quality of investment' which counts (1992, p vi).

"Managers have been unable to forget the unfulfilled promises, the hype and the jargon of IT vendors, the delays of systems implementation, the difficulties of recruiting qualified technical staff, the cost overruns and the many other problems."

(Beaumont and Sutherland 1992, p vi)

This may be because the informal information system has not been recognised, and the IT driven approach is a mindset.

3.2.2 *Information Systems Management and Size of Companies*

The traditional and well-known approaches to information systems management are orientated towards large companies. What holds all these different schools of thought together, apart from the fact that they are all technology led, is the fact that they use large companies as case studies. Examples are the SABRE system installed in travel agents by American Airlines, Merrill Lynch's Cash Management Account System (Ward op.cit.), Reuters, Thomsons, Nottingham Building Society (Earl 1989 op.cit.), Ford in Europe (Gooding, from Earl 1989 op.cit.), General Electric (Porter and Miller op.cit.), American Hospital Supply (Reponen 1994). Large companies are able to influence their environment more through material resources, the capital they have can buy in sophisticated ICT and skilled personnel to work with them. General Motor's Manufacturing Automation Protocol (MAP), and Boeing's Technical Office Protocol (TOP) are information management systems linking computers together. MRP11 and CIM are information systems aimed at large manufacturing companies.

3.2.3 *Machine Metaphor*

These technology-driven approaches are reminiscent of the metaphor of the organisation as a 'machine' - embodied through theories of bureaucracy and scientific management developed by management theorists such as Durkheim and Taylor (Walsham 1993, Checkland and Holwell 1998). Their approach, though going beyond the sheer technical aspect which has been prevalent in information systems and technology management, is still a further development of this metaphor.

Traditional mechanistic thinking:

".....adheres to analysis and reductionism, claiming that all objects and events, and their properties, can be understood in terms of ultimate elements. This leads to the view that the universe is constructed of building blocks arranged in a hierarchy making up a giant machine."

(Flood and Jackson 1991, p 3)

Flood and Jackson claim the *machine* paradigm is useful when:

- The task to be performed is straightforward.
- There is repetitive production of a single product.
- The 'human parts' fit into the design and are prepared to follow machine like commands.
- In a stable environment.

It breaks down when

- It reduces the adaptability of the organisation (i.e. a machine-like organisation is vulnerable in a volatile environment).

- It requires a mindless contribution that is difficult to maintain with mindful parts (i.e. it will either dehumanise or will lead to conflicting aims between machine and minds).

Walsham claims that the metaphor of organisations as machines is powerful and pervasive. The social context within which the technology is embedded is virtually ignored, or else described as a few formal relationships.

Walsham claims that the machine approach creates information systems which are rigid and inflexible, and not suited to the challenges of a changing environment. As SMCs often operate in a volatile environment, the machine metaphor was unlikely to provide broad enough scope in which to explore information. The approach to analysing information in SMCs had to be systemic and not IT-driven.

3.2.4 Information Processing and Small Companies

The concept of organisation as an information processing system was made famous by Simon. Simon (1960) has maintained that management is about decision making, and he identifies three categories of boundaries:

- Mental skills, habits and reflexes
 - Knowledge and information
- and
- Values.

As a consequence, the actor i. Satisfies and ii. Simplifies. This is the concept often known as 'bounded rationality'. The information-processing model (sometimes referred to as the decision-making model) is a rational model, based on how efficient the flow of information in the organisation is towards achieving goals. It assumes that an organisation's behaviour is directed at the attainment of goals and is primarily concerned with uncertainty and choice. This has been supported by different types of information systems. It was a highly formal and rational way of viewing organisations, rooted in the 'hard' systems tradition deriving from Durkheim (Checkland and Holwell 1998).

The 'information-processing' view of organisations has predominated theory and practice for decades, and theories of management information systems which are based on this view, are still the primary way of teaching the subject of information systems management in organisations today (Checkland and Holwell op.cit.). This is the view that organisations are rational, machine like bureaucracies, and all information can be processed using rational systems such as IT. It is closely related to the 'machine' metaphor in its rigidity and assumption that organisational goals are certain, well-defined and stable.

The author has found that customer-focused small manufacturing companies rely on their informal information. The information-processing view of organisations is not enough to be able to analyse and explore the information in these SMCs. Their

environment is too volatile and they do not have the certainty of stable, well-defined goals.

3.3 Knowledge Management

In recent years, information systems management has given way to some extent to knowledge management. Earl, for example, has a Chapter on knowledge management in his book on the organisational dimension of information management (Earl, Edwards and Feeny, From Earl 1996). Scarbrough, Swan and Preston claim that the core themes in knowledge management cover mostly IT/IS related topics. Through a survey conducted in 1998, they found that nearly 70% of articles on knowledge management were in the IT/IS areas, and many of these were practice driven, with the emphasis on explicit knowledge (1999 op.cit.). The authors claim that knowledge management has mirrored the widespread interest in BPR and IT enabled change. Knowledge management focuses on creation, capture and transformation and use of knowledge. This has been exploited by consultants and IT vendors in the form of groupware, intranets, list servers, knowledge repositories, database management and knowledge action networks (Scarbrough et.al. op.cit.).

“Knowledge management emphasises information systems as a means of *externalising* tacit knowledge to codified, explicit knowledge and also *combining* different kinds of explicit knowledge.”

(Scarbrough et.al. op. cit., p 25)

This also means that the responsibility of knowledge management has fallen to those IT/IS experts who are equipped to develop IT strategy. Chief knowledge officers are often from an IT background. A major problem is that ‘tacitness’ is elusive. Once again, these sophisticated tools are still a manifestation of the rational, information-processing approach which suits large companies. They lose the tacit, informal dimension.

3.4 Discussion

This section has explored IT-driven approaches to information systems management and knowledge management. It has shown that this approach, regardless of what it is called, can only provide a means for manipulating formal information. The crux of this section is that the more sophisticated the technology, the more it appears to ignore people and the informal system. Such an approach is inappropriate to the study of information in small manufacturing companies - they need to start with the informal information system.

4. *Alternative Approaches to Information*

Information concerns the *informal* system, which is about people, and how they can provide the behavioural resources which can enable flexibility and allow a customer-focused SMC to satisfy customers and adapt to the environment. In this section the rich, behavioural nature of information can be seen more clearly, through an in-depth analysis of alternative approaches to information. They have been inspired by the recognition that rational, technology-driven approaches have been increasingly diverting attention from the vast richness of information which abounds in organisations through their people. This section shows that information is a systemic combination of:

- Activities and behaviours
- Interpretation and understanding
- Formal and informal means of information processing and communication.

Information in these small companies is not so much about the strategic management of information technology and systems, but is about how customer satisfaction and flexibility is achieved through the actions and behaviours of their people towards and with information.

Section 4.1 looks at the increasing information component in IT, and the need for smart people to work with this technology. 4.2 explores the differences between the formal and informal information systems. 4.3 points out the fact that information is a natural phenomenon and is highly systemic, and 4.4 shows that the topic of information as a resource involves the recognition of a more informal, behavioural approach. 4.5 continues the argument that information is systemic, 4.6 explores the concept of information culture, and 4.7 shows that an information culture involves all the previous approaches and can be used as a way to investigate the research questions in companies, especially the management issues of information behaviour and the relation this has to the power culture in customer-focused SMCs.

4.1 Increasing Information Component in IT

Information technology was designed to process information. Few writers in this area have made much attempt to realise or discuss the nature of the information which is processed - they are familiar with the configuration of *technology* as opposed to understanding and using *information*. Efforts have focused on consolidating the manipulation of technology as opposed to understanding the content and purpose of the information which is being manipulated through technology. A recent paper looking into the key issues in the effective management of change in manufacturing advocated that technology should be seen as a solution to organisational needs rather than as a driver of change in itself (Older, Cassell, Nadin, Todd, Whybrow, Clegg and Bain 1999).

Knight and Silk suggested just this:

“The availability of cheap IT has diverted attention away from information itself towards what can be done with it in a purely manipulative sense.”
(Knight and Silk 1990, p 140).

This may suggest that the real problem is lack of understanding of the term 'information'.

Modern writers on IT and its management have begun to realise the importance of this concept. Oliff and Marchand show how information technology and manufacturing technology have converged in recent years, and how computer integrated manufacturing has become information-driven, rather than technology-driven. (Table 3.1).

<p>VIEW 1</p> <ul style="list-style-type: none">• CIM is TECHNOLOGY DRIVEN• CIM enhances the PROCESSING of Information in solving manufacturing problems• CIM emphasises the role of Information to CONTROL manufacturing technologies in use• CIM applies a system model to manufacturing processes
<p>VIEW 2</p> <ul style="list-style-type: none">• CIM is INFORMATION DRIVEN• CIM focuses on the VALUE of Information not just the processing of Information• CIM needs to emphasise using Information to promote business objectives in manufacturing strategies• CIM requires basic changes in organisational relations and decision processes

Table 3.1: Contrasting Views of Computer-Integrated Manufacturing (Source: Oliff and Marchand, 1991)

This model reveals the recognition of an increasing information component in the technology itself. This is similar to the development from data processing to strategic advantage of information explained in Section 3.1. Again, however, CIM in the latter context appears to refer only to the information which can be manipulated through information technology and systems, and not to information in its broader, non-technological sense.

Zuboff also described in detail how the computer has become a 'smart' machine, and she coined the terms 'automating' and 'informating':

"IT also increases the comprehensibility of the very processes automated - the process of automation creates a deeper understanding of the activity itself."
(1986, p 8)

This work actually recognises the value of information in the wider, human sense. Zuboff claims that people can learn and increase their knowledge through interacting with information technology.

However, although these views display the manifestation of information as an asset to better understand organisations, realising the increasing richness and potential of the information processed, they still assume this has come about through technology. Zuboff recognised the smart machine and its interdependence with smart people (1988), and Oliff and Marchand, in Table 3.1 above, clearly illustrate the organisational and people factors.

4.2 Informal and Formal Information Systems

King's early papers implied a technology led perspective, but a later well known paper pointed out a distinct difference between 'information' and 'technology'. He put the missing 'information' back into IT:

"...one of the most obvious things that can be inferred from the anecdotes...is that information and IT are often discussed interchangeably..."

(King, Hufnagel and Grover 1989, p 76)

King et al. stress that IT can give easier access to information or it can speed up transfer time, thus making it a competitive weapon, but real strategic advantage can only come from innovative use of information, and suggest that IT strategy and information strategy should actually be separate management policies in organisations.

Davenport (1994) takes the view that the management of information can only be done effectively through knowing how people use information, as opposed to how they use machines. He suggests that organisations tend to simplify information to fit into computers, thus losing the rich complexity of organisational information. For example, managers get the vast majority of their information from non-IT sources - two thirds from face to face or telephone conversations and one third from documents. What is needed is a strong information culture which realises the value of this rich information.

Frank Land made a detailed attempt to describe types of information, including the formal and informal system. Typical technology led approaches do not recognise the informal system, he states:

"Many less effective systems fail because the designers of the systems have succeeded in stripping away the informal elements of the information."

(1987, p 18)

Liebenau and Backhouse clearly show these two distinctions in Figure 3.2, although they claim that the formal system is not separate, but a part of the larger information system:

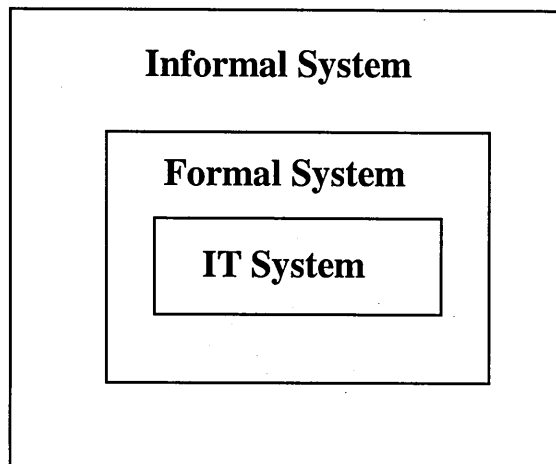


Figure 3.2: A Framework for Understanding Information (Source: Liebenau and Backhouse 1990)

They base their approach to understanding information on four levels, based on a semiotic framework:

- Pragmatics (culture, context)
- Semantics (meaning, knowledge)
- Syntactics (formalisms, logic)
- Empirics (signals, codes).

The top two are concerned with the softer, more informal elements of information, and the bottom two the harder, more formal. The formal may also include paper-based systems.

The two approaches to information can be summed up:

The Formal System: That which is routinised, proceduralised - regardless of medium. The formal system in an organisation is:

“.....behaviour which is governed by rules.”
(Liebenau and Backhouse 1990, p 105)

These rules are used to control the organisation. They are more easily analysed than the informal system because these rules are explicit. Rules govern repetitive behaviour - the routines which drive everyday, normal operating procedures. These rules can often become boring because of their constant repetition. For this reason also, they are computerised very easily (Liebenau and Backhouse op.cit.).

The Informal System: That which is ad hoc, unpredictable, often reliant on brainwork. Sometimes known as the ‘real’ information system, that is, the goals, assumptions and expectations which hold together the company, making it an organisation. It is about the:

“.....perceived regularities of behaviour within a cultural context..... the real information system is the system built on norms and which interacts through interpersonal communication.” (Liebenau and Backhouse op.cit., p 105).

These approaches reveal a broader view of information - the dynamic flows, verbal and spoken information, invisible and tacit information, intuition and knowledge. They show that ‘informal’ , ‘tacit’ information may be a significant part of an organisation’s information resource.

4.3 Information as a Natural Phenomenon

Beniger claimed that information processing and communication is an *epiphenomenon* of matter and energy processing (1986). He asked why there is so much information in the world, and why everyone is so preoccupied with it. He suggested that the information society did not begin with the invention of computers or electronic communications as is often believed but that information has always been an important element in organisations. He presents a paradigm of society as one large information processing system which has come about through revolutions in production, distribution and consumption of goods, controlled by information processing and communication technologies. He calls it 'organised complexity:

“On the other side, our own side in that we ourselves are living systems, we find structures purposively organised for *information processing, communication, and control*, the special subject matter of the behavioural and life sciences.” (1986, p 35)

Beniger bases his approach on open systems theory, which relies on a free flow of vertical and horizontal information throughout the organisation. This flow relies on information not simply being processed, but also *communicated*. Information has no value unless it is communicated. The twin concepts of information-processing and communication are interdependent. Voice, paper and information and communication technologies (ICTs) are all used to pass information from one mind to another, and to be part of the larger systems of human learning, team-working and knowledge accumulation which is an everyday part of the flow of organisational life. To confuse information with ICTs is to ignore the fact that people have processed and communicated information ever since the human race began.

Likewise, Knight and Silk have talked about ancient engineers, and how builders all had plans, work schedules, objectives and reports which had to be communicated to different parts of the organisation (1990 op.cit.). Orna also claims that the original form of information was speech, long before the written form was invented (1999).

Anthony (1966) illustrated types and characteristics of information at different levels of the organisation, regardless of whether they were computerised. It is worth noting that this book was written in 1966, well before the era of mass computing in most organisations.

The concept of 'information' is much broader than information technology. Information, of course, has always been around - the human race has communicated via paper and word of mouth for a long time before computers were developed.

4.4 Information as a Resource

4.4.1 Recognition of Information as an Organisational Resource

Closely related to the previous argument is the concept of information as a resource. The subject of information resource management in general claims that information is now of such significance in organisations that it should be treated as a valuable resource in the same way that other resources have traditionally been. Knight and Silk claim that a managers' resources today are:

- People
- Money
- Materials
- Energy

and

- Information.

(1990 op.cit.)

It has been called the 'fourth resource' (Best 1996). Although this doctrine is the basis of a few books and articles on the subject, there is no single definition of 'information', or how it should be managed. This area is fragmented. The main perspective is the view that information is something 'internal' to the organisation, and that it can be used in the traditional sense of the word 'resource'. That is, it can be a means to an end. It can be a raw material to be processed into a refined product (Horton 1980). It is not prescriptive, relying on the external purchase of IT solutions.

4.4.2 Early Approaches

Synott wrote a book on IRM, although his perspective is technology led (1981). Ricks and Gow IRM simply as records management, regardless of technology. Horton recognised information as an internal resource, and described the characteristics of information as a resource (1980).

Progressing the argument from this book, Burke and Horton's 'Infomap' has supplied a structured method for identifying and valuing information resources in a large company. Burke and Horton laid out an explicit and clearly defined tool to identify formal, tangible information resources. These are, according to them, mostly paper based or electronic information and communication technologies (ICTs), and their case studies are based in large companies only. The Burke and Horton approach offers a method based on interviews and examination of documents, but this does not go far enough to identify or explain in any detail the intangible, informal information resources and flows.

ID Number	Category	Type	Resource Name
Location	Organisational Unit	Resource Manager	Operating Contact
Concise Statement of Goals/Missions/Purposes Supported:			
Description of Contents, Operations and Uses			
Comments and Observations:			
Evaluation:			
Primary Inputs Media	Primary Outputs	Holdings/Storage	
Prepared by/Date:	Reviewed by/Date:	Approved by/Date:	

Figure 3.3: The Inventory Form for Gathering Data on Information Resource Entities (Source: Burke and Horton 1988)

It claims to identify, cost, value and enable an organisation to gain an overview of its information resources through a four stage process:

Stage 1 - The Preliminary Inventory: Background knowledge of company, identify users, managers and handlers of information and design inventory forms for specific potential information resource entities pertaining to these people (Figure 3.3).

Stage 2 - Costing and Valuing the Information Resource Entities: By means of a survey, perceptions can be gathered on:

Quality of Information : accuracy, currency, simplicity.

Utility of Information holdings: accessibility, flexibility, presentation.

Productivity of operations - contribution to the efficient operations, reducing noise, reducing uncertainty, timeliness.

Leading to:

Effectiveness of customer satisfaction.

Stage 3 - Information Resource Mapping Techniques: The information resources are mapped on a grid to present this array of data in ways that relate them to the structure, functions and management of the organisation.

Stage 4 - The Corporate Information Resource: The previous steps combine to form a detailed picture of the company information resources - their strengths, weaknesses, purpose, accessibility, managers, users, characteristics and strategic value. This knowledge can now be exploited to better manage the organisation - in this case to realise the strategic objective of customer-focus.

These information resource entities, as they are known, are clearly defined by Burke and Horton as having a definite 'fixed' location, have a name and being managed by one particular person (Figure 3.3).

Early approaches are technology-driven, though Burke and Horton show a more interpretive dimension. However, the Burke and Horton approach to identifying information has limitations - it is too long and elaborate, not capturing a lot of the essence of important people-based information. It is not a *systemic* approach - it attempts to reduce all information in the organisation to tiny parts, and then rebuild it up again to form a complete picture.

4.4.3 *Later Approaches*

Later approaches suggest that information has a more intangible, informal element. Beaumont and Sutherland claim that information resource management (IRM) has no single definition:

"IRM includes all types of data, numbers, text, images and voice."
(1992, p 16)

Although they recognise the inherent richness and variety of information, they give little indication on how to utilise this information as a resource (1992).

Punset and Sweeney referred to 'information activities' Sweeney claims that:

"There are widely divergent views as to what is and what is not an information activity. It is a complex concept, embracing ideas and knowledge, content of libraries, office files and computers and even more that combination of education, experience, skills, intuition and creativity which is both the substance and the output of the human mind."
(1989, p 1)

They also recognise information 'flows' within the organisation and with the environment. He suggest it is this intangible factor which is best for corporate growth, but it is difficult to measure and price

In the same book, Hami refers to resources in two senses - the first are material resources which are tangible and measurable, and the second are the invisible assets and intangible resources. He also refers to speech and information flows, though obliquely:

"Either store this information or tell someone else about something."
(1989 op. cit., p 39)

Once again all case studies are based in large companies, in the above case, IBM. However, what these have in common is their recognition of the systemic nature of information - that it is a combination of different factors, both formal and informal.

4.5 Systems Theory and Information

4.5.1 Mechanistic vs Systems Thinking

Closely related to the concept of information as a natural phenomenon is systems thinking. Flood and Jackson claim that the term 'system' is used so much nowadays that it has become virtually meaningless (1991). Systems thinking emerged in the 1940s as an alternative to traditional mechanistic thinking.

Mechanistic thinking could not explain complex biological phenomena, and this led to the origination of systems thinking. Within this view, characteristics of a system are:

- Composed of interrelated parts or sub-systems and the system can only be explained as a whole
 - Hierarchical in that the parts are made up of other smaller parts
 - No part can be altered without affecting other parts
 - 'Open' rather than 'closed' to their environment
- and
- Synergy - the whole is greater than the sum of its parts.

(Flood and Jackson op.cit.)

The popularity of systems thinking as a tool for analysing organisations may be due to the fact that a system has inputs and outputs and is interactive with its environment, as Figure 3.4 illustrates:

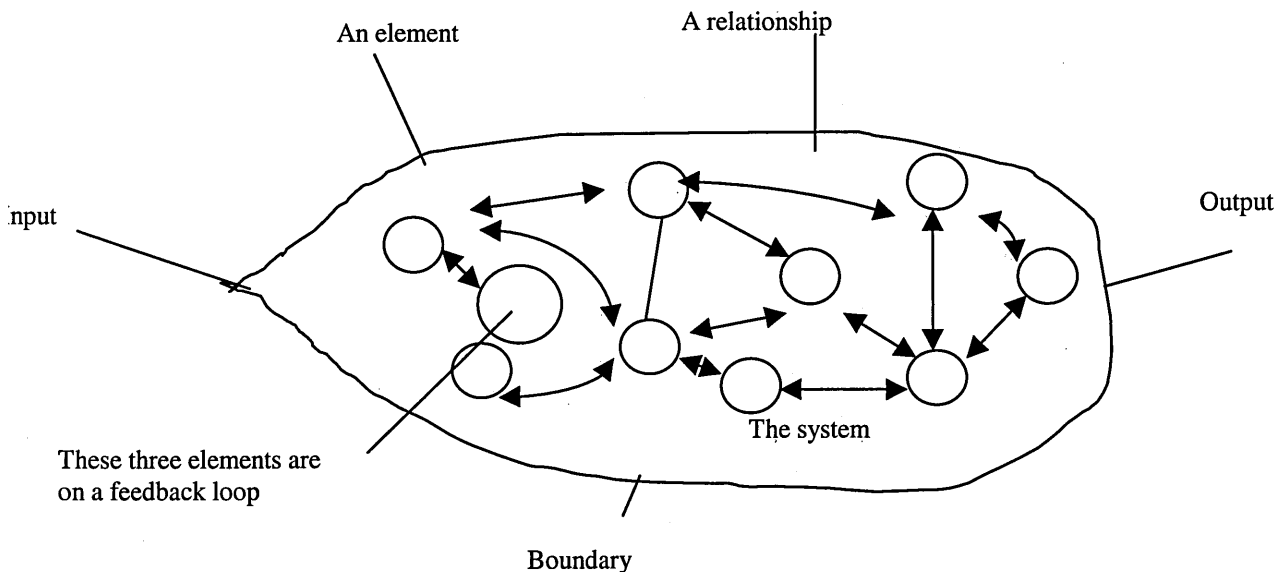


Figure 3.4: A General Conception of 'System' (Source: Flood and Jackson 1990)

Central to this is the *communication of information* between elements. A system exhibits control when it can maintain identity in an unstable environment, and information allows it to do so. (Figure 3.4).

4.5.2 *Soft Systems Methodologies*

Soft Systems Methodology (SSM) was developed by Checkland (1981). It is a philosophy for managing change, and is based on the belief that different individuals and groups construct interpretations and hold perceptions of the world which is uniquely theirs, and may be different to anyone else's. In organisational terms, if these views can be reconciled to a 'unitary' perception of the problem then it can be solved.

"What is in short supply in organisations is an organised sharing of perceptions sufficiently intense that concerted action gets taken corporately. Enacting the process of SSM can help."

(Checkland and Scholes 1990, p 79).

This has been particularly useful in the case of information systems design and implementation. It illustrates that there is a world which interacts and is interdependent with the formal system, based on people's understanding which they have in their heads. This is closely related to the notion of information cultures, pragmatics and semantics. It concerns the values, understanding and knowledge of people, and the part they play in the informal system.

4.5.3 *Socio-Technical Approaches*

The Socio-Technical approach was developed through a recognition that neither people nor technology could achieve organisational objectives on their own - this could only be achieved through emphasising the interdependence of both working together. The term 'socio-technical' was created by Trist and Bamforth to:

".....describe a method of viewing organisations which emphasizes the interrelatedness of the functioning of the social and technological subsystems of the organisation, and the relation of the organisation as a whole to the environment in which it operates."

(Pan and Scarbrough, p 361).

Systemic in nature, it was designed to improve the efficiency of a work system through analysing system variances. The most well-known of these approaches is ETHICS (Effective Technical and Human Implementation of Computer Systems), developed by Enid Mumford and Mary Weir. This is a step-by-step, process to managing change through learning. It introduces the participation of the workforce in systems design and implementation. Like SSM, there is a recognition and drive to resolve differing interests and perceptions (Mumford and Henshall 1979).

When this approach was first developed, there was little recognition of information as a resource. It revolved around technology, in this case, computers. Again, this may be because this was the era of data-processing, when IT was relatively unsophisticated. Today, however, it is different. The interest in knowledge management appears to be recalling similar interest in socio-technical approaches, as a more holistic, less technologically deterministic way to study knowledge. Pan and Scarbrough call for a renewal of this perspective in relation to knowledge management:

“Our development of the socio-technical approach is concerned with the subtle and diffuse structuring of behaviour and perceptions arising from information flows and communication systems.”
(1999, p 361 op. cit.)

They make explicit reference to conversation and social interaction as a significant part of this approach.

4.5.4 Neurocybernetics

The neurocybernetic, or perspective is another systems approach to information. The perspective uses the brain as a metaphor to analyse the processes of communication and learning. It is developed from the discipline of cybernetics. Standard cybernetic models have four processes:

- transformation
- information system
- control unit
- activating unit

However, the model is concerned with control and self-regulation, and is a highly rational approach based on information-processing. In this model an information system conveys data through the system.

Neurocybernetics, however, realises the limiting aspects of the rational approach, and builds a model which analyses the processes involved in ‘learning to learn’. (Flood and Jackson 1991 op.cit.). They claim that:

“...the brain metaphor stresses getting the whole into the parts, creating connectivity and redundancy, and simultaneous specialisation and generalisation.”

Information in this context becomes a more holistic phenomenon, incorporating more informal and ad-hoc information and knowledge. This paradigm has been developed and refined through the work on the Viable Systems Model of Stafford Beer. The VSM is an orchestration of five sub-systems which can be used to represent any organisation. The concepts of information flows and communication is of fundamental importance to the model. The information shows how all the parts of the organisation are performing in relation to the organisation as a whole, and how the organisation is performing relative to its goals. However, the goals that Beer suggests softer and more abstract than goals such as profits. Realising the necessity for flexibility, he suggests investment in research and development, and goals such as employee morale (1985).

4.6 Information Culture

The subject of organisational culture was broached in Chapter 2, Section 2 when it was noted that customer-focused SMCs are often power cultures. A power culture was defined as the organisational thinking and behaviours relating to an entrepreneurial, powerful central figure. An information culture is therefore a culture pertaining to the thinking, beliefs and behaviour concerning information.

In writing about information cultures, Davenport refers to the need for organisations to recognise that information means different things to different people:

“Information evolves in many directions, taking on multiple meanings.”
(1994, p 120)

This implies coming to a ‘common definition’ and a ‘shared understanding’. Similarly, Flood and Jackson recognise the need to share a common language. Although they do not refer explicitly to an organisational information culture, they view culture at an international level as being concerned with, amongst other things, the issues of a shared language.

The idea of an information culture based on shared meaning and understanding is also used by Walsham to interpret information systems in organisations. He uses the metaphor of ‘culture’ as being based on ‘shared meaning, linked to symbolic anthropology’. He bases this on the approach of Smircich:

“Symbolic organisation theorists are concerned with interpreting or deciphering the patterns of symbolic action that create and maintain a sense of organisation. They recognise that symbolic modes, such as language, facilitate shared realities, yet these realities are fleeting, always open to reinterpretation and renegotiation.”
(Smircich, from Walsham 1993, p 33)

Walsham also draws on the work of Morgan (1986), whose culture metaphor comes from a similar perspective - organisation as an enactment of a shared reality. This emphasises the understanding of organisation through processes of shared meaning.

Orna recognises the value of information flows, and claims that information is led by people, not technology. She talks about people and the systems they create within the organisations overall objectives:

“The culture therefore has a potent influence on how the organisation values information, on the way it flows, and on how it is used, and so it will condition the resources it is prepared to devote to developing information policy and strategy, and affect the success of any such endeavours”
(1999, p 62)

Sub-cultures are an important aspect of an information culture for both Walsham and Morgan, especially in relation to multiple meanings. Walsham claims that organisations are rarely unitary cultures. He draws on the work of Young to illustrate this (1989), who claims that relationships within organisations often involve multiple meanings placed on simple events, actions and statements (1993 op cit.).

4.7 Discussion

The idea of an information culture seems to incorporate all the previous six areas pertaining to the study of information:

- Increasing information component in IT: This view recognises the value that information can give to people's understanding of their organisation
- Informal vs formal information systems: This view recognises that people not only transfer, store and process information, they also interpret it
- Information as a natural phenomenon: This view recognises that people used and transferred information before there was any way of formally codifying it. It recognises that organisations are a systemic mix of communication and information processing
- Information as a resource: This view recognises the people element in information - that information is also transferred through conversation, and that people can value information
- Systems theory and information: This view recognises that people are inextricably linked with technology, and the interpretations they give to information can affect flexibility and adaptation to their environment

and

- Information culture: The view encompasses the others. It is the recognition that information is a systemic and complex mix of people, their understanding and interpretation of their organisation, and the media they use to transfer and process information, whether it is conversation, paper or IT based. It encompasses informal and formal information, information activities and realises that the information culture is crucial to knowledge management in an organisation. People's *behaviour* in regard to information activities is a manifestation of the information culture.

Information is a mixture of both formal and informal, but the informal information system is difficult to define and little written work exists. The main terms associated with it appear to be:

People	Communication	Speech
Language	Skills	Processes
Knowledge	Flexibility	Informal information
Culture	Meaning	Information flow
Interpretation	Understanding	Culture
Activities	Conversation	

These terms can be provisionally split into two:

- i. Terms which refer to interpretation and understanding: *People, language, knowledge, culture, meaning, skills*. These are related to information culture, systems approaches and the differences between the formal and the informal system, described above.
- ii. Terms which refer to activities and behaviours: *People, communication, flexibility, speech, informal information, information flow, processes, conversation*. These are related to information resource management, the role of information in knowledge creation, information as a natural phenomenon and systems approaches, also described above.

People can both interpret information and carry out information activities, therefore 'people' is in both categories.

Formal information is more straightforward to recognise, and refers to IT and paper-based systems. These also form part of integrated activities, and can be interpreted in different ways. People use and behave towards them in different ways. These alternative approaches are more relevant to the behavioural, informal information of SMCs, and they can be used to build the conceptual model. An information culture can be seen as the way in which these companies can achieve customer satisfaction.

However, there are ambiguities even concerning electronic and paper-based systems. In customer-focused SMCs on the Adapt/C.O.R.E. programme the author observed people frequently scribbling information down on pieces of scrap paper, during phone calls especially. Therefore this type of information may not necessarily be described as formal, because of the spontaneity of the activity itself and the informal behaviour of the people carrying out the activity. It may also be said that email is more informal than formal, as people tend to use them in an ad hoc manner, outside the formal business processes.

The above argument reveals the systemic nature of information. That is, the combination of formal and informal information, and the fact that there are often few boundaries between them implies that organisational information is highly dynamic and cannot be broken down into small parts. This was first pointed out in Section 1, where the author explored the meaning of all the different terms pertaining to information. It was shown that all the terms were interdependent on each other, and were often ambiguous in nature.

5. Conclusions and Next Steps

This Chapter has shown that information is a systemic combination of:

- Activities and behaviours
- Interpretation and understanding
- Formal and informal means of information processing and communication.

The main thrust of the views explained in Section 3 is to emphasise the importance of people to information rather than simply leading with technology. This Chapter has gone some way to answering the third research question on the nature of information in the customer-order fulfilment process in customer-focused small manufacturing companies. These views link the manufacturing and marketing views of integrated customer satisfaction and information cited in the previous Chapter. The fourth research question, the management issues, has also been delved into to an extent in this Chapter, when it was stated that information culture is at the heart of the management of information behaviour in small companies.

Section 5.1 concludes the findings from Chapter 3, and 5.2 goes into the next steps in the research programme.

5.1 Conclusions

The manufacturing view of the previous Chapter focused on the use of formal information tracking, shared culture and language to integrate the activities and link the gaps of the customer order fulfilment process. The power culture of the SMC implies that they use people and informal communication to do so.

An information culture can accommodate all the above, and this would imply an assumption that a customer-focused SMC which was able to utilise the management of information well would be an information culture. An information culture is the recognition of the rich variety of information which abounds in an organisation, and the shared understanding and ability of the people in the organisation to implement it fully. This is why information behaviour is so important to customer-focused SMCs. People's information behaviour can integrate the activities in the customer order fulfilment process.

Small manufacturing companies have an informal structure, and a power culture, therefore it may be assumed that to understand the nature of their information requires an understanding and application of the principles of the informal system described above. The formal system is part of, and interdependent with the informal system, and part of the information culture (1990 op.cit.).

The recognition of an information culture is one way in which information can be studied in SMCs is a major step towards understanding the fourth research question: How does management facilitate/impede their ability to maintain customer-focus through information?

This is also a management issue as in power cultures, the senior manager is at the centre of the 'web'. There may be conflict between the power culture and an SMCs ability to be an information culture. This is an important sub-question which is emphasised in Chapter 4, Section 1.2.

5.2 Next Steps

The underlying assumption this thesis takes to the study of information in all its forms is that an effective *information culture* is conducive to the ability of a SMC to integrate activities, manage change, satisfy customers and maintain flexibility. Once an information culture is in place, then people will record, process and communicate information in the way it needs to integrate activities. Information behaviour is a manifestation of this culture.

The research continued with an investigation into the information which SMCs need for customer satisfaction, bearing in mind that their information is likely to be a complex mix of people and technology, thoughts and activities, informal and formal. It approached the research by assuming that the formal information system can only be understood by going first through the informal information system, as illustrated in the first section of this Chapter, and builds this up into a conceptual framework in Chapter 4, Section 1.2.

The author decided the best way to gain this understanding was to begin with the informal system, and study the formal systems through that, rather than beginning with the formal system as writers in the management of information have done. This means that any research must begin with *people*, bearing in mind that they are behind the information culture.

This is explored in the methodology.

***Summary of Chapter 3.**

This Chapter has covered the following areas:

1. There is much misunderstanding of terminology in the area of the management of information
2. Information is an interdependent part of knowledge, but also deserves to be studied in its own right
3. Traditional approaches are technology-led, and are usually based on large company case studies. They are based in the information processing, machine paradigm of organisations.
4. Alternative approaches recognise the informal information system as separate to the formal system, including areas such as knowledge, culture, understanding, perception, speech and competencies.
5. Other approaches recognise that information has been an inherent part of organisations a long time before IT came along, and that 'information' is distinct from 'information technology'
6. Information culture incorporates all these alternative approaches, as they all recognise the value of people in information processes and activities. Information behaviour is a manifestation of culture.
7. As SMCs are known to rely on more informal information than large companies, these alternative approaches may be more appropriate to identifying the nature of information which enables them to be customer-focused, and indeed have already gone a long way to doing so.
8. The power cultures prevalent in SMCs may conflict with the ideal of the information culture, especially with formal information. This may be a major management issue.
9. A conceptual model would be developed from the above theories to do this, based on the notion that people determine the information culture.

PART 2

RESEARCH METHODOLOGY

This part shows how the data collection itself was undertaken, why it was carried out in the way it was, and what the results were.

Chapter 4 explains how the research questions were tackled. The author shows the purpose of the research, primarily to explore the nature of information and its management in these customer-focused SMCs, and the nature of the research strategy which had to be planned to accommodate the purpose. The Chapter shows how the author found a starting point for the data collection and introduces the various research designs and strategies available, explains what was chosen to explore the particular research domain and why. The initial conceptual model is presented, and it explains the methods used in sampling. The Chapter shows the need for a flexible methodology to provide the depth necessary to explore the research questions.

Chapter 5 shows how this was done, and illustrates the problems of the research domain.. It points out the weaknesses of such an approach, and how these were overcome. The last Chapter showed the need for flexibility and depth in the methodology. This Chapter shows how it was achieved through multi-methods used in the data collection and process, and introduces the types of methods available to social researchers. It illustrates what types were chosen and why, and how they were used throughout the three case studies to answer the research questions and keep the methodology exploratory in nature. Theoretical sampling is developed, and the Chapter ends with the important area of establishing trustworthiness and credibility of the research findings.

Chapter 6 lays out the process of data collection, demonstrating the careful thought gone into the methodology, and how it makes the research trustworthy. It also confirms that a qualitative methodology is appropriate for the research questions, because of its simple and flexible applications. The Chapter illustrates, step-by-step, the process of carrying out the data collection, and shows how both rigour and flexibility were maintained at the same time. It clearly shows the ways in which the data collection techniques were modified as the research progressed, in keeping with the need to keep the methodology flexible. The author shows how the data collection was intertwined with analysis of findings, and that the development of theory sprouted almost as much from the methodology itself as from the data analysis. This interdependence is typical of qualitative approaches.

The Chapter concludes with a summary on the nature of information and its management, based on research questions 2, 3 and 4. This forms an important part of the triangulation with the findings from the literature review.

Chapter 4.

Research Design and Strategy

1.

- There is a need to maintain a qualitative, flexible methodology to capture and understand the more intangible aspects of informal information.

2.

- The research was primarily exploratory. The case study was considered an appropriate method overall, as it has the flexibility to accommodate emergent findings and different types of data collection techniques.

3.

- The purpose of the research was primarily in-depth exploration, and generalisability would come only second to this.
- Sampling is about the boundaries of the research - what the author picks out to focus on and why.
- The exploratory nature could be maintained, while keeping the methodology rigid enough for external validity through different kinds of sampling.

1. General Research Design Issues

This section explains the author's thinking leading to the development of the research questions and the building of the conceptual model. It illustrates the need to maintain a qualitative, flexible methodology to capture and understand the more intangible aspects of informal information. This was stated in the deliverables, Chapter 1, Section 1.2.

Section 1.1 looks at the methodological problems and shows that a qualitative approach needs to be considered. 1.2 explores the nature of the research questions and how they were developed and manifested in a conceptual model which was used as the basis for the process of data collection.

1.1.1 Research Paradox

The research area posed a paradox. There was little previous research in this specific area to build upon, that is, the nature of information and its management in customer-focused SMCs.

Apart from the background work, the author's background knowledge was not particularly cohesive and the literature review, although thorough and wide ranging, was fragmented. Neither was there a tried and true method to investigate and elicit the nature of information and its management. The methodology was predetermined to be emergent and tentative, and would depend on the nature of the information in these small manufacturing companies. The development of the methodology took place at the same time as the literature review, therefore the conceptual model was built gradually. The author knew that informal information might be important in customer-focused SMCs, and that formal information might also be increasingly important. This could not be known until data was collected and analysed, and this was the basis of the conceptual model used to begin the methodology.

Another aspect was the somewhat implicit nature of the research domain - it had already been shown that the management of information is not generally recognised as an integrated concept in small manufacturing companies, or indeed, recognised at all in any form - this could pose problems in terms of how to gather data for analysis. Direct questions on the management of information could potentially be misunderstood. These dilemmas exacerbated the 'exploratory' nature of the research, and the need for a reflective, iterative approach with a large degree of openness and flexibility. The author realised that this was especially true in regard to 'informal' information.

1.1.2 Research Approach

The requirement for a flexible approach raised the subject of qualitative and quantitative approaches. Flick points out that qualitative methods are very different to traditional quantitative techniques:

".....the process of (quantitative) research can be neatly arranged in a linear sequence of conceptual, methodological and empirical steps. Each step can be taken and treated on after the other and separately. In qualitative research, on the other hand, there is a mutual interdependence of the single parts of the research process and this has to be taken into account much more."

(1998, p 40)

In quantitative research he says that each step can be studied individually, as separate units of analysis. The model is constructed previously to the research and hypotheses are derived. Complex relations can be broken down into variables which can then be tested,

based on the hypotheses. Qualitative methods cannot be regarded independently of the research process and the issue under study. They are unequivocally embedded in the research process.

Grounded Theory, made famous by Glaser and Strauss, is the bedrock of qualitative research:

“.....it gives preference to the data and the field under study as against theoretical assumptions. These should not be applied to the subject being studied but are ‘discovered’ and formulated in dealing with the field and empirical data to be found in it.”
(1967, p 41)

Glaser and Strauss claim that the aim is not to reduce complexity by breaking it down into variables but rather to increase complexity by including context.

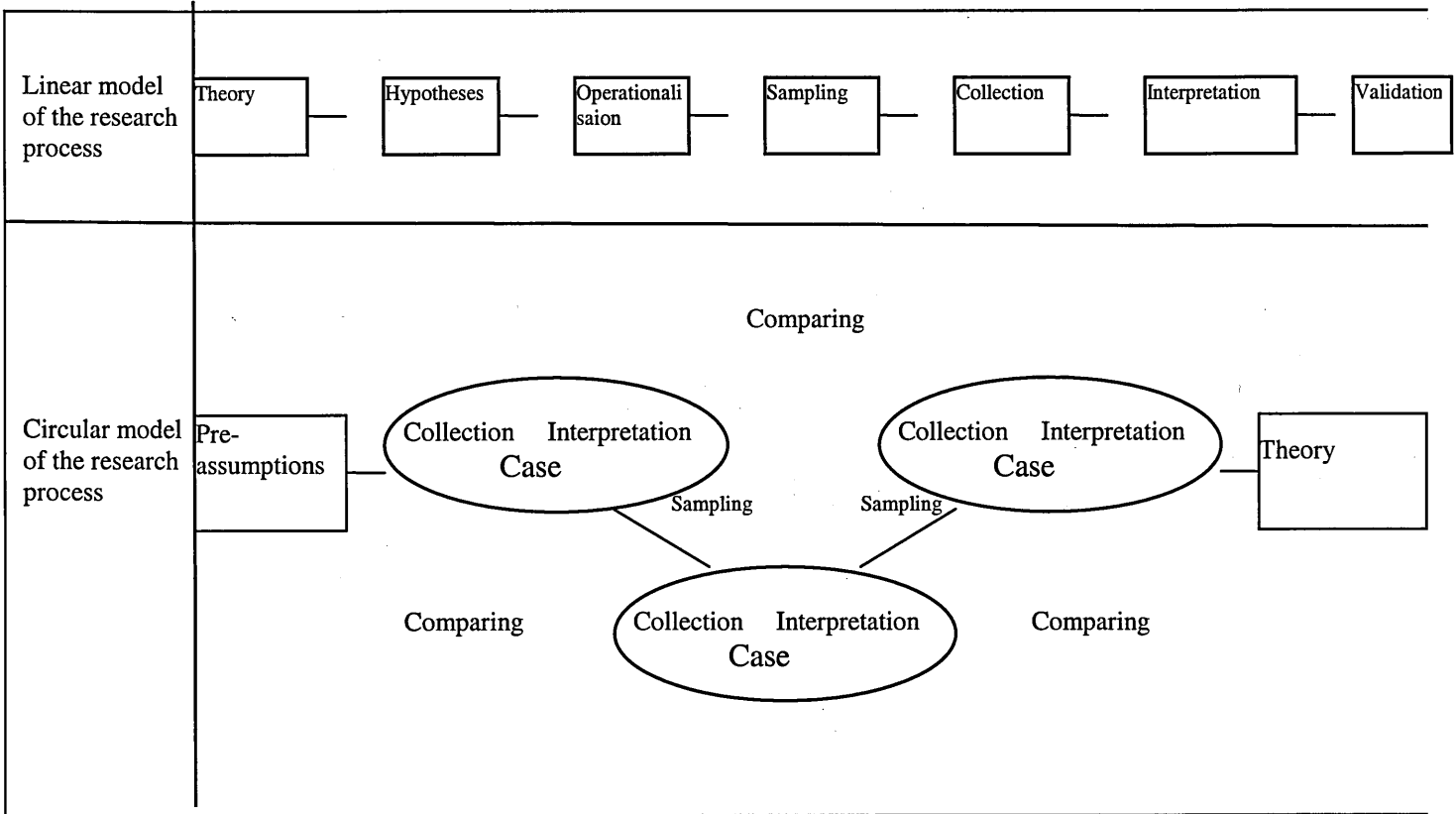


Figure 4.1: Contrasting Quantitative and Qualitative Approaches (Source: Flick 1998)

Figure 4.1 illustrates models of quantitative and qualitative research. The top model clearly shows a linear, step by step process of rationalisation. Hypotheses are clearly defined and reduced to variables which can then be tested in isolation. The bottom model shows a circular process of pre-assumptions, rather than hypotheses, which are continuously revised and refined at the same time as data is collected and interpreted. The first begins largely with theory as the input and the second has theory mostly as the output.

1.1.3 Preliminary Assumptions and Practical Experience

To explore the research questions, there was one well known approach to identifying information resources in organisations, that of the Burke and Horton model explained in Chapter 3, Section 3.4. This approach is linear and has a quantitative dimension. The a priori assumptions from both the literature and the Adapt/C.O.R.E. project were that this would not be an adequate methodology in itself. The Burke and Horton approach is aimed at large companies. It was not an entirely suitable methodology because of its linearity and focus on tangible, formal information only. The methodology had to be flexible to identify and accommodate the type of information which was at this point thought to be peculiar to small companies.

This research lay in between the two extremes of linear research and grounded theory, tending more towards the latter. Although not quantitative, as no hypotheses were drawn and there were few variables to measure, enough was known to have expectations about what would be found at least in the pilot case study, and this was shown through the conceptual model which was embedded in the research questions, author's background and literature review. Thus the theory development had already begun through the literature review and background knowledge. The initial assumption, though by no means a hypothesis was:

Customer-focused small manufacturing companies may be able to achieve customer satisfaction through managing both their informal and formal information.

For example, it was possible to make propositions about the nature of information and how it supports customer satisfaction in SMCs. The author thought at an early stage that they may attain this from managing formal information for traceability in the face of complexity and informal information for flexibility in the face of uncertainty. This was simply a guess, and it is not enough evidence to draw a hypothesis. More understanding of these areas would, however, make it possible to generate hypotheses, and the thesis sets out to do that as one of the deliverables.

The intention was to try out different ways to do research, to find out the best way to gather data to answer the research question. The methodology, analysis and material are described as they emerge and in order - the 'mutual interdependence' that Flick claims (Flick 1998 op. cit.). The purpose was to understand and explore, not hypothesise and

rationalise. Qualitative research tends to generate *questions* at the outset, rather than *hypotheses*. (Chapter 1, Section 2.4). Enough was known both before, during and after the literature review to define specific research questions. For these reasons, ideas would be taken from Burke and Horton, and also the rest of the literature review, but the main criteria was to be that constant and continuous interpretation and analysis of the research process would be necessary to identify the information in its true context.

As the research progressed through the three case studies, it was found that a linear approach was impossible, and a circular, holistic approach had to be taken, where the analysis of data and the moderation of the methodology are an interdependent, synonymous process. As Chapter 5 goes on to show, a quantitative element of the Burke and Horton approach was tested, and it was found to have less value than originally intended by them.

Flick focuses on the circularity of qualitative research as a *strength*, as it forces the researcher to constantly reflect on the entire research process, reviewing and analysing everything in light of the rest of the methodology and data. Cases are continuously compared to each other, and pre assumptions are continuously refined and reflected on in relation to the findings. Theory emerges gradually as a result of this. Indeed, this is what the author found as the research progressed.

1.2 Research Questions and Conceptual Model

1.2.1 Tight/Loose Designs

Miles and Huberman discuss the merits and disadvantages of research design. They say that tight designs are more generalisable. Loose designs can mean less selective data collection, although more case sensitive. The decision can hang on:

“.....the time available, how much is already known about the phenomena under study, the instruments already available, and the analysis that will be made.”
(1984, p 17).

Many Ph.D candidates find there is a lack of time when undertaking Ph.D research, and this was no different for the author than it is likely to be for anyone else. However, aside from the fragmented knowledge on the specific area, the instrumentation available was good. There was enough background knowledge and experience to build a reasonably tight conceptual framework, inferring the specific area, and the work the author had done on the Adapt/C.O.R.E. programme meant that she had good access to several of the Companies. No specific instrumentation was thought to be needed for the data collection, except for perhaps basic software for analysis. However, the design needed to be loose enough for flexibility.

1.2.2 Developing a Set of Research Questions

Miles and Huberman suggest that the research questions and conceptual framework affect each other greatly, but they can come in any order.

Cresswell claims that qualitative research is based on *questions*, rather than objectives or hypotheses (1994). He calls the main research question a *Grand Tour* question:

“The *grand tour* question is a statement of the question being examined in the study in its most general form.”

(Cresswell op. cit., p 70).

Miles and Huberman claimed that the main research question can be followed by sub-questions (1984 op.cit.). The research was not entirely grounded, as there is a body of literature in the areas of concern, although little in the specific area of the research question:

Small Manufacturing Companies
Customer Order Fulfilment Process
Customer-focus
Information Management (Including alternative, more interpretive approaches).

Therefore, the main (Grand Tour) research question was decided upon from the start, and confirmed from the above four areas, and this was illustrated in Chapter1(Section 2.3).

Main Question:

- What is the nature of the information important to the customer order fulfilment process in the customer-focused small manufacturing company, and how is it managed?

Miles and Huberman recommend that researchers write no more than a dozen research questions, and these questions become sub-topics in themselves (1984). Cresswell says the aim is to give freedom to the qualitative researcher while narrowing the focus of the study to make it manageable (1994 op. cit.). In this way, they can tighten the design while keeping it loose enough for flexibility.

The more obvious sub-questions were defined in Chapter 1. The section below shows that they were answered at various stages in the thesis:

1. What is a customer-focused small manufacturing company, and why is this type of company worth investigating?

Already defined in literature review, and through experience on the ADAPT/CORE programme.

2. What is customer satisfaction?
3. What is the nature of information in the customer-focused small manufacturing company, and how is it linked to customer satisfaction?
4. How does management facilitate/impede their ability to maintain customer-satisfaction through information?

These three were already defined to a certain extent in literature review, and through experience on the Adapt/C.O.R.E.. programme, but to be defined further during data collection and analysis, especially management issues.

Miles and Huberman recommend that the questions are constantly reviewed in qualitative research, as this helps maintain focus (1984 op.cit.). Indeed, this was the case. As the research progressed, these questions were continually evolving and becoming more detailed. However, the literature review has gone some way to answering them, especially the first three questions.

The last sub-question below, for example, was not posed until the notion of the power culture was introduced in the second Chapter, long after the main research questions were put forward in Chapter 1.

Other sub-questions drawn from the research questions 2 - 4 were:

- Does information achieve customer-satisfaction?
- Is the information informal or formal?
- What is formal and informal information?
- Do SMCs have an ability to integrate their internal processes and activities to achieve customer satisfaction?
- What is the value of this information to the customer order fulfilment process?
- What are the order-winners?
- Is information managed and recognised as an integrated concept?
- Does the power culture prevalent in these SMCs conflict with the need to develop an information culture?
- Can information be a tool which can be managed, or is it embedded in behaviour?

These questions were all answered during the course of research and analysis.

1.2.3 Conceptual Framework

A conceptual framework was built to provide grounds on which to base the data collection. The conceptual framework explains, either in graphic or text form, the main things to be studied, and the relationships between them (Miles and Huberman op.cit.). In this case, it is a mixture of theory, practical experience and common sense, based on the research questions. A conceptual model was created, taken from a large area of literature, and based on the above set of questions. All the approaches to information summarised in the previous Chapters would be tightly defined enough upon which to base the data collection.

It was possible to make this more specific, based on a combination of literature, experience and common sense.

Small manufacturing companies appear to rely on more informal information than larger companies. At this stage however, it was already rationalised that customer-focused small manufacturing companies of the type specified in Chapter 2 may rely on more codified information and more formal procedures. Therefore it was important to include this in the conceptual framework.

CONCEPTUAL FRAMEWORK (Based on research questions nos. 2, 3 and 4.)	
<p>■ 1. What is the link between information and customer-focus in these companies?</p> <ul style="list-style-type: none"> • Christopher and MacDonald's Transactional Elements (Chapter 2, Section 4.4) • AMBITE customer order fulfilment process (Chapter 2, Section 4.2) • Hill's concept of order winners, relating this to the separate cultures and languages of manufacturing and marketing (Chapter 2, Section 4.5) • Models such as BPR, MRP11 and scheduling - linking customer-focused activities through information (Chapter 2, Section 4.2) 	
<p>■ 2. What is the nature of information in the customer-focused small manufacturing company?</p> <ul style="list-style-type: none"> • <i>Informal Language and Voice-based Communication:</i> Understanding of terminology and meaning between functions and customers, the fact that much information is spoken: Liebenau and Backhouse (Chapter 3, Section 3.2), Hill (Chapter 2, Section 4.5), Beaumont and Sutherland (Chapter 3, Section 3.4), Checkland (Chapter 3, Section 3.5), Davenport (Chapter 3, Section 3.6) • <i>Formal Procedures:</i> ISO standards, logging procedures etc. in the customer order fulfilment process, customer order information: Liebenau and Backhouse (Chapter 3, Section 3.2), Hill (Chapter 2, Section 4.5) • <i>Formal Means:</i> Paper and Electronic: Burke and Horton (Chapter 3, Section 3.4), Liebenau and Backhouse (Chapter 3, section 3.2) and Hill (Chapter 2, Section 4.5) 	
<p>■ 3. How does management facilitate/impede their ability to maintain customer-focus through information behaviour?</p> <ul style="list-style-type: none"> • <i>Background Elements:</i> Context, Customer Policy, Objectives, Order-Winners, Organisational Structure, Culture: Burke and Horton (Chapter 3, Section 3.4), Orna (Chapter 3, Section 3.6), Christopher and MacDonald (Chapter 2, Section 4.4), Liebenau and Backhouse (Chapter 3, section 3.2), Hill (Chapter 2, Section 4.5), Bridge, O'Neill and Cromie (Chapter 2, Section 2.3), Davenport (Chapter 3, Section 3.6), Walsham (Chapter 3, Section 3.6) 	

Table 4.1: Initial Conceptual Framework

This model demonstrates that data can be collected on the basis of research questions numbers 1,2,3 and 4 using background knowledge from the literature. The first question had already been answered substantially from the literature, and Questions 2 and 3 also to a certain degree. These findings were to go on to provide a base upon which to explore them further through the Companies.

1.3 Discussion

This section has illustrated the first methodological steps taken towards the building of the conceptual model. It has shown the differences between qualitative and quantitative research, and pointing out that the highly tacit, informal and exploratory aspects of information require a methodology which is more qualitative than quantitative, to maintain the need for flexibility. However, aspects of quantitative research may be useful to support or enhance the qualitative nature of the research.

2. Research Strategy

This section shows that the crux of the data collection process was flexibility. The author kept as open a mind as possible as the research was primarily exploratory. The case study is considered an appropriate method overall, as it has the flexibility to accommodate emergent findings and different types of data collection techniques. Through this, the author was able to demonstrate how she was learning throughout the research process.

Section 2.1 explains the purpose of the research strategy and 2.2 shows why the case study strategy was chosen over the others.

2.1 Research Purpose

In deciding a research strategy, it was essential to take into account the purpose of the research, and the ways in which it could be explored. Robson says that

“The general principle is that the research strategy or strategies, and the methods or techniques employed, must be appropriate for the questions you want to answer.”
(p 38 op.cit.)

Robson classifies the purposes of enquiry:

Classification of the purposes of enquiry	
1	<p>Exploratory</p> <ul style="list-style-type: none">• To find out what is happening• To seek new insights• To ask questions• To assess phenomena in a new light• Usually, but not necessarily, qualitative
2	<p>Descriptive</p> <ul style="list-style-type: none">• To portray an accurate profile of persons, events or situations• Requires extensive previous knowledge of the situation etc. to be researched or described, so that you know appropriate aspects on which to gather information• May be qualitative and/or quantitative
3	<p>Explanatory</p> <ul style="list-style-type: none">• Seeks an explanation of a situation or problem, usually in the form of causal relationships• May be qualitative and /or quantitative

Table 4.2: Classification of the Purposes of Enquiry (Source: Robson 1995)

Robson, however, points out that any research may have more than one of these purposes, although one will often predominate. He also proposes confirmatory research:

“If you are carrying out an exploratory case study with little on which to base your conceptual framework, very general research questions and a weakly defined emergent sampling strategy, it is inappropriate to have much, if anything, in the way of prior, standardised data collection devices. If it is a confirmatory study, where previous work gives you confidence to adopt a well defined conceptual structure, and specific well focused research questions with a tight and known sampling strategy, then you can use similarly focused, pre-structured data collection techniques. Crudely, if you know what you are after, then you can plan ahead on how best to collect the required information.”
(p 157 op.cit.)

The purpose of the research was fundamentally *exploratory*. Little was known or documented on the specific research domain, and the purpose was to gain a better understanding of it. Yet enough was known for the author to realise that to gain this understanding the information would need to be described in a reasonable degree of detail, and the management issues would need to be explained. The boundaries were not particularly clear, but the research purpose was to:

1. *Explore* the phenomenon of customer satisfaction in the context of customer-focused SMCs; what it means, how it is achieved and to be able to identify and explore the information vital to achieving it, and the management issues.
2. *Describe* the information - what it is, the handlers, users and managers, and how valuable it is to the customer order fulfilment process.
3. *Explain* what management practices give rise to strengths and weaknesses associated with the information.

and also

4. *Confirm* (or otherwise) that
 - Information is important to the customer order fulfilment process - it integrates activities, and the mix of formal and informal can provide traceability and flexibility.
 - Information is both formal and informal, based on a systemic approach to culture, and embedded in behaviour.

The methodology was designed to be symmetrical in approach, so that research findings could always be accommodated in the conceptual model, no matter what they were, that is, if the findings confirmed previous assumptions or not (Gill and Johnson 1991). The last point brings up important issues of validity, which is discussed in Chapter 5, Section 2.2.

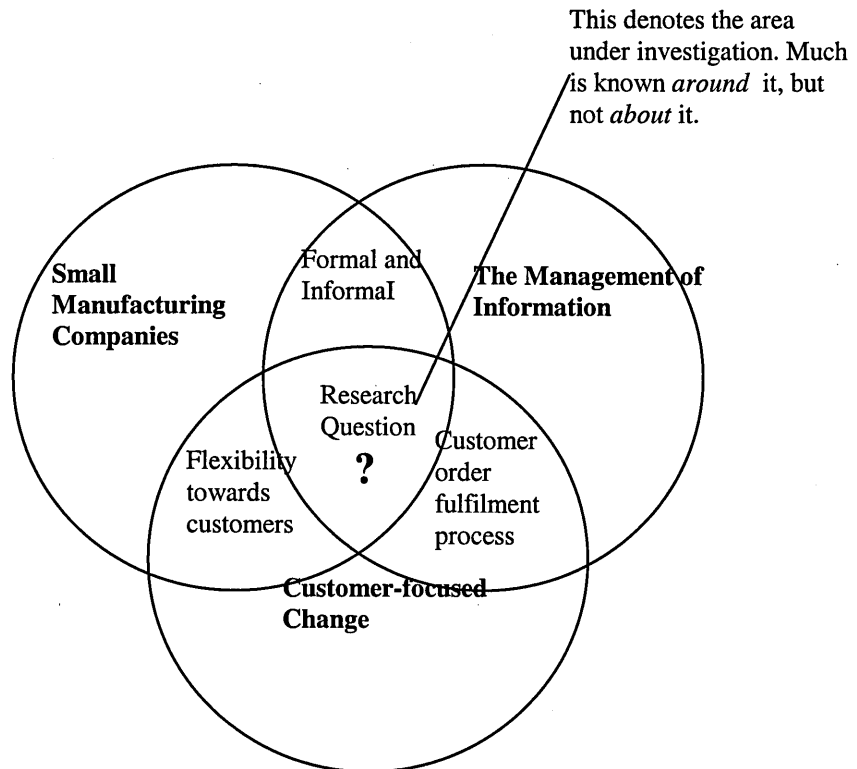


Figure 4.2: Area Under Investigation

Figure 4.2 shows the areas which have already been explored to an extent in the literature review.

2.2 Choice of Strategies

There are various ways in which research questions can be explored.

Robson claims that there are three traditional approaches to research:

- Experiment - “Measuring the effects of manipulating one variable on another variable”
- Case Study - “Development of detailed, intensive knowledge about a single ‘case’ or a small number of related cases”
- Survey - “Collection of information in standardised form from groups of people”.

(p.40 op.cit.)

Yin points out two more:

- Archival analysis

- and
- History.

Yin's helpful categorisation of these five types can shed more light on why a certain research strategy is chosen over another in Table 4.3:

Relevant Situations for Different Research Strategies			
<i>Strategy</i>	<i>Form of Research Question</i>	<i>Requires Control Over Behavioural Elements</i>	<i>Focuses on Contemporary Events?</i>
Experiment	how, why	yes	yes
Survey	who, what*, where how many, how much	no	yes
Archival analysis (e.g. economic study)	who, what*, where how many, how much	no	yes/no
History	how, why	no	no
Case Study	how, why	no	yes

- "What" questions, when asked as part of an exploratory study, pertain to all five strategies

Table 4.3: Relevant Situations for Different Research Strategies (Source: Yin 1989)

One main methodology was selected - Case Study methodology. Robson says that:

"The case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence."

(p 52, op.cit.)

and Cresswell says that in a case study the researcher:

".....explores a single entity or phenomenon ("the case") bounded by time and activity (a programme, event, process, institution, or social group) and collects detailed information by using a variety of data collection procedures during a sustained period of time."

(p 12)

Yin noted that some types of 'what' questions are exploratory, and others are of a 'how many' or 'how much' nature. Therefore, according to the above table, the nature of the

research question overall pertains best to a case study - the research questions have three 'whats' and one 'how' (1989 op.cit).

No control was required over behaviour and events, as the aim was to investigate the domain in its own natural setting. In addition, the focus was mainly on contemporary events as the question is 'what *is* the nature of information?'. Historical events would be included if thought necessary, for context. A substantial amount of time and effort would have to be spent in a company/companies to explore the area in depth.

At this stage, the author decided to include the second stage of the Burke and Horton framework in the form of a survey. The reason for this was to test it to ascertain the extent to which it could reveal the value of information in the eyes of people. Thus the methodology would include a small quantitative type survey within it.

A survey as the main method was not appropriate because:

- There was no need to collect information in standardised format from a large group of people (random sampling).
- There was not much detail known about the research question.
- The research was exploratory - it was generated by a need to understand more about the information in these SMCs, rather than the testing of hypotheses.
- The research domain simply generated questions, not hypotheses.
- Lack of understanding of information, especially the informal side, made it difficult to use as a survey tool as the term 'information' would be difficult for people to understand.
- Little need to ask 'how many' or 'how much' type questions.
- Generalising to a larger population was not the main aim of the research - the main aim was in-depth exploration.

An experiment as the main method was not appropriate because:

- There were no variables in the conceptual model which could be measured or manipulated.
- Organisational research cannot be repeated using exactly the same laboratory conditions.
- The research was exploratory in nature, and an experiment to measure the effects of one variable on another could not be generated. The question "Does the management of information enable customer satisfaction" was considered but this would mean precise definition of the management of information at the start which was not possible.
- Again, no hypotheses were generated which could be tested.
- Control over events was not needed.

Archival analysis as the main method was not appropriate because:

- The view of the management of information which is proposed in this thesis includes information of a more informal, tacit type. This cannot be documented easily.

History as the main method was not appropriate because:

- The aim was to discover, in a reasonable degree of detail, the nature of the information in the customer order fulfilment process in the present moment.
- At this stage it was thought that observation may be a useful aspect to identify the less tangible elements, and this cannot be done in the case of a historical analysis.

The approach that this research is taking assumes that information in SMCs is more intangible and informal. It is highly unlikely that the management of information would be seen as an overt, integrated concept or an explicit management policy in these Companies. It was assumed that it would be difficult to explain what it meant, difficult to pinpoint aspects of it, hard to elicit it from people much of the time. It would need a degree of depth and different methods of probing to elicit these intangible elements. At least one case study was the only way to do this.

Although the case study methodology was selected as the primary strategy, a small scale survey was designed to be included as part of it, based on the second stage of the Burke and Horton method. In addition, the research question had the feel of an experiment if thought of in terms of “Does the management of information enable customer satisfaction”, and this was actually included in the previous list of research sub-questions. As the research progressed, a degree of archival analysis was undertaken and the historical context naturally came out in the interviews.

2.3 Discussion

The methodology was to be kept flexible. As Yin says, any type of research purpose can be done through any type of methodology, and indeed there are quantitative case studies as well as qualitative, as there are experimental and survey-type case studies. The research purpose naturally leads into the question of drawing boundaries, for the sake of keeping the research focused on the problem domain.

3. *Sampling Strategies*

An important part of the research was the development of a suitable methodology to elicit the nature of customer-focus and these sometimes largely intangible resources. It had to be investigative in nature, and the initial case study had to show the extent to which the methodology was or was not appropriate, and what needed modified. The purpose of the research was primarily in-depth exploration, and generalisability would come only second to this.

Through multi-methods used in the case study method, both requirements of rigidity and flexibility could be maintained. The exploratory nature could be maintained, while keeping the methodology rigid enough for external validity through different kinds of sampling. Sampling is about the boundaries of the research - what the author picks out to focus on and why.

This section explains the nature of sampling. Section 3.1 lays out the unit of analysis, 3.2 shows three stages of sampling decisions used in the research process, and 3.3 explains them in more detail, and why and how sampling decisions are used in the context of this research.

3.1 Drawing Boundaries

Sampling strategies were started with the formulation of the research questions. Miles and Huberman say that bounding the area of research is a problem for qualitative researchers. They claim that the *case* is the unit of analysis, and give examples of cases as:

- Individuals
- Roles
- Groups
- Organisations
- Communities

or

- Nations.
- (1994 op.cit.)

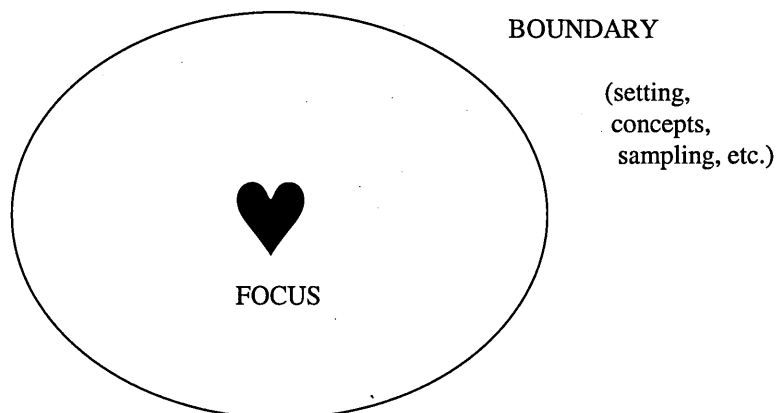


Figure 4.3: The Case as the Unit of Analysis (Source: Miles and Huberman, 1994)

In this research programme, the *organisation* was the case, or unit of analysis. As already outlined, this means the customer-focused small manufacturing company. This focused down further to the customer order fulfilment process.

3.2 Sampling Methods

A case study is an in depth study of the unit of analysis.

Robson claims that:

“...sampling in survey and experimental design is primarily in the service of generalising from the sample selected to the population from which it comes.”
(p154, op.cit.)

However, in case studies sampling takes on a different meaning, he says, as it is not possible to study everything. There must inevitably be discrimination. This usually concerns:

- Who* Which persons are observed, interviewed etc?
- Where.* In (or about) which settings are data collected?
- When* At what times?
- What* Which events, activities or processes are to be observed?

Miles and Huberman also remind researchers that settings have sub-settings. The researcher must also be aware of sampling *within* the case:

“Qualitative researchers usually work with small samples of people, nested in their context and studied in depth.”
(p 27, op.cit.)

This was an important prerequisite for the first case study.

Flick has defined a categorisation of sampling decisions in the research process:

Stage in research	Sampling methods
While collecting data	Case sampling Sampling groups of cases
While interpreting data	Material sampling Sampling within the material
While presenting the findings	Presentational sampling

Table 4.4: Sampling Decisions in the Research Process (Source: Flick 1998)

and he splits sampling into two types, taken from Glaser and Strauss - theoretical sampling and statistical sampling.

3.3 While Collecting Data

3.3.1 Statistical Sampling

The initial stage in the research was to decide the sampling necessary while *collecting the data*. A case sampling strategy had been decided upon, with probably a group of case study companies.

This was partly because three customer-focused SMCs with information management challenges had already been identified on the Adapt/C.O.R.E. programme in conjunction with the literature review, and they had been narrowed down from the initial twelve on the learning cluster programme. The particular cases to be used then were defined clearly from the start around abstract criteria, which would be replicated for each consecutive case.

In this way all the case study companies could be integrated to achieve a degree of confidence in the findings. Although the primary aim was not generalisability to a larger population, achieving even a small degree of generalisability would enable the generation of hypotheses as one of the outputs of the research, which could lead to further research in the area. Flick refers to this as statistical sampling, based on Glaser and Strauss (1998 op.cit.).

Another sampling question was how many cases to study. Miles and Huberman claim that multiple cases can give

“.....a deeper understanding of processes and outcomes of cases, the chance to test (not just develop) hypotheses and a good picture of locally grounded causality.”
(p 26 op.cit.)

They claim that they add confidence to the findings.

How many was not known in advance, but would be decided as the research progressed. It would depend on the findings, but it was thought at this stage that three would be a good number to add depth and confidence to the findings and also to gain at least a small degree of generalisability.

They also point out that too many case studies may result in thinner data, and like random sampling, can give results which are decidedly biased. It was already decided to stop at three case studies, to review the situation, and if it was felt that enough data had been collected, to make the decision to stop there. Generalisation was not the main purpose of the research, but the author thought that a degree of generalisation could be gained using methods from statistical sampling based around three similar types of case study companies.

Certain people were selected for sampling groups of cases, and this is expanded in the next Chapter. However, they were people important in the customer order fulfilment process, and this was known from the outset.

3.3.2 Theoretical Sampling

Miles and Huberman argue that:

“.....sampling in qualitative studies is usually not wholly pre-specified, but can evolve once fieldwork begins. Initial choices of informants leads you to similar and different ones”
(1994 op. cit. p 28)

They call this conceptually-driven sequential sampling, and recommend sampling both within and across case. Similarly, Erickson suggests a sampling method consisting of a generic, funnelling sequence which works from the outside in (1986).

This is very similar to Glaser and Strauss’s idea of ‘Theoretical Sampling’, a method appropriate for Grounded Theory. After the initial definition of the type of case studies to be researched, it became clear to the author that the actual data collection and analysis would be more investigative and tentative as less was known in this area. This was a deliberate strategy on the part of the author to keep the method flexible.

While interpreting and presenting the data, certain aspects had to be selected also, based on certain criteria. Again, this process will be expanded upon in the next Chapter.

It has already been shown that qualitative research is holistic and circular. Theoretical Sampling then is

“.....the process of data collection for generating theory whereby the analyst jointly collects, codes and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges. This process of data collection is controlled by the emerging theory.”
(Glaser and Strauss 1967, p 45)

The research methodology was on the whole investigative and emergent, because of the abstract nature of the research domain. Although there was a conceptual model, the nature of information and its management needed to be investigated further. As Chapter 6 shows, theoretical sampling was undertaken, and continued for the next two stages - material and presentational sampling.

3.4 While Interpreting Data and Presenting the Findings

In terms of the research *material* itself, the information was less tangible and less measurable because of the highly informal nature. They were harder to identify and needed an appropriate methodology to identify them. It was to be necessary to modify the approach to suit the particular resources of these companies continuously as the research progressed from one case study company to the next, the type of information resources revealed themselves, and theory was developed.

Similarly, presentation of findings was trial and error, modified and iterative as before. It was known from the start that there would be a model, but no more than this. This is laid out in Chapters 7, 8 and 9.

3.5 Discussion

The theory, methodology and nature of information revealed themselves in an emergent manner, as part of an interdependent whole. The need for observation as a research method was not ascertained until after the initial interviews, and well into the first case study. Thus the methodology was emergent, and interdependent with the data collection, again, based on an approach akin to theoretical sampling. There was a need to explain this step by step for the purposes of validity and this is laid out in Chapter 6.

4. *Conclusions and Next Steps*

The last three research questions need to be investigated further, through in-depth research in companies. The uncertainty of theoretical sampling meant that great care had to be taken over data collection methods, and these were thoroughly researched before the start. The uncertainty and need to keep the methodology flexible also meant the validity and reliability of findings needed to be constantly checked and assured.

Summary of Chapter 4.

This Chapter has covered the following areas:

1. The contrast between quantitative and qualitative research. This research is qualitative, but is not purely grounded theory, and also has some quantitative elements.
2. The research questions were specific, but they were broad enough to allow the flexibility needed in exploratory research.
3. A preliminary conceptual framework was developed from the questions, and this was used as the basis for interviews.
4. Case Studies were considered appropriate for the flexibility needed in the principally exploratory research. However, the research could also be seen as confirmatory to some extent, as there was some background assumptions on which to start.
5. Drawing boundaries to the research was important, and sampling strategies were used to do this. The customer-focused SMC was tightly defined from the start, in Chapter 2, and this is related to statistical sampling. The other three research questions were explored through an emergent approach while collecting and analysing the data known as theoretical sampling.
6. The lack of rigour involved in flexible theoretical sampling methods meant that great care had to be taken over the way the data collection was carried out, to keep the findings quality assured.

Chapter 5.

Data Collection

1.

- Multi-methods of interviewing, observation and documents were chosen to make the data collection as in depth, detailed and valid as possible.
- These techniques ensured ways of eliciting the more ambiguous, tacit aspects of informal information, as well as formal.

2.

- There is always a trade-off between rigour in the research methods, and the depth and richness of results in qualitative research.
- Depth and richness could be achieved while still maintaining rigour simply through the multi-method and triangulated data collection techniques.
- The triangulation of the three parts of this thesis showed that similar results were being found through each of these parts, especially concerning the nature of information.
- Three case studies were undertaken as a way to achieve this.

1. Research Methods

This section explains why certain methods were chosen to gather data. It shows that multi-methods of interviewing, observation and documents were chosen to make the data collection as in depth, detailed and valid as possible. These techniques ensured ways of eliciting the more ambiguous, tacit aspects of informal information, as well as formal.

Section 1.1 briefly describes the data collection techniques available, 1.2 describes the interview design and why it was chosen. Section 1.3 explains why the author also undertook observation and the different types of observation which were chosen. 1.4 describes the function of document analysis and why it was undertaken.

1.1 Data Collection Techniques

There are three established techniques for collecting data:

- i. Asking questions (Sometimes known as a primary source)
 - ii. Observation
- and*
- iii. Studying documentation (Sometimes known as secondary sources).
- (Buchanan and Huczynski 1997)

The method of 'asking questions' does not always refer to formal interviews with an interviewee actually present. Robson says that the typical extremes of approaches to asking questions are:

1. Self-completion questionnaires with a fixed sequence of closed questions
- and*
2. 'Free range' interview - fluid agenda and open ended questions.
- (1996)

In the same way, Robson has laid out this table of data collection techniques, although he makes no reference to questionnaires, and concludes that these three are the most common techniques:

**Data collection in Case Study - a summary
of commonly used techniques**

1. Observation

- a. *Participant observation* The investigator takes on a role other than that of passive observer and participates in the events being studied
- b. *Systematic observation* Use of standardised observation instrument
- c. *Simple observation* Passive unobtrusive observation (i.e. of facial expression and language use)

2. Interview

- a. *Open-ended interview* No-prespecified set or order of questions; little or no direction from interviewer; goal typically to gain insight into a person's perceptions in a situation
- b. *Focused interview* Use of interview guide specifying key topics; order of questions not fixed
- c. *Structured interview* Standardised set of questions

3. Use of documents and records

Includes a wide range of written or recorded materials e.g. minutes of meetings, pupil and patient records, diaries

Table 5.1: Data collection in Case Study - A Summary Of Commonly Used Techniques (Source: Robson 1996)

All the above three, interviews, observation and document analysis, were used in this research, in various formats and modified in keeping with the flexible and multi-method nature of the methodology. Hybrid strategies are possible, as are the combination of strategies, and this was indeed the case as this Chapter shows. However, this was not decided right from the start. Interviews were the starting point, and the process of carrying them out revealed the need for different kinds of methods.

1.2 Interview Design for Case Studies

The author knew from the beginning that interviews would be used, rather than questionnaires. It would be necessary to actually be there for prompts, keeping the interview structure open and flexible. Although an initial set of questions were used for the interviews, based on the conceptual model, she assumed that emergent aspects would unearth themselves. Some questions would need more flexibility with answers than others.

There are three types of interview, as shown in Table 5.1 above. Powney and Watts have described the two extreme types of interviews - the 'respondent' interview in which the interviewer has control and the 'informant' interview where the interviewee has control

(1987). In this case, like Robson's comparison between structured and open-ended interviews the 'respondent' interview consists of 'closed' questions, and the 'informant' consists of 'open'. There is a middle ground between the two extremes of interviews - focused interviews, or semi structured interviews. They have:

"...clearly defined purposes, but seek to achieve them through some flexibility in wording and in the order of presentation of questions."

(Robson op.cit., p 227)

Keeping the overall interview structure open to a certain extent was inevitable to make sure that it was in line with the exploratory/confirmatory nature of the research.

The questions were a mixture of unstructured, semi-structured and structured questions:

- Unstructured, because the author was prepared to let the interviewee take charge if necessary, to elaborate on areas of interest or relevance in an exploratory fashion
- Semi-structured, to elicit data directly based on the research questions and
- Structured and quantitative in accordance with the approach for valuing information - Step 2 of the Burke and Horton approach (Chapter 3, section 3.3).

All three types were modified and evaluated through each of the case studies.

The interview questions were similar for each interviewee, though there was a certain amount of flexibility as they were gone through, usually due to the personality of the person being interviewed, how much they were prepared to talk, how much time, and how much insight into the organisation they had. The questions which the interviews were based on were designed to encompass what people knew and were doing, and also what they felt and thought. Some questions had to be rephrased or explained differently, or some missed out altogether, on the grounds of being unsuitable for eliciting the data needed. Often the answers to some of the questions had already been answered indirectly, as part of earlier questions. Therefore, although there was a set of structured questions they were by no means inflexible. Some would answer directly to them, others would expand. This is explained in more detail in Chapter 6.

1.3 Observation Design for Case Studies

1.3.1 The Need for Observation

It was found during the interviews that it was relatively easy to elicit what people feel, understand and believe about certain things, but less easy sometimes to get a clear picture

of what people actually *do* in terms of the activities and behaviours carried out on a daily basis in the customer order fulfilment process. This was the main reason for observing.

The author believed at this stage that the pre-transaction elements referred to in Chapter 2, Section 4.4, could be examined through company documents i.e. business plans, and what the key people said in the interviews, i.e. relationship marketing, formal standards, management meetings and staff skills. The everyday combination of activities, behaviours, formal logging and informal communication which formed the transactional elements, or the customer order fulfilment process could best be *observed*.

The main purpose of the observation was to identify and explore more clearly the nature of information within its context. It had already been established through the interviews and before that much information in these Companies would be intangible and transient, and highly dependent on the everyday customer-focused activities which were carried out.

One of the questions was to describe the *nature* of the information. To do this in the fullest sense, observation of people taking part, especially the customer order fulfilment process, was perhaps an appropriate way to see what people were actually doing.

Observation can be either:

1. Exploratory - typically in unstructured form, to gain new insights

or

2. Supportive or supplementary to other techniques - a natural part of the case study method, it can shed additional insight on a phenomenon and complement other techniques, and this is one of its major advantages.

(Robson op.cit.)

Both the above reasons were felt to be necessary after the interviews.

Another advantage of observation is that it can uncover discrepancies between what people say and what they do. Mintzberg argued that observation can enable the distinguishing between what people actually do (the informal organisation) to what they might claim they do as official rules (the formal organisation) (1973). Observation was thought to be a useful way to examine both the formal and informal system.

It revealed that there may be a split - the split between what people *do* and what they *say*. In terms of information this could mean a split between:

- i. How people use information i.e. do they write it down, enter it in the electronic system, pick up a phone or go directly to someone to talk to them?
and

- ii. What they say about information - how they understand it, what they believe and value.

This split was already realised in the literature review (Chapter 3, Section 3.7.).

The author thought that observation and the study of documents would answer the first aspect, and interviews would better answer the second, although in practice they were more integrated than this. This revealed to some extent what the informal information system is. 'Information flow', 'communication' and 'speech' can be observed, but 'meaning' and 'understanding' cannot be - they are what people believe and how they interpret the world.

1.3.2 Types of Observation

Observation was selected as a way to more closely examine the customer order fulfilment process - the formal and informal information activities which support customer satisfaction.

It is very hard to physically be in an environment and not be a participant. Even if the observer plays no part in activities, her presence is known. There was no way the author could go unnoticed in such a small company. Referring to Table 5.1, systematic observation was not possible, as it is virtually impossible to eliminate the impact of the observer, and the observer actually becomes the instrument. The other two types of observation, participant and simple, were more appropriate - the aim was flexibility and this could be done by becoming part of the activities to some extent, and a small amount of passive observation could probably be done.

However, the author tried to be non-participant, and began the observation with this as an objective, detached an approach as possible, without deliberately interacting with any of the subjects, or trying to get their attention in any way.

Observation can also be either narrative (usually from participant observation) or coded schedules (structured) (Robson op.cit.). In this case it was decided to carry out narrative accounts because of uncertainty as to the nature of the information, and, once again, because of the exploratory nature.

Therefore, there are two factors to take into consideration when embarking upon observational methods, according to Robson. They are:

- Degree of pre-structure in observational methods: In this case, little except an idea of the purpose. However, the author had some guidelines available, and these are explained in Chapter 6, Section 2.4.
- Role of the observer: There are two extremes - full participation, actually becoming a member of the group, and 'pure' observing, an unnoticed part of the

wallpaper. The author tried to do as 'pure' observation as possible, especially at the beginning of the observation, before she realised the need to ask questions. (Robson op.cit)

Gill and Johnson claim that participant observation:

“.....may be the only viable means of discovering what is actually happening.” (1991, p 109).

They extend this with the idea of *overt* and *covert* observation. This refers to whether the subjects know about, or are aware of, the presence of a researcher. (Figure 5.1).

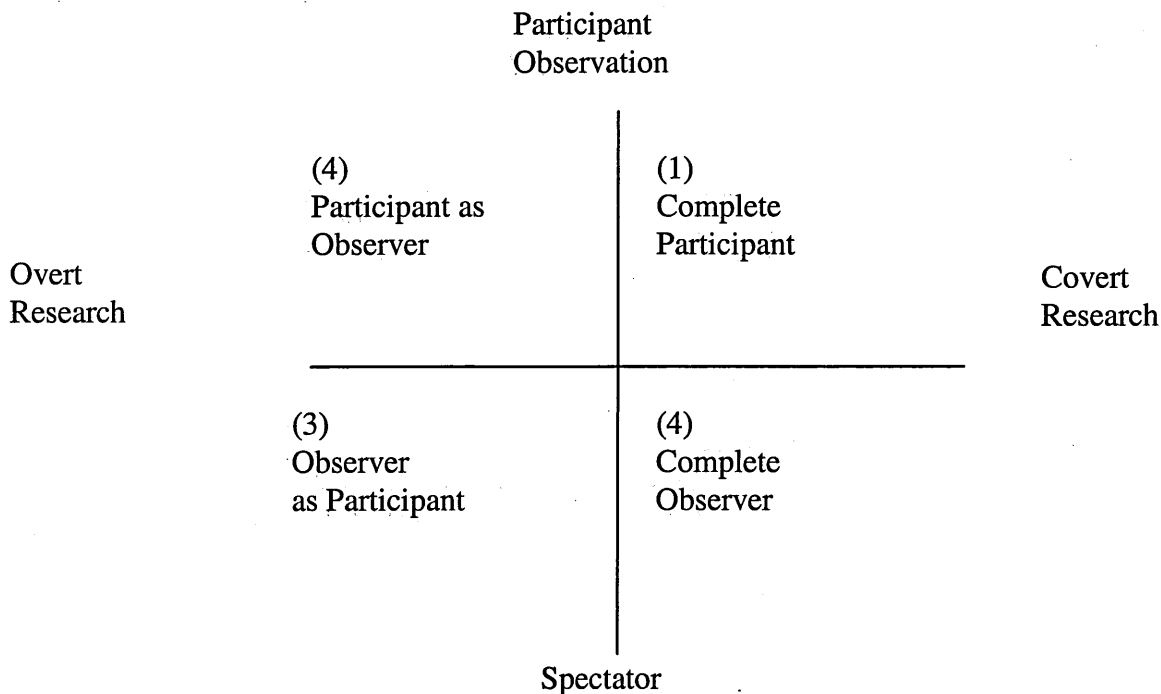


Figure 5.1: A Taxonomy of Field Roles (Source: Johnson and Gill 1991)

In this case, all observation was overt, as it was not possible to be completely covert, and it could be split fairly clearly into two different types:

1. Observer as Participant

The observation was begun with this. Observation was done primarily through the observer as participant method. The author’s status as researcher was known, but she took no part in activities. It was as pure, or spectator oriented, as possible.

Robson goes on to say that common practice in observation is to start with a descriptive account i.e. space, actors, activities, objects, acts, events, time, goals and feelings. This was all taken into account during the observation, especially the 'observer as participant' research. A narrative account was given of this, described in Chapter 6.

2. Participant as Observer

Robson mentions that to give precision to the data, the observer often has to ask questions about the situation.

This was in fact the approach taken to complement the first method. To be able to understand the details of the customer order fulfilment process, it was necessary to ask questions about what they were doing to put it into context. This is, in a sense, a hybrid approach. Questions and observation and study of company documents (including what can be seen on computer monitors) were done all at the same time.

1.4 Study of Documents and Records

Once again, this showed what people were actually doing - this time in terms of the formal information system. Most of this was done as part of the observation techniques, though occasionally they were used as back-ups or further examples during the interviews. The author considered computer monitors to be documents, as they are part of the present and past archival system in companies. It was done largely intertwined with observation, rather than being a back up. Documents can be used to study the formal information system. In fact, they *are* a large part of the formal system, and this is why the study of them is so closely tied up with observation. Documents are tangible, and objective, as are computer monitors.

Robson (op.cit.) proposes certain criteria for good content analysis, as he describes the study of documents:

- Keeping the research question in mind.
 - Sampling Strategy (already explained in Chapter 4, section 3)
 - Define Recording Unit
 - Test
- and
- Analysis.

The author was able to keep the questions in mind, although the approach was fairly unstructured. The main criteria was any documentation which formed a part of the customer order fulfilment process, to study the nature of it and how it was managed. The sampling strategy was described in Chapter 4, Section 3 and in more detail in Chapter 6,

but here documents are a back-up to the observation. The recording unit was primarily for gaining more insight into the formal information in the customer order fulfilment process. Testing and analysis were done as an integral part of the research methods. Again, this is described in more detail in Chapter 6.

1.5 Discussion

There is always a trade-off between rigour in the research methods, and the depth and richness of results in qualitative research. However, depth and richness could be achieved while still maintaining rigour simply through the multi-method and triangulated data collection techniques. The different types of interview questions backed up and supported each other, as did the observation methods and study of documents.

Validity of research findings is always a main concern of any researcher, and this is explained in Section 2.

2. *Issues of Trustworthiness and Confidence in the Findings*

The main purpose of the research methodology was to explore in depth issues which were ambiguous and open to much misinterpretation, and to explore them within their context to enhance the richness of the findings. Three case studies were undertaken as a way to achieve this.

Depth was more important than generalisability from the findings.

This posed problems in terms of validity and generalisability. Rigour is sacrificed to some extent through theoretical sampling. With the constant modification of data collection techniques, analysis and presentation, there was little opportunity to standardise the data collection formats, and this is a major requirement for generalisability. However, validity was ensured through the multi-methods and triangulation. The three customer-focused SMCs were defined tightly before the data collection commenced and this gave it some degree of generalisability to other customer-focused SMCs of the same type. In this way, the research was able to achieve two methodological objectives - the primary one of an in-depth and rich exploration of these companies, and a secondary one of providing some degree of generalisability.

Section 2.1 considers the issues of ensuring good research, 2.2 explains how triangulation added to the overall validity. 2.3 explains the nature of validity itself, and problems associated with bias and error, especially in relation to both the bias and error the author could have made and the bias and error of the subjects during the questioning. 2.4, 2.5 and 2.6 describe other factors of trustworthiness - generalisability, objectivity and credibility.

2.1 Problematic Characteristics of Research Domain

The author had to consider the issues of validity, especially important to a case study strategy. Yin claimed that the biggest concern over case study research has been the apparent lack of rigour mostly through sloppiness, equivocal evidence or biased views. However, he claims that bias can also enter other research strategies, such as experiments or surveys (1989). In that case, establishing trustworthiness should not be a particularly exceptional problem, but simply a matter of total quality management.

Robson supports this argument. He suggests that if the researcher has done a good, thorough and honest job, has tried to explore, describe or explain things in an open and unbiased way then the research is good. If however, they are more concerned with delivering the required answer or selecting the evidence to support a case then the research is essentially worthless.

In this sense, the grand tour question led to a potentially unbiased result - an honest attempt to understand information behaviour and management in customer-focused SMCs. If the question had been for example 'Does the management of information *enable* customer-focus in SMCs', it may have been harder to validate the results, and far more tempting to prove that information does in fact enable customer-focus. This was referred to in Chapter 4, Section 2.1, when it was realised that there appeared to be some contention between the exploratory and confirmatory nature of the research question, and the potential biases this could provoke.

The author was well aware of the quality issue - the process of producing a good doctoral thesis is no different to any other product or service. TQM is a concept associated with maintaining the highest standards of rigour and integrity, through an iterative process of checking and rechecking. The reality is that the process of research must be supported by quality management. This can only be done if it is an integral part of the research, *right from the start*. Robson claims that on the whole reliability is a quality control issue:

"It is easy to guarantee unreliability, through carelessness, casualness and lack of commitment on the part of the enquirer, as does a corresponding lack of involvement by participants."
(1995 op.cit., p 74).

The challenges of the research domain were recognised mainly as the ambiguity of the nature of information, especially when it came to the informal aspect. Flexibility had to be an integral part of the methodology, but rigour was also of utmost importance. The author had to be well aware of these issues throughout.

2.2 Triangulation

Because of those potential weaknesses, the author recognised the need for a triangulated approach to ensure rigour, and this became more obvious as the research progressed. Robson advocates the idea of triangulation which he describes as:

“.....getting a fix on where something is from two or more places.”
(p 290).

Denzin suggests four different types:

1. Data (or source) triangulation:

Denzin suggests studying different phenomena at different dates and places and from different persons. This was done even before the start of the thesis, as well as throughout it. The authors background in research, the Adapt/C.O.R.E. programme and ASLIB IRM Network (Appendices A and B), together with the multi-disciplinary literature review, combined to form the initial conceptual model.

The work undertaken with the case study Companies was conducted over a period of one year and four months. The process of data collection from different people is described in Chapter 6, but it was decided to collect data from a wide variety of people. For the interviews, between five and eight significant people in the order-invoice cycle, and for the observation, many of the people in the Company were observed. They were all interviewed on different days and at different times.

2. Investigator triangulation:

This was not an issue, as the author was the only investigator.

3. Theory triangulation:

Denzin describes this as bearing multiple perspectives and hypotheses in mind when approaching data. This aims to stretch the possibilities for generating new knowledge (Flick op. cit.). This was done through the literature review, especially through the sometimes conflicting view between formal and informal information, the rational versus more interpretive approaches to the management of information and also the varying views on customer-focused change.

4. Methodological triangulation:

Sometimes known as multi-methods, there are two types - within-method and between-method. Both were used in this research, and again this is described in

detail throughout Chapter 6. Three types of interviews were used - structured, semi-structured and unstructured. Two types of observation were done and a variety of company documents were examined. The within method element was done through the quantitative element of the interviews using a qualitative back up to give it extra depth and rigour.

(1989)

There is however, a type of triangulation which the author has placed great importance on, and it falls into the methodological triangulation described above. She introduced the research questions as quickly as possible into the research programme, and deliberately attempted to answer them one-by-one from the beginning, that is, from the commencement of the literature review, through the methodology and the analysis and presentation of findings (Refer to Chapter 1, 2.4). At the end of each of the three parts, the extent to which these questions could be answered was shown, and they have all been compared to each other in Chapter 9. The triangulation of the three parts of this thesis showed that similar results were being found through each of these parts, especially concerning some research questions more than others.

2.3 Validity

2.3.1 Introduction

Robson has called the issues of quality management 'Establishing Trustworthiness', and has categorised this into two sections: *Validity* and *Generalisability*. He says validity is about:

".....being concerned with whether the findings are 'really' about what they appear to be about."

(p 67 op.cit.).

He claims there are three types of validity, and they are explained in the following sections.

2.3.2 Reliability

This is linked to the need for triangulation, which is a way to make findings more reliable. There are certain problems which can arise when conducting social research, especially concerning biases:

Biases in interviews:

Interviews, especially the unstructured variety, have certain advantages and disadvantages. Robson says:

“The lack of standardisation that it implies inevitably raises concerns about reliability. Biases are difficult to rule out. However, it has the potential of providing rich and highly illuminating material.....”
(p 229 op.cit.)

The latter was clearly a major advantage in this case, especially important in exploratory research. However, because control is often given over to the respondent, this is less in line with the ‘validity’ which good control elicits. The author was aware of this problem, and rigour was included through more focused questions.

Biases in observation

Robson states that there are four main biases in observation:

- Selective attention - concentrating on some things or people to the exclusion of others.
- Selective encoding - how interpreting what you observe can be biased.
- Selective memory - how the events are recalled some time after.
- Interpersonal factors i.e interacting with some people more than others.

These were all considered. The author made a conscious effort to distribute attention as widely as possible. She walked around the shopfloor, especially as part of the observer as participant method. Again, she was highly *aware* of the potential biases she could introduce, so she tried to keep an open mind. The field notes were written up straight away, and the author wrote down as much as possible during the observation.

Biases in Document Analysis

The main biases which are likely to come into content analysis are that the documents are usually written for a purpose other than that of the author’s, and causal relationships are difficult to assess (Robson op.cit.). The author was not looking for causal relationships, and she was aware of the fact that they were written for another purpose. Once again, awareness was the key.

Robson says that reliability can have certain inaccuracies, where subject (that is, subject under investigation) or observer (that is, the author) is concerned, and this includes, once again, bias, but also error:

Subject error:

To make sure of as much reliability as possible, the interviews were conducted at different times, with an average of five days in between each one. The same

applied to the observation and the study of documents. In addition, the case studies backed up some of the observations already made in the time before that while working on the Adapt/C.O.R.E. programme. Care was taken to make sure each day when work was done in the Companies that they were 'normal' days. That is, not over the summer holiday period or during an outbreak of 'flu. Although, of course, this is probably not such a problem as someone commented "What is a normal day here anyway?". In this way, exceptional circumstances affecting the results of the data collection could be minimised. This is a form of data triangulation.

Subject bias:

This was harder to minimise, as it is difficult to know the extent to which subjects are not able to be objective in their answers, and often this happens without their realising. For example, subjects may give the answers they think the interviewer/observer wants, or they may be scared to say what they really think in case it gets back to their boss. This is why the author chose to 'cross-reference' what subjects said through a multiple-method and multiple-source approach. Between five to seven subjects were chosen for interview in each of the case studies, and similar questions were asked of all of them, taking into account the flexibility of the sampling strategy. The interviews were backed up by the quantitative questions, and by the observation and study of documents.

What they had said was frequently backed up by others in interviews, although the author made no attempt deliberately to influence what people said by saying anything like: "This person said that. Do you agree?". Finally, each of the interviews were kept to a standard maximum time of one hour, to avoid boredom and bias.

Observer error:

The author was not free from potential error either. However, in this case, the main thing was to be *aware* of the possibility of this happening, then it could be minimised through the author modifying her behaviour. The spacing out of the research was as beneficial to this as it was to subject error. If all interviews had been done on only one day, then this would make it harder to minimise error, as the author may not have been on form.

One possible error could have been that the case studies turned into 'snapshots' and may not have been representative of the general situation in the Companies. This was overcome by getting the interviewees to talk generally, giving examples and anecdotes from the past and present. In addition, previous background research had already been done through the previous work on projects. This had involved

observation and interviews. The case studies were spread out over time. The first one was spread over eight months, the second and third over five weeks.

Observer bias:

This concerns the extent to which the author's own biases and expectations inhibit the research method and the examination of the findings. Certain expectations were built from the start in the conceptual framework and research questions. This is the nature of exploratory research and theoretical sampling. If little is known about something then data has to be elicited from a variety of sources in a variety of ways to gain the insights and depths necessary for a broad outlook on new knowledge.

Again, awareness was a way around this. Trying to treat all the subjects equally was important, although the author was on friendlier terms with some than others. It was also important to listen as carefully to the lowest status people as to the highest. Once again, the multi-method approach was useful here, as the author was able to back up findings and conclusions through other methods, and by cross-referencing what interviewees had said.

Above all, documentation of all aspects of the research was kept, in the form of notes, texts and tapes.

The above strategies introduce a more 'pluralistic' perspective. Flick mentions that a strategy of frequently repeated data collection leading to the same results should be rejected, as it may lead to a biased view (1998 op. cit.). The author made sure that reliability was introduced through pointing out the conflicting evidence as well as the similarities.

2.3.3 Construct Validity

Robson claims that construct validity is about:

“.....measuring what you think it measures”, and it is “.....central to the methodology of testing”
(p 68 op.cit.).

The question of measurement is not particularly applicable in the case of qualitative research. Measurement tends to be associated with quantitative research. In qualitative research, *defining* something is probably a better alternative. Regarding the research question, there were some aspects which could be defined from the start, and they were explained in Chapter 1, Section 2.3, through the research questions.

The three customer-focused SMCs selected were defined very early (Chapter 2, Section 4). Information, its management and customer satisfaction were harder to define, and the conceptual model was an initial attempt to define it, but this was to be tested as part of the overall research process. Again, here, the triangulation was an important part of this. Robson claims that multi-methods can reveal similar patterns of findings and can also reveal discrepancies, and the author did indeed find this to be true throughout the research. For example, the quantitative element of the interviews was backed up by a qualitative answer for each, or most of, the questions. This test revealed that it was easy for the subjects to put a quantitative measurement on the value of information, but overall these measurements proved meaningless without being backed up by more qualifying statements.

As the domain was abstract, construct validity was built in gradually as the definition became clearer, culminating in the theoretical models and hypotheses, laid out in Chapters 7, 8 and 9.

2.3.4 Internal Validity

This was not an issue. Internal validity is concerned with establishing causal relationships between variables, and this was not the aim of the research. Although an *emergent* aspect of the research appeared to be that the management of information may enable customer-focus in SMCs, this was not a part of the original question.

2.4 Generalisability

Otherwise known as external validity (Robson op.cit.), it means the extent to which the research findings are generalisable to other groups, types or settings. Robson says there are two ways to do this: direct demonstration and making a case.

Three case studies were undertaken, therefore it can be said that direct demonstration was done in two case studies, after the pilot study, and results were found which were similar. Making a case was manifested in the final theoretical model, which emerged from the data analysis. As the type of case study companies were defined at the beginning of the programme, it is possible to say that the findings are probably generalisable to other SMCs of the same type, though of course three case studies are really not enough to make a convincing case for generalisability. The purpose was primarily to discover, explore and better understand the nature of information in these particular SMCs, and the methodology had to make a tradeoff between generalisability and the flexibility needed for in-depth research.

It was not possible to do a direct repetition of the original case study, as the people were obviously different. There was in any case no intention to do so. The necessity of using theoretical sampling to understand more about the information and boost reliability was in direct conflict with the notion of generalisability, making repetition impossible.

Theoretical sampling faces the criticism of poor science and reliability. It has little validity in the general sense because there is no standardisation - there is little to compare if measures are dropped and changed. The interview structure was modified to make it broader, to encompass aspects which arose during the interviews, and to make it more appropriate to the research questions. This inevitably leads to a conflict between reliability of the research data and the case study method which is deliberately looking for new insights and discoveries.

2.5 Objectivity

Objectivity was achieved through triangulation, especially in regard to data (source) triangulation. Chapters 7 and 8 explain how unitary perspectives were found on many of the issues regarding customer satisfaction, information and its management. Many of them were similar, and patterns could be found.

2.6 Credibility

Robson said that researchers should ask themselves if there is sufficient detail on the manner in which the evidence is produced to give credibility to the research (1996 op.cit.). In this project, this is down to the quality management of the researcher, and the patience, pride and attention to detail which she had put into the project. The purpose is clearly stated, the literature reviewed and the triangulated methods used are considered to be the best possible to fulfil the purpose. It is also well documented. The findings contribute to knowledge and are manifested in a sound theoretical framework and the generation of hypotheses. Every effort was made to establish credibility.

2.7 Discussion

Exploratory research is not about drawing together samples to 'prove' through generalisation that certain hypotheses are true, it is about gaining a very deep insight into a focused area, to develop new insights which may lead to new hypotheses. Research is a continuum over a long period of time, of exploring new areas, new insights, generating hypotheses, testing hypotheses, building new models and taking new knowledge to explore new areas.

3. Conclusions

This Chapter has shown what data collection techniques can be used, and why the author used them. They were for the primary purpose of research - detail and depth in understanding through a flexible method, but with enough rigour to provide a degree of generalisability.

Validity of any project, whether physical or social science base, can never be said to be 100% reliable and credible. Quantum Theory showed this a century ago, by revealing that even in the realm of physics, where it was assumed that there was always an 'objective' reality separate to the observer/scientist, the results of measurement and experiments depended on who was doing them, and the way in which they chose to 'view' the phenomena (Zukav 1999). The author has made no claim of 100% validity, although she has made an effort *as far as possible* to reduce unreliability. Barry claimed that no theory can be complete in itself:

"This is the way that science makes its advances, moving ad infinitum from one incomplete circle to a larger, but still, incomplete circle, in 'paradigm shifts.'"

(Barry, p. 105).

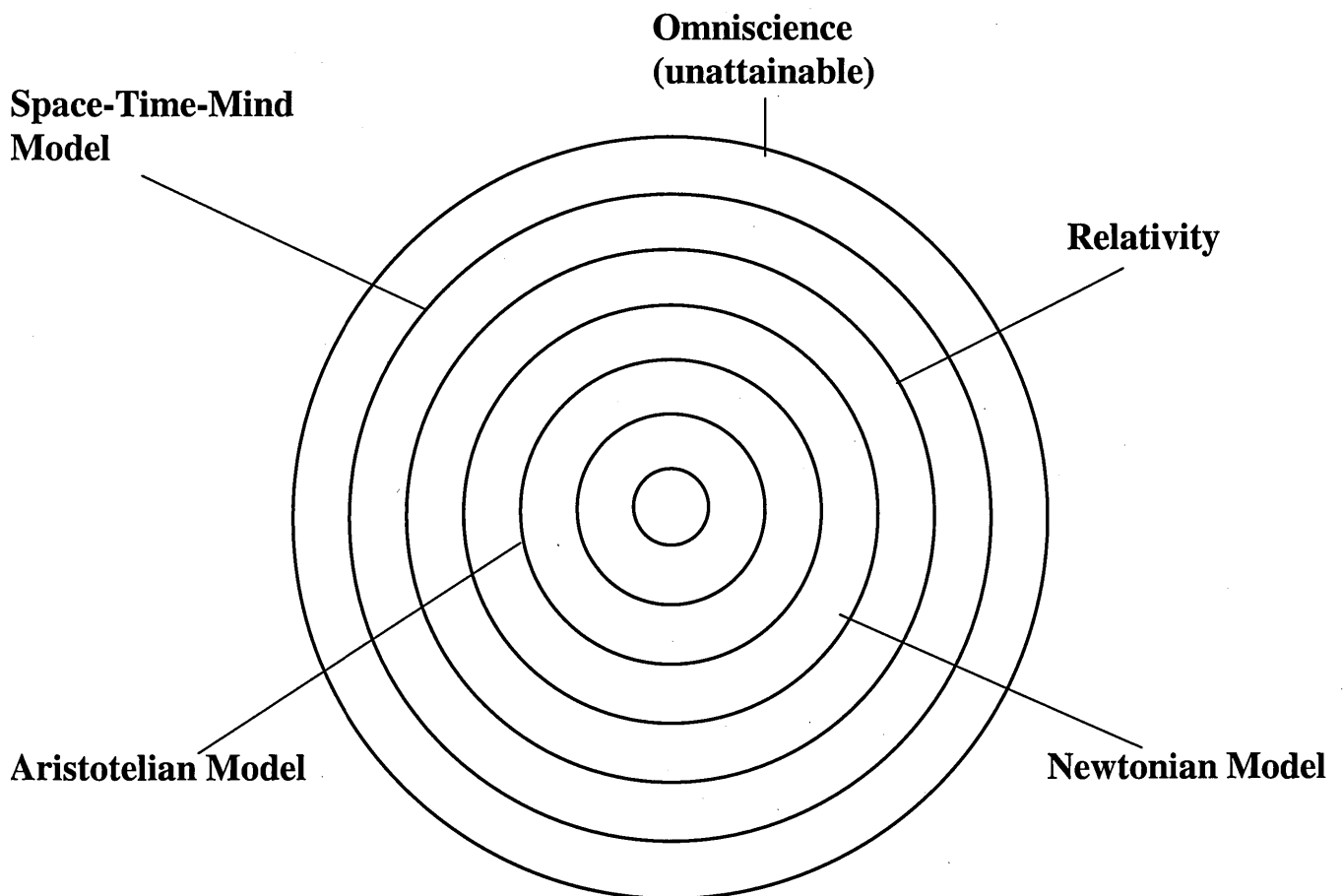


Figure 5.2: The Advancement of Science (Source: Barry, p 105)

The author claims as much validity as is possible in a piece of research which is not scientific, but social. The trustworthiness comes not from the generalisability and applicability to other situations, but from the depth and detail of knowledge gained in an area which was previously hardly understood at all.

Summary of Chapter 5

1. There are a variety of data collection techniques: interviews, observation and document analysis.
2. All have their strengths and weaknesses, but in this case a variety of techniques were used because of the tacit nature of much of the research domain and the need for flexibility.
3. The flexibility of the research methods was gained at the expense of generalisability: the aim was primarily to gain an in-depth understanding of the research domain, as opposed to a few findings which could be generalised to the rest of the SMC population. However, there was enough standardisation through the clearly defined case study companies to also provide some degree of generalisability.
4. This brought with it a need to explain the care the author took in being aware of the issues of the validity of findings, and the multi-methodologies and triangulation provided underlying rigour. The process of carrying out the research was accompanied by an awareness of Total Quality Management.

Chapter 6.

Research Process

1.

- The process of carrying out the data collection shows how both rigour and flexibility were maintained at the same time.
- The methodology was refined and modified throughout the first three case studies, in accordance with the methods of theoretical sampling.

2.

- The nature of information and its management can be gleaned somewhat from the data collection itself, and before the data gathered was properly analysed.
- Information was revealing itself as a dynamic, flowing phenomenon, living in activities, behaviours and processes.

3.

- Information is highly systemic, and has two facets:
 - The interpretation/activity divide
 - The formal/informal divide
- This section showed that the methodology used to answer the research questions should be *qualitative*.

4.

- The research process undertaken in the second and third case studies support to a large extent the findings from the pilot study.

5.

- The rich complexity of information revealed the need for a flexible, yet simple methodology, and it was realised that quantitative measures could not value informal, tacit information.

1. Introduction

The methodology was refined and modified throughout the first three case studies, in accordance with the methods of theoretical sampling. Although not a purely grounded approach, little enough was known on the specific research domain to justify a large amount of flexibility during the data collection. The literature review, methodology and data analysis and presentation were written separately for easier reading, and the literature review was still being built on throughout the research process.

Case sampling has already been defined for the purposes of this research. The types of cases were defined in advance, although it was not known precisely how many would be studied. The people to be studied were defined in advance, although again it was not known how many would be studied in each individual Company. Sampling tended towards theoretical, especially for the exploration of research questions 2, 3 and 4. This is because the first question had already been defined as a result of the literature review and author's previous knowledge. The next three had not been explored or confirmed to the same extent, although insights had been made into them, especially the nature of information.

Material sampling concerns the actual research data itself - where, from whom, how is it collected. Within theoretical sampling it is concerned with interpreting the research data. The interpretation was begun at the same time as the data collection, and the two were interdependent. Throughout the process, the author was highly aware of the constant decisions to be made, as recommended by Flick:

“Sampling decisions are aimed at that material which promises the greatest insights, viewed in the light of the material already used and the knowledge drawn from it.”
(Flick 1998, p 65)

Theoretical sampling through the material is illustrated through the following accounts of the data collection processes in the three case studies.

2. Case Study 1. (Pilot Study)

This section shows the research process in the first case study. It illustrates the author's thoughts and care which went into the research process. The section shows that the nature of information and its management can be gleaned somewhat from the data collection itself, and before the data gathered was properly analysed. The way in which the data collection process constantly had to be modified justifies the qualitative approach taken.

Section 2.1 explains the data collection techniques, 2.2 the first interviews, 2.3 the observation methods, 2.4 the document analysis and 2.5 the next interview design. 2.6 sums up.

2.1 Data Collection Techniques

About ten days were spent in the Company. During this time, three research methods were used to elicit data:

- 12 unstructured, semi-structured and structured interviews with key people in the customer order fulfilment process, three of whom were interviewed twice:
 - MDs (both)
 - Sales Manager
 - Distribution Manager
 - Shopfloor Manager
 - Special Projects Co-ordinator
 - Three shopfloor workers

- Observation, (observer as participant, and participant as observer) including:
 - General observing
 - Asking questions
 - Management meetings
 - Customer order trail
 - Job trails

- Examination of documents, including:
 - Business plan
 - Customer order documentation
 - Computer prints outs
 - Quality manuals
 - Product catalogues and specifications
 - Computer monitors.

2.2 First Interviews

2.2.1 Process

The first group of interviews were structured into four parts, taken from the initial conceptual framework and research questions (Chapter 4, Section 1.2). In addition, a requirements analysis questionnaire helped to structure the initial interviews (CIM Ltd 1996).

The initial research questions were aimed at one of the MDs, who also happened to be the sales director. He was the first interviewee. It was assumed the MD could be relied upon to supply background data on the company (Appendix C).

The next interviews were designed slightly differently, to elicit more detailed information about the customer order fulfilment process, as it was recognised that the MD may not be directly involved in this to the same extent. They were designed more broadly on the initial conceptual framework and the research questions (Appendix C).

This general format was kept for the rest of the interviews, although they were changed slightly along the way, usually with the addition of new questions, and occasionally the retraction or rephrasing of some. For example, 'communication' was used increasingly, in place of 'information'.

These modifications were continuous until the completion of the fifth interview. The sixth was exactly the same as the fifth. (Appendix C).

2.2.2 Analysis of Interview Methods

Although the data collection and analysis are in separate sections, they were, in practice, interdependent, in keeping with qualitative research and theoretical sampling. This, however, was not so much planned from the start, but emergent. They were constantly analysed and modified during the course of the research. Some insight into the nature of information was gained already at this stage:

- *Systemic Nature of Information:* It was difficult to gather a clear picture of the information resources - they were difficult to separate from the interviewees descriptions of order winners, activities and people. Many of them were transient - they appeared to be dependent on everyday activities which were liable to change in an unpredictable environment. Information was revealing itself as a dynamic, flowing phenomenon, living in activities, behaviours and processes.

It was also difficult for the interviewees to answer specific questions regarding 'information'. This is probably because *all* tasks, items etc usually have some degree of information component in them, and it is difficult to separate them from those tasks and people. Again, this was referred to as 'communication'.

- *Thoughts/Activities split in Information:* It was said in Chapter 5, Section 1.3 that it was easier to elicit perceptions and understandings through interviewing alone, rather than the activities and behaviours which took place in the customer order fulfilment process. Activities were realised by the author as important by this stage, as it was clear that information could not be broken down and analysed in small chunks, as Burke and Horton recommend (Chapter 3, Section 3.4.) This is closely related to the systemic nature of information.
- *Informal Nature of Information:* It was also found that it was difficult to explain to the interviewees what an 'information resource' was, or even 'information'. It was easier

to use the word 'communication', and also 'informative' and 'helpful'. This indicated the importance of informal communication to this Company. It seemed more appropriate to talk about 'communication' rather than 'information' when referring to the informal, conversation-based side.

The lack of clarity thus far, especially in the differences between thoughts and actions gave rise to the recognised need for *observation*, and this was explained in Chapter 5, Section 1.3. This demonstrated the awareness the author needed to have when dealing with the interviewees, and the flexibility needed for exploring the research question.

2.3 Observation

2.3.1 Observer as Participant

This observation provided a chance to observe these activities and the people carrying them out at a distance, to gain an overall picture and put information into its context. The first stage of the observation was *observer as participant*, both in the workshop and the sales managers office. It was possible to observe closely the procedures being used in the customer order fulfilment process, and the information being stored, processed and communicated.

The author used the guide in Table 6.1 on which to commence the observer as participant observation:

Dimensions of Descriptive Observation	
1. Space	layout of the physical setting; rooms; outdoor spaces, etc
2. Actors	the names and relevant details of the people involved
3. Activities	the various activities of the actors
4. Objects	physical elements; furniture etc
5. Acts	specific individual actions
6. Events	particular occasions, e.g. meetings
7. Time	the sequence of events
8. Goals	what actors are attempting to accomplish
9. Feelings	emotions in particular contexts

Table 6.1: Dimensions of Descriptive Observation (Source: Robson 1995)

There was opportunity to view the overall Company layout which revealed posters and information on the walls, numbered shelves, bins and parts and a chance to soak up the

general 'atmosphere' of these places. The atmosphere was informal, with much rushing around, ad hoc meetings, chats and phone calls. The MD, administrative and sales staff constantly came down to the workshop, and customers frequently phoned the sales manager for queries, as well as the MD, distribution and production managers. Two meetings were attended - one of the weekly senior management meetings, and one more informal meeting between the sales manager and the production manager, again as observer as participant.

It was 'ad hoc' - the author started trailing an order through 'Goods In', through to the engineers, and this was accompanied by studying the relevant paperwork along the way. The paperwork eventually ended up in the marketing directors' office. It was possible to observe people at work through walking around, and listening to their informal conversations and reactions.

At this stage, the research was objective, although the author's presence was known. However, the author could observe activities, but not understand much about the formal information being logged and processed. The author then decided that a more detailed knowledge had to be gained about formal information.

2.3.2 Participant as Observer

The next stage was *participant as observer*, to gain more detail of the actual information which was being logged and communicated in the context of the customer order fulfilment process. Questions were asked frequently of the staff involved - questions on what they were doing and why, and a close look at both paper-based and computer monitors. The main people involved in this were the special projects manager, who was doing a quality standards audit, the sales manager, production manager and distribution manager, and some workshop staff. Again, this was fairly ad-hoc and emergent, and was mixed up with observer as participant to a certain extent.

Observation is a natural part of the multi-method case study approach.

2.3.3 Analysis of Observation Methods

At first it was not really known *what* to observe, only *why*. The observation confirmed that both observer as participant and participant as observer were useful techniques. Again, some adjustment of the methodology as it went along was necessary and analysis of data was again done during the actual data collection. For example, the participant as observer, and observer as participant observation were not done separately. They tended to be opportunistic, depending on circumstances at the time.

The observation developed as it went along and emerged into four points. Point 4. had already been planned in Chapter 4 as a complement to the case study method. The

emergence of the four points again confirmed the emergent and theoretical sampling nature of the methodology as a whole.

1. *Informal Information Activities:* The author could observe the informal information activities - the ad hoc meetings on the shopfloor, in the corridor and the stream of phone calls from customers to staff and internally between staff. Observation, especially observer as participant, better revealed informal communication and activities more directly in the customer order fulfilment process.
2. *Formal Information Activities:* Through participant as observer the author could examine a combination of company documents and computer monitors and ask further questions on the nature of the tasks the staff members were undertaking, within their context. This made it possible to gain more insight into the *formal* system. This type of observation revealed the *logging* procedures for information more directly.
3. *Culture and Structure:* Observation also allowed the author to get a 'feel' for the organisation. Through this, the organisation *structure* and *culture* could be picked up more, especially the culture, through listening to what people said informally and how they communicated. For example, recorded conversations between functions which revealed their language understanding, and level of understanding of order winners could reveal this. Job design, or lack of it, could be observed through the activities of the staff.
4. *A More Thorough Investigation of the Customer Order Fulfilment Process:* Observation was also able to reveal the activities of the entire organisation, as opposed to simply some of the views of the key people, so in this way it was a more broad, thorough investigation of the Company, and part of the triangulated methods used (See Chapter 5, Section 2.2).

Observation gave an overall picture of the information *activities* and *behaviours*.

2.4 Document Analysis

As many documents as possible were examined, to complement the interviews. This was done to 'back-up' what was said. Computer screens were included in this. Documents exemplified the need for accurate and timely logging of information, which was needed for the order-winners. For example:

- Studying the monitors of computers to gain an insight into the Company database.
- Documents for communication with customers i.e. faxes.
- Amount of paper on the shopfloor - this shows the need for formal information.

Again, this was emergent. The study of documents, or 'content analysis' as Robson calls it formed part of the observation and the larger contextual picture, and provided a direct study of much of the formal information system. It helped to reveal exactly how much 'formal' information was needed, and where these procedures facilitated or impeded the customer order fulfilment process.

2.5 Next Interview Design

2.5.1 Reasons for Next Interview Design

The second round of interviews were done to elicit more on management issues. The *value* that the information has to the customer order fulfilment process relates more to the fourth question on the management issues.

The nature of information had to some extent been explored and confirmed at this stage, and lists of information resources were drawn up (See Chapter 7, Section 3.1). The author chose to conduct a further round of interviews to explore the value this information has to the customer order fulfilment process from the eyes of the people involved. It was believed this would gain more insight into culture, especially the information culture, and any conflict this may have with the power culture. This would back up or contradict the findings from the research already done.

The interviews were extended in the second stage into a valuation exercise which was structured in nature, using quantitative values based on a Likert Scale. The aim was to gain more insight into the specific information and an understanding of their value in the eyes of the people using them. This is known as Attitude Measurement (Robson op.cit.), and the framework was based on Stage 2. of the Burke and Horton methodology (Cited in Chapter 3, Section 3.4).

As well as scoring each of these variables on a scale of one to ten, the interviewees were asked to qualify them by giving more subjective opinion and information. This would make it possible to understand more about the contextual factors giving more meaning to the exercise. It would also allow not only how valuable they perceive information to be, but also shed more light on *why* they perceive them to be so, and this would delve deeper into the management issues. It would also allow a comparison between quantitative and qualitative - this type of triangulation would add to the validity and reliability of the research.

2.5.2 Pre-design and Emergence of Method

Certain variables defined by Burke and Horton were taken out both before and during the process of collecting data (See Table 6.2). The reason for this was because some of them

were repetitive, for example, '*credibility*' and '*reliability*'. Others were simply difficult to understand - for example, it was likely that it would be difficult to discern the difference between 'ease of access' and 'accessibility'. Many of the terms were ambiguous. Obviously, they were not ambiguous to Burke and Horton, but the author had to think in terms of and through the eyes of the interviewees for practicality. As the interviews progressed, this became more evident - most of the interviewees were not particularly well-educated and, as before, were not used to thinking of information in conceptual, tacit terms.

By this stage it had been established that there were different types of information, broadly divided into formal and informal - voice-based, paper-based and electronic based, and all were important (See Chapters 3, 5 and 7). More research was needed on these different aspects and how valuable they were. The interview format was based on the above three categories. However, it was known that 'voice-based' could not really be categorised further at this stage. Electronic based was mostly the large information system, so could not be broken down. The only resources which could be broken down were paper-based.

Next the interviewees were asked to give more subjective opinions on the 'Impact on Organisational Productivity' and finally on 'Organisational Effectiveness' - in this case, improved customer satisfaction. In this way, the 'deeper' more hidden organisational and management dimensions could be explored, all of which were part of the management of information, and these are illustrated in Table 6.2:

<i>Quality of Information Itself: Examples</i>				
Accuracy			Precision	
Comprehensiveness			Relevance	
Credibility			Reliability	
Currency			Simplicity	
Pertinence			Validity	
<i>Utility of Information Holdings: Examples</i>				
Accessibility, intellectual			Format and presentation	
Accessibility, physical			Frequency of use	
Adaptability			Physical stability	
Browsability			Reproducibility	
Ease of access			Selectivity	
Ease of use			Unreproducibility	
Flexibility				
<i>Impact on Organisational Productivity: Examples</i>				
Greater returns for employees and management			Reducing "noise"	
Improvement in decision-making			Reducing uncertainty	
Improvement of product quality			Stimulation	
Improvement of working conditions			Timeliness of actions	
More efficient operations			Time-saving	
Obtaining needed goods and services			Withholding	unneded information
<i>Impact on Organisational Effectiveness: Examples</i>				
Finding new markets			More harmonious relationships	
Improved customer satisfaction			Part of a product	
Meeting goals and objectives			Part of a service	
Meeting responsibilities			Product differentiation	
<i>Impact</i>	<i>of</i>	<i>Financial</i>	<i>Position:</i>	<i>Examples</i>
Cost reduction			Improved profits	
Cost saving			Insurable interest	
Creation of new assets			Lost opportunity cost	
Displacement of more expensive resource inputs			Return on investment (ROI)	
Exploitability of exisiting assets				

Table 6.2: Some Categories and Elements of Value of Information Resource Entities.
(Source: Burke and Horton 1988)

This time three of the same people were interviewed again. The MDs were not interviewed as they tended to have less detailed knowledge of the everyday information activities. The special projects manager had left the Company. Another three staff members were included in the interviews this time, to give a wider range of perspectives. None of them were management, nor considered to be 'key' people in the order-invoice cycle. Altogether, six people were interviewed.

Once again, it was found that the interviews had to be modified along the way, to accommodate any questions which were incomprehensible to the interviewees, or which simply seemed like unnecessary duplication. This resulted in some of the variables being dropped altogether. This time the decisions on modifications were done during the interviews, rather than between. This was not planned, but emergent (Appendix C).

This time, even more moderation was done during the actual process of the interviews, rather than making the decisions in between, prevalent in the first interviews. It became obvious that many of the variables simply could not be used for voice-based information, and this was realised during the interview itself.

Already, there were vast differences between the original plan and the actual first interview. In this interview, many of the variables were answered quantitatively only, without any qualitative replies. The same happened in the second interview (Appendix C).

By interview 6, only 29 of the original variables were used, in total of all categories, out of the 42 in the original interview structure:

- Electronic: 6 from Quality and 5 from Utility
- Paper: 6 from Quality and 5 from Utility
- and
- Voice: 6 from Quality and only 1 from Utility.

2.5.3 Analysis of Interviews

Once again, theoretical sampling is apparent, and the interview techniques and questions were analysed and modified during and after each interview, as before. This method was emergent, as were the others before. The findings this time confirmed the previous findings:

- *Systemic Nature of Information:* On the whole, it was easier for interviewees to give *quantitative* answers in the second round of interviews. The variables were harder to answer *qualitatively* - it seemed difficult for interviewees to separate out variables in their minds, and often would answer a question about one variable in a preceding one. Again, it was harder for either the author or the interviewees to refer to specific resources, though paper was not so difficult.

It was hard to detach information from its context. People found it easier to talk about *activities and behaviours*, rather than individual items of information. Often, they would talk about *people* or *means (voice, paper or electronic)*, but usually in the context of activities. It was easier to report on information activities and events. It was harder to get answers from very specific, focused questions - again it was easier for them to think in terms of events and activities. This revealed the systemic nature once again.

The quantitative valuations were often given on their own, with no back up comments. This tended to happen with a high score, and qualitative valuations were given only when something was perceived as being poor, to explain why. They could pose quantitative values easily when they did not have to think about things in detail - it appeared to be harder when they had to think of individual information resources.

- *Informal and Formal Information:* There was value in separating the formal information from the informal. However, quantitative measures were not useful for valuation of resources which could not be made explicit. This indicates the 'tactiness' of much valuable information - information which is informal. It is harder to measure and this justifies the qualitative approach.
- *Information Culture:* The interviewees often have little comprehension of the variables - frequent questions were "What do you mean?", or "Can you explain that?". This would often lead to the author dropping aspects of the interview questions, or finding another way to ask them.

For example, 'credibility': this variable was often greeted with confusion, and the author had to explain this on every single occasion. It was difficult to explain - "Do you believe what your colleagues say?" This process revealed that there appeared to be little shared understanding of an information culture. It is justifiable to say that these people have little comprehension of the nature of information or its management as an integrated concept, especially the concept of information as informal.

2.6 Discussion

This section has shown that there is a need for a simple and flexible methodology, qualitative rather than quantitative. This type of data collection process was both analysed, modified and developed further as the author went through the process. So far, the process of undertaking data collection in the first case study had begun to reveal more on Research Questions 3 and 4, especially 3.

3. Conclusions About Research Methodology in Pilot Study

This section shows how the answering of the research questions has progressed through the process of the methodology alone. Question 3, the nature of information and the link between information and customer satisfaction is clarified somewhat, through all the data collection methods, where it was found that information was an issue and challenge to these types of companies, albeit not necessarily in the traditional tangible, explicit areas of technology. More was elicited on Question 3, the nature of information in SMCs.

Many insights into the nature of information were gained through the data collection techniques, illustrated especially through the need to modify them constantly. Information is highly systemic. Although elements of information cannot be isolated or quantified, it is possible to point out some major characteristics of the nature of information

- The interpretation/activity divide and
- The formal/informal divide.

In addition, some insight was beginning to be acquired on the fourth research question, the management issues.

The data collection process and techniques revealed much awareness of information issues amongst people, though by no means an explicit awareness. The constant modifications showed the need to delve into the tacit dimensions in an attempt to explore the unconscious assumptions and beliefs of the people.

Section 3.1 explains the importance of information to the customer-focused SMC, 3.2 summarises the nature of information based on the findings from the pilot study. 3.3 discusses the management issues and 3.4 sums up these ideas and plans the next steps in the research process.

3.1 The Link Between Information and Customer-focus

The idea of information as an organisational resource is feasible - information permeates everything in the customer order fulfilment process. In the Company, there is nothing which is not affected by information. Even the parts which are brought in for repair are in themselves a source of information - the sales manager uses them to give her an idea of the quote, engineers assess them to see what is wrong with them and what needs to be done. Information is clearly a valuable resource and should be identified and managed as such to utilise it for competitive advantage, and in the case of this Company, for customer responsiveness. Information integrates activities in the customer order fulfilment process.

3.2 Nature of Information

The process of the methodology and the theoretical sampling showed that much could be gleaned about the nature of the management of information from the methodology alone. Most of the modifications made during the methodology process showed something about the nature of information and its management, through trying to make it understood and transparent to the interviewees, and through trying to understand more about the formal and informal processes.

3.2.1 Systemic Nature

The initial assumption that the information would be difficult to identify and categorise was largely correct. Burke and Horton, for example, try to define them clearly in their approach. In this Company, as the need for observation revealed, information resources are not so defined and measurable - they are somewhat messy and chaotic.

Information appears to be complex, interdependent, systemic and holistic - a combination of people and means. The Burke and Horton methodology, for example, treats the information as 'static', assuming it always resides in the same place, with the same people for the same purposes. It does not view the resources as an *integrated system*, with flows of information as well as holdings.

Information in this company is *systemic* and *holistic*: it continually flows dynamically around the organisation. The need to use the term 'communication', especially in regard to informal, voice based information, and the need to keep the overall data collection flexible, illustrated this. This is why the quantitative valuation did not work well.

People, computers and paper were visible in these activities, as were voice-based communication.

3.2.2 Formal and Informal Information

Information in this SMC is a systemic flow of formal and informal information. Not only individual people, but relationships between them are an important 'hidden' information resource. Data was best gathered through observation. Much of the information important for customer satisfaction in the Company is difficult to capture and identify clearly - it is *spoken*, in the form of the many face to face encounters, telephone calls and impromptu meetings that happen every day. The need for observation illustrated this.

Informal Information

Observer as participant observation revealed the numerous informal information activities and behaviours which could be observed from a distance - the spoken,

voice and telephone based conversations. The recognition of the many formal processes as an integral part of these activities led to participant as observer research and document analysis as an integral part of this.

Staff are often expected to carry out tasks which are not officially part of their job but nonetheless contribute greatly to a customer responsive organisation - i.e. the calls to and from customers that the distribution manager has to make, though he is not formally involved with customers. As the sales manager said, this allows ECS to work as a team.

Formal Information

This aspect was known to some extent from the start, and was affirmed during the research. This is undoubtedly interdependent with the formal system. The initial appearance that SMCs lead with their informal system may not be what it seems. The participant as observer and study of documents especially revealed the extent to which formal information is important in relation to the order-winners. The participant as observer type research was done because of the need to explore the formal system in greater depth, as well as the study of documents. Logging of information on paper and electronically was found to be important in this Company. Cards were passed around, and each stage of the customer order fulfilment process appeared to require formal information of some sort.

3.2.3 Interpretations and Activities

Activities and Behaviours:

The decision to undertake observation also illustrated the interdependence of information - a complex mixture of activities and behaviours and also what people think and understand about them. It is clear that they tend to be dependent on *activities, tasks* and *behaviours* in the everyday customer order fulfilment process. Many of the examples are one-off 'events' or 'activities', especially in the customer order fulfilment process. They are not tangible and permanent, and they cannot be broken down individually and examined. Information appears to be dependent on not so much 'means', that is, computers or paper, but 'activities'. Activities usually include both 'people', and 'means', that is people, speech, paper and ICTs.

Thoughts and Interpretations:

There is also another element to the informal information system. This is the more 'tacit' dimension, the one that deals with people's beliefs, understanding and values - the dimension related to the purpose of information and the company context. Peoples' thoughts, understanding and interpretations of information clearly showed itself to be a factor in information flow and effectiveness. It was easier in some ways to get an idea of this than to see what people actually did in the COFP. This

has already been cited before through the need to do observation as a support method.

3.3 Management Issues

Both the first and second round of interviews delved into the culture, through eliciting people's perceptions of information issues and challenges in the organisation. The second round was more focused in this than the first. The interview technique worked best at eliciting what people think and feel, as described earlier in this chapter, and it became clear that information was a major challenge in the company, though not explicitly recognised as such. This lack of recognition of the management of information as an integrated concept illustrated the fact that information was an issue, though the organisation was perhaps not exactly an information culture.

The observation helped to gain some insight into the power culture, through observing, at some distance, the informal activities and behaviours in the customer order fulfilment process.

3.4 Discussion

3.4.1 Simplicity of Research Process

The pilot study has shown the need to maintain an essentially simple approach, for flexibility. Simple in this sense means a simple design, that is, the conceptual model, and enough open-mindedness from the author to respond to the situation at hand. In this way the complexities and richness of the formal and informal information activities, behaviours and interpretations were unearthed.

The Burke and Horton methodology, for example, is highly complex, and through its complexity, tries to simplify the organisation. It attempts to deconstruct the organisation and thus loses the richness and interest of the dynamic information which abounds in the Company. It cannot be deconstructed in a linear fashion. The variables actually complicate the situation in the minds of many people - it is easier to get data from 'broader' questions and more flexible questions. For example, the second stage is concerned with assessing the value of information resource entities. The author found that much of this was done naturally in the process of identifying the potential information resource entities - when talking about information, the interviewees would naturally mention the quality or characteristics of it in relation to what they did with it.

The quantitative scale has been useful for illustrating the general understanding of the management of information, though as a survey tool for generalising from samples it has little validity, because of the constant modifications throughout the process and lack of standardisation. It was shown that both were important - they both had to be modified and

cogitated. The variables appear to be best used as prompts, to gain more insight into the different types of information, how they are used, and their strengths and weaknesses.

Looking at Case Study 1 in the light of systems theory described in Chapter 3, Sections 2.3 and 3.5, it clearly does not fit into the 'machine' metaphor. The Company operates in an uncertain environment, has a high level of skills and knowledge in its staff, and specialises in 'one-off' repairs, in other words, non-repetitive products. It may be possible to apply Burke and Horton's methodology to a manufacturing organisation which is repetitive, straightforward and stable, and in which information is fairly static. The pilot study has revealed that for this Company there is a strong emphasis on the informal, hidden dimensions of information in addition to the formal.

This section showed that the methodology used to answer the research questions should be *qualitative*, and this was believed previously to the pilot study, and as executed throughout the pilot study. The phenomenon itself is highly systemic, and this was also pointed out in the literature review. Systemic phenomena cannot be broken down, rationalised and measured as discrete quanta. The variables make useful prompts, but not quantitative valuations for generalisability. There was little point to numbers in this exercise. In this case, qualitative methodology is inseparable from systemic phenomena.

3.4.2 Next Steps

The next case studies were to be kept simple in methodology structure. The methodology, data collection techniques and analysis of data are all interdependent and rely on each other for their development and validity. The analysis of the data collection techniques and analysis of the data itself developed the methodology for the next two case studies.

By this stage it was time to start another case study, testing the methodology as it now stood. It was important to get more *specific* examples of problem areas, especially the differences between the formal and informal system.

Each of the stages was to be conducted in a similar manner to the pilot study, with some changes. That is, the second methodology would commence where the first one ended:

1. *Interviews*: Both rounds would be included in one round of interviews. Formal information would be combined into one, rather than separated into electronic and paper-based information. This is because a main finding from the pilot study was that formal may be as important as informal. Also, interviewees sometimes found it difficult to distinguish between electronic and paper-based. 'Print-outs' is an example of this. However, there is not much difference between electronic information and paper-based - paper is easy to computerise. There is a world of difference between voice-based, uncoded information and coded information. This is important for issues of flexibility and traceability.

The interviews would continue where the pilot study interviews left off, in keeping with theoretical sampling, rather than attempting to repeat the original interviews.

2. *Observation*: The two types of participant observation were decided on again, this time with the intention of looking for the four categories uncovered in the pilot study.
3. *Documents*: Again, documents would be used to back up what people were saying, and for a chance to examine the formal information system. It was recognised that computer monitors were a part of this - this indicated further the 'blurring' between paper and electronic information - they are all part of the formal information system.

4. *Next Case Studies and Analyses*

The research process undertaken in the second and third case studies support to a large extent the findings from the pilot study. This section progresses both the certainty that a flexible, simple methodology was needed and also the answering of the research questions through the process of the methodology alone, as in the Pilot Study. Question 3, the link between information and customer satisfaction, is explored in more depth and the findings from the Pilot Study confirmed and developed further. The data collection process, and all the methods used, show that information is also highly important to the customer order fulfilment process in these two companies.

The flexibility of the methodology has revealed the rich types and sources of information. Again, however, the flexible methodology best served Question 3, the nature of information in these Companies, and again pointed out the systemic nature, characterised by:

- The thoughts/behaviours divide
and
- The formal/informal divide.

The findings on Question no.4, the management issues, were also confirmed more through the next two case studies. As in the Pilot Study, the constant modifications showed the need to delve into the tacit dimensions in an attempt to explore the unconscious assumptions and beliefs of the people, that is, to gain some insight into the information culture.

Section 4.1 and 4.2 introduce the next case studies, 4.3 discusses the interviews in both case studies, 4.4 the observation, 4.5 the document analysis and 4.6 sums up the arguments.

4.1 Introduction

The same basic methodology was kept, but it was kept flexible through constant modifications, to gain a better understanding of the formal and informal information especially, and a more specific understanding of the points above. The modifications were slight, and the next case studies tested and progressed the findings from the pilot study, rather than trying to repeat the entire study from scratch. The next two case studies found similarities and some differences too.

4.2 Second and Third Case Studies

4.2.1 Case Study 2

About ten days were spent in the Company, as in Case Study 1. During this time, seven interviews were held with seven key people in the customer-order fulfilment process. They were with the:

- Managing Director (First)
- Company Administrator
- Sales Manager (Also a Director)
- Production Manager
- Quality Manager
- CNC Operator
- Estimating and Planning Manager.

Observation was done, again including:

- Management Meeting
- Shopfloor,
- Manager's offices
- Quality Managers' office.

and Examination of Company Documents including:

- Customer Quality Presentation
- Log Books
- Computer monitors, including Production Planning System.

4.2.2 Third Case Study

Once again, about ten days was spent in the Company, the same length of time as the other two. During this time, five interviews were held with five key people in the order-invoice cycle. The data collection took the form of:

Interviews, including:

MD
Quality Manager
General Manager
Pattern Shop Foreman
Foundry Foreman

Observation, again including:

Management Meeting
Shopfloor, in sections including:
Foundry
Pattern Shop
Machine Shop
Front Offices, with CAD and
MD, Secretaries
Quality Manager's office

Examination of Company Documents including:

Log Books
Quality Records
Route Cards
Customer Invoices
Health and Safety documents
CAD designs

4.3 Interviews

4.3.1 Introduction

In this instance, it was decided not to do two separate interviews, as in the first case study, but to take the important points and combine them into one interview. This was because many of the variables had been dropped because of their ambiguity or irrelevance, and the need to use them as prompts only, and by this stage the author had a clearer idea of what she was looking for, due to the development of the theoretical framework, explained in the next chapter.

These interviews were similar to the first round of interviews in the Pilot Study, but with more emphasis on the value of the information resources, using the most important of the variables from the second round of interviews in the pilot study. Emphasis was given to the differences between the formal and informal system, distinctions being made through examples throughout.

In this structure, it was decided to incorporate the formal information - the paper and electronic means - in one section. This was because in these particular SMCs, the

important characteristics of information appeared to be the difference between the formal and informal system, or the conflict between flexibility and traceability.

An interview structure was designed, taking the lessons from the pilot study, to elicit the following:

- 1) Context of company, policy to customers, order winners, culture and structure.
- 2) Formal information resources - *everyday* procedures in the customer order fulfilment process, electronic and paper means.
- 3) People and informal information.

The reason for this order was because it provided a more visible, tangible way for the staff to perceive information. Someone who is not used to seeing information in everything tends to see people as being separate from formal information, that is, computers and paper.

By this time the methodology was established as primarily interviews, to elicit:

- i) Context, order winners and perceptions of them and culture, structure and policy to customers
and
- ii) Information itself, formal and informal. The observation and documents were *supporting* methods.

4.3.2 Case Study 2

Once again, the MD was interviewed first to gain support and detailed information on the Company background. The same interview structure was used for the other six staff members, and included were the selected variables to gain a better understanding of the value, although it was modified as before.

Interview 1 was based on the following format, except that the MD was more prepared to answer the qualitative questions, and not the quantitative variables, so none of the variables were asked as in the pilot study (Appendix C).

As in the pilot study, the other interviews were started at Question 5, threats and opportunities, as the first four questions were more strategic in nature. Again, certain variables and questions were taken out, because they were inappropriate. The three above did not seem to pertain to informal, conversation-based information. It is interesting to note that the only question answered regularly with both qualitative and quantitative data is physical stability. This was easy to answer, as the system often crashes.

4.3.3 Case study 3.

This time 'credibility' was removed altogether and 'format and presentation' was removed also in the third section (Appendix C).

The MD was an elaborate talker - this shows how important flexibility is. Much useful data was gleaned from this interview. Small changes were continuous throughout the next case study interviews, although not to the same extent as before, as so much moderation and insight was gained from the pilot study (Appendix C).

4.3.4 Analysis of Interview Methods for Second and Third Case Studies

Once again, the methodology itself was analysed and modified throughout the interviews in both processes, though not quite to the same extent as in the pilot study. This time it was slightly easier to get what was required from the interviews, and although some modifications were made, the extent of them was less. With the formal and informal resources separated, it became easier to elicit them. This also made it easier to explain what was meant by the term 'information', as the descriptions in the interview show.

Once again, the interviews revealed:

- *The importance of information to the customer-focused small manufacturing company:* By the end of the pilot study, the author realised that Research Question 3, the link between information and customer satisfaction could be explained to a certain extent. Again, information in all its forms came out through the data collection process, and clearly is a major management and organisational challenge in the same way as the pilot study, though the second company was slightly simpler, both in processes and technologies, with fewer customers than the other two.
- *Systemic nature of information:* Again, information was highly systemic as in the pilot study - a systemic combination of:
 - *Thoughts/Activities:* It was slightly easier to get a clear picture of what people actually do in terms of the activities carried out on a daily basis in the customer order fulfilment process, as well as the information themselves. This, however, was probably because of the refining of the data collection process.
 - *Formal/Informal Information:* The division of the means into formal and informal information for the purposes of Case Study 2 and 3 illustrated the importance of the distinction. It was difficult to explain 'information' to interviewees - 'communication' was easier. It was difficult to answer specific questions on 'information'. Again, this showed the need for observation.

Again, the variables were often difficult to quantify, especially voice, though on the whole the score was high. There was little validity in the quantitative approach and the variables were best used as prompts. The subject, especially the 'informal' aspects, were easier to explore through 'qualitative' answers, again revealing both the systemic nature and the highly informal nature of much of the information.

This could indicate again that the more structured the methodology, the less flexible it became, thus interviewees could not really say what they thought about different things and felt confined by the structured variables. The quantitative variables show that more flexibility is needed.

Once again, it was not really possible to put a quantitative value on any of the potential information resources individually. It was impossible to put them in order of value - it depends on the context and combination of resources - the mix of people and means, communication and storage, formal and informal and all within the overall organisational context - policy to customers, culture and structure.

Sometimes it is difficult for the interviewees to separate all these things in a rational way. It was easier to separate formal and informal resources, as the methodology demonstrates, although this often pertained to information activities, as opposed to distinct resources.

■ *Management Issues:*

The interviews in each of the case studies delved into the culture, through eliciting people's perceptions of information issues and challenges in the organisation. The interview technique worked best at eliciting what people think and feel, as described earlier in this chapter, and it became clear that information was a major challenge in these companies, though not explicitly recognised as such. This lack of recognition of the management of information as an integrated concept illustrated the fact that information was an issue, though the organisation was perhaps not exactly an information culture.

The observation helped to gain some insight into the power culture, through observing, at some distance, the informal activities and behaviours in the customer order fulfilment process.

4.4 Observation

4.4.1 Case Study 2

The observation was begun, as before, as observer as participant, unstructured, and followed leads from the interviewees. The observation was done mostly on the shopfloor. In this case, there were various offices leading off from the shopfloor which were used by the managers, that is, the quality manager, the production manager and estimating and planning manager. This made the chance to undertake different types of observation and document analysis easier to do, and to examine more closely and efficiently the processes and activities in the customer order fulfilment process. Again, Robson's guide on 'Dimensions of Descriptive Observation' helped to define the space, actors, activities, objects, acts, events, time, goals and feelings (Table 5.1). The author tried as far as possible to trail a customer order, both through the activities and actual paperwork, and people could be observed at work in their everyday context. Once again, the author's presence was known and it was known from the start that more needed to be understood on the formal information being logged and processed. Once again, there was no particular structure to this part of the observation. The aim was to simply stand back and observe the information activities, bearing in mind the nine dimensions used previously. This was easy to do and needed little preparation. In addition, a management meeting was attended.

In the process of carrying out participant as observer research the author once again asked frequent questions of the staff involved. In the case of this Company, logging procedures for BS EN ISO 9002 and other tasks were less complex and sophisticated, and therefore less sophisticated information systems were used. Much of the formal information was paper-based, and there was much of it. (Appendix C).

4.4.2 Analysis of Methodology

The analysis of the methodology again revealed similar findings to the pilot study:

- 1) *Informal Information Activities*: The observer as participant observation allowed the author to pick up the importance of the informal system. Again, this involved spending time on the shopfloor and in the side offices of the key staff, observing them at work. This revealed a very similar scenario as the Pilot Study. There was much apparently hectic rushing around, especially the key staff attending to problems on the shopfloor, and phones would ring. There were ad hoc conversations and meetings. The shopfloor staff were free to wander in and out of the offices of the production manager, the quality manager and the planning and estimating manager with queries. Small groups of people would chat about the product/process around workbenches and machinery. There was much movement and informal contact happening.

- 2) *Formal Information Activities:* The vast amounts of forms on the shopfloor, including logs of jobs completed and their details, quality manuals which are constantly updated, computerised production planning system, and job and route cards illustrate once again that the logging of information is vital to the customer order fulfilment process in this Company. This is best done through participant as observer observation.
- 3) *Organisational Culture and Structure:* Most of the perceptions of order winners in the second case study were derived from the interviews. The shared understanding of language was better able to be observed through the meetings - both pre-arranged management meetings and ad hoc conversations. Through this, the organisation culture again could be picked up more, especially the culture, through listening to what people said informally and how they communicated. For example, recorded conversations between functions revealed their language understanding, and the study of staff's jobs and tasks revealed their activities and behaviours.
- 4) *More Thorough Investigation of the Customer Order Fulfilment Process:* The activities of all the staff members who are active in the COFP, as opposed to simply a few key members who were interviewed (in this case seven) could be studied. In this way it was a more thorough investigation of the Company again.

4.4.3 Case Study 3

In Case Study 3, again, time was set aside for participant as observer type activities. This involved spending time on the shopfloor which was split roughly into five sections - pattern shop, foundry, machining, CAD system and also the front office. This Company was slightly more technically sophisticated than Case Study 2, with a CAD system attached to CNC machines, although all of the formal system on the shopfloor including the quality manager's office. In the case of the third case study, the majority of forms and documents were in the quality manager's office and the front offices. The computer monitors were all in the front office. The Company was perhaps not as spread-out as in the first two as it was more concentrated, but still important in terms of the formal information system. Anyway, they still had formal procedures logged on route cards.

4.4.4 Analysis of Methodology

- *Informal Information Activities:* Once again, this revealed a very similar scenario as the other two case studies, with a few differences. There was some rushing around, especially the shopfloor staff attending to problems on the shopfloor, and phones would ring in the front office. There were ad hoc conversations and meetings. The shopfloor staff were free to wander in and out of the offices of the quality manager and the front office with queries. Small groups of people would chat about the product/process

around workbenches and machinery, as before, and this illustrated the importance of the informal information.

- *Formal Information Activities:* Again, the need to do participant as observer observation revealed itself as an appropriate method to gain insight into the formal information activities. Once again, they appeared to be important.
- *Organisational Culture and Structure:* Some basic insight was gained once again into the culture, especially through the observer as participant observation which revealed the functional divisions in the organisation.
- *More Thorough Investigation of the Customer Order Fulfilment Process:* Again, as in the other two case studies, only some of the people were interviewed (in this case five) and the observation gave the chance to study the COFP in more depth through a wider range of people.

4.5 Documents

In both case studies, they were good for showing the importance of formal information to the COFP, and provided both back-up to the other data collection methods and a data collection method in its own right, for the study of the formal system. It helped to reveal once again how much formal information was used in the Company, and where these processes facilitated or impeded the customer order fulfilment process.

4.6 Discussion

As in the pilot study, it was found that information issues and challenges were numerous, although the management of information was not recognised as an integrated concept. In the second and third case studies, as in the first, the nature of the methodology was highly dependent on the nature of the information uncovered through the methodology.

5. Conclusions

Case Studies 2 and 3 showed that, like the pilot study, the methodology needed to be flexible - the exploratory nature and tacitness required this, rather than a run of quantitative valuations which could be compared and generalised from. The rich complexity of information revealed the need for a flexible, yet simple methodology, and it was realised that quantitative measures could not value informal, tacit information.

This section summarises the findings from the process of carrying out the data collection. It focuses on and summarises the systemic nature of information in particular.

Results have been found through the process of carrying out the research which are similar to the conclusions about information found at the end of the literature review. This involved mainly the nature of information, though involved to some extent research questions 2 and 4 as well. They are:

- The link between information and customer-focus in these three SMCs: Information is crucial to these companies in all its forms, and it may integrate activities in the customer order fulfilment process.
- The nature of information: Information is a systemic combination of
 - Interpretations and activities
 - Formal and informal information.

These can be summed up in the following diagrams. Figure 6.1 shows the systemic nature of information activities and behaviours, putting the Flood and Jackson illustration first shown in Chapter 3, Section 3.5. in the context of information in customer-focused SMCs.

Information Activities and Behaviours

People (elements) e.g. people in order-invoice cycle (interpret information)

Means (relationships) e.g.
Informal: voice
Formal: paper
 electronic
 (communicate and record information)

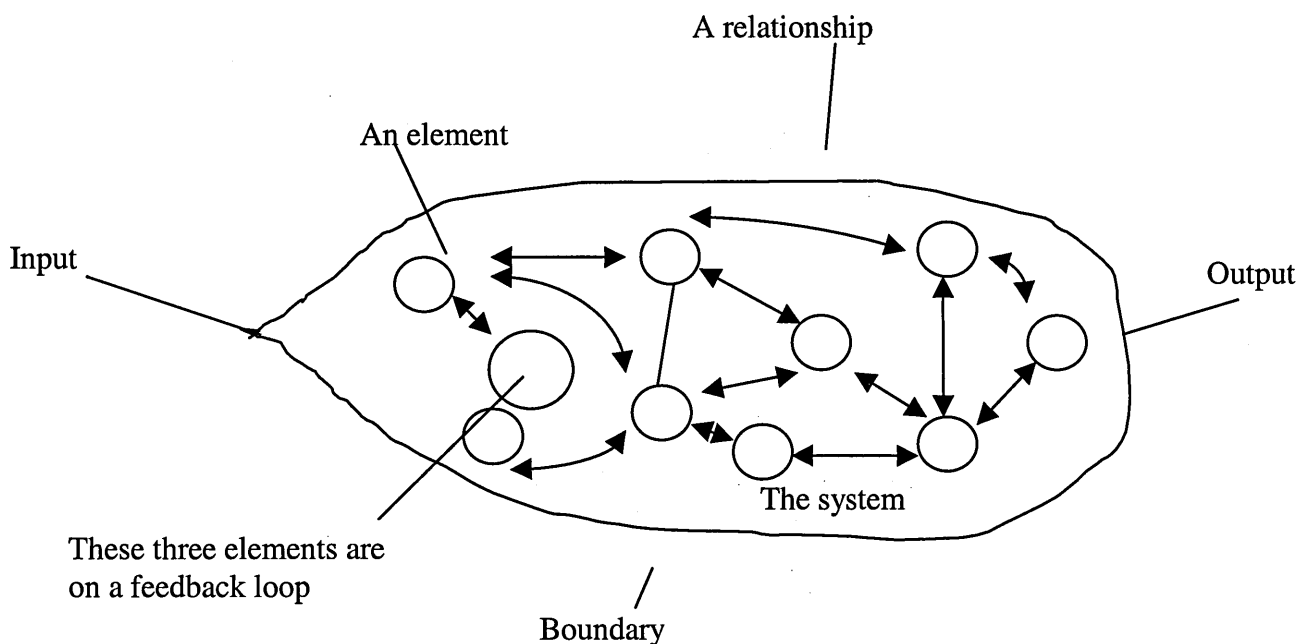


Figure 6.1: The Systemic Nature of Information - Adapted from 'A General Concept of System' from Flood and Jackson 1990

Figure 6.1 depicts the formal and informal information systems, and shows how informal information can be split into two types: understanding and interpretation, and the means of information transfer and communication, in this case, voice.

Figure 6.2, developed from the Knowledge Hierarchy of Chapter 3, Section 1.2 shows how the two types of information can facilitate or impede information processes and activities in the customer order fulfilment process. It also reveals more on the nature of information. The formal and informal information systems do not necessarily have boundaries - there is much in between, and this was referred to in Chapter 3, Section 3.7.

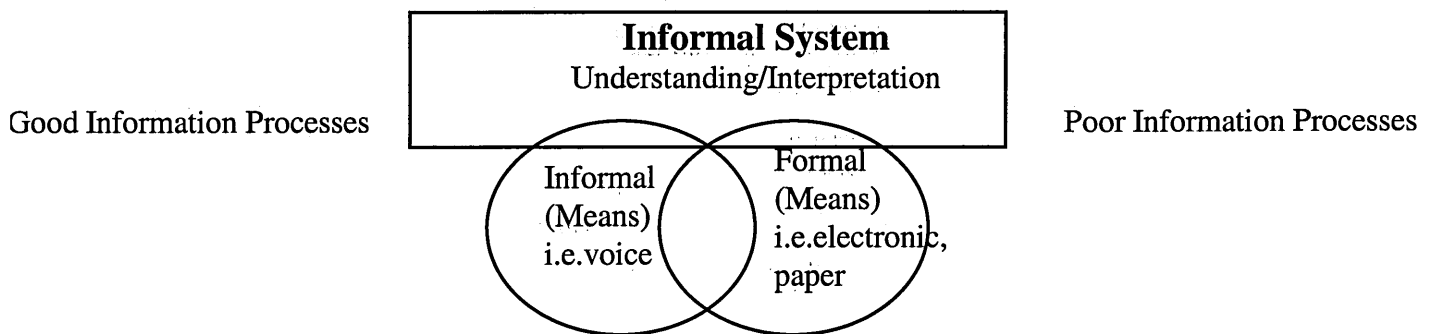


Figure 6.2: The Formal and Informal Information System

Understanding and interpretation is directly related to the informal and formal means, and management issues. Chapter 7 and 8 build on this.

- **Management issues:** The power culture is apparent, through the informal activities and behaviours concerning information transfer and communication. However, there appeared to be little indication that information and its management was recognised as a concept in these Companies, and this was drawn from and is related to the top layer above - the informal information system.

Chapters 2 and 3 recognised the importance information has to the customer-focused SMC in a knowledge-intensive economy. This chapter has recognised the rich complexity of information in these companies, through the need to constantly review and modify the data collection techniques.

Chapter 3 also identified to some extent the nature of information in small companies, and this chapter has confirmed what was discovered through the literature review. Chapter 3 also recognised the fact that in small manufacturing companies an 'information culture' could facilitate the leveraging of the management of information, and this chapter also found that culture may be an issue, through the observation of the informal activities and behaviours, and the fact that no-one interviewed appeared to be aware of information and its management in any integrated concept.

This Chapter illustrated the systemic nature of information. Formal and informal information combine together through activities which make up the customer order fulfilment process. The two following case studies have again shown the systemic nature, that is, the flow, means, people and holistic nature, and the split between what people do and what they believe.

This nature of information then meant the methodology had to be flexible i.e. qualitative. A high level of structure inhibits people and doesn't give much 'rich' information. This satisfied the exploratory/confirmatory nature of the research. The methodology developed

was flexible enough to adjust to different people and go along with their level of education, understanding etc, but structured enough to be able to explore what was wanted, and maintain a degree of control.

This thesis so far has continuously borne the research questions in mind, and worked the process of carrying out the research around them. Each stage of the research has moved the research questions on a stage further.

The next phase of the research was designed to analyse the findings from the data collection itself, that is, the answers to the interview questions, the narrative gained from the observation and further knowledge from the document study.

Summary of Chapter 6

This Chapter has covered the following areas:

- Through clearly laying out the process of the data collection, the author showed how there was a need for a flexible, qualitative and simple methodology which did not impose too much rigidity on the subjects. This enabled a deep exploration of the research questions.
- Rigour was achieved through the multi-methodology approach, and the author bore in mind the need to be aware of quality management throughout the process of theoretical sampling.
- The development of the methodology has revealed
 - more on the link between information and customer satisfaction - it has pointed out that information lives in every activity in the customer order fulfilment process
 - important aspects of the nature of information:
 - the formal/informal divide (This was known to some extent from the literature, and was confirmed through the methodology)
 - the interpretations/activities divide - this refers to the fact that information resources can be utilised into people and means, and the two are interdependent
 - the systemic nature of information - i. The information activities are a complex mix of people and means of communication, that information flows as well as being stored, and the system is open and reliant on this flow of information and that ii) There are also a multitude of beliefs and perceptions which affect the way in which information is utilised and understood.
 - more on the management issues, especially the 'power' and 'information' cultures. The apparent informal information revealed the existence of the power culture while the attitudes of the staff revealed the apparent lack of recognition of an information culture.

PART 3

THEORY DEVELOPMENT AND CONCLUSIONS

This part analyses the research findings, developing them into theoretical models and generating hypotheses.

Chapter 7 analyses the findings from Case Study 1, and shows how the research questions are answered. This Chapter describes the findings from the first case study, continuing on from the methodology, and to use the relevant data to further develop the theoretical framework, based on the research questions. The author identifies the nature of customer satisfaction, the nature of information and the management issues which facilitate or impede information behaviour for customer satisfaction within the customer order fulfilment process.

Chapter 8 describes and analyses the findings from the second and third case studies and, once again, to use the relevant data to develop further the theoretical model. The author further identifies the nature of customer satisfaction, the nature of information and the management issues which facilitate or impede information behaviour, building on and testing the findings from the Pilot Study. The initial theoretical model built in Chapter 7 was used as a basis for testing and identifying order winners, information and its management in the next two case studies. The results are described in this Chapter.

Chapter 9 summarises the findings from the research programme. The author refers back to the initial research objectives, deliverables and contribution to knowledge and explains how they have been achieved, going over each of the four major research questions in turn. She outlines how they have been explored and summarises the generation of hypotheses. The next section then looks at the value this research has to both academia and industry, and focuses on further research which can be generated..

Chapter 7.

Pilot Study - Data Analysis and Theory Building

1.

- The initial analysis in Chapter 6 was determined from the process of the methodology itself, that is, the data collection techniques, rather than the actual research data collected.
- This Chapter describes the findings from the material gathered in the pilot study.

2.

- Seven order winners are identified in this section, and this not only explores research question 2 on customer satisfaction, but also number 3, the link with information
- The order winners show that flexibility is the overall order winner.

3.

- Research question No. 3, the nature of information in customer-focused SMCs and the link with customer satisfaction, is further explored in this section.
- Information is systemic, but can be broadly categorised into:
 - activities/interpretations and
 - formal/informal information
- At this stage, the author decided that interpretations belonged in the fourth research question - the management issues, as interpretations concern cultural issues.
- This section shows that *behaviour* is the main driving force behind information. It also shows the link between information and customer satisfaction through the fact that activities and behaviours are about communication and storage of information, and that communication provides flexibility and storage provides traceability.
- It suggests that traceability, provided through formal information, may be as important to customer satisfaction as flexibility in integrating activities in the customer order fulfilment process.

4.

- Informal, voice-based information is what has provided flexibility to customers in the past - the ability to respond at short notice in an informal manner. However, there is an increasing need to maintain traceability in the form of formal, codified information - paper-based and electronic.
- This section also shows the conflict between the customer demands, the MD policy to customers, the structure, power culture and the effect this has on the ability of the Company to develop an information culture.

5.

- The outcome of the analysis of Company structure was the realisation that the study of the Company as a power culture could have more to offer, but this was in conflict with the customer demands, the MD policy and the ability of the Company to be an information culture.

1. Case Study 1.

The initial analysis in Chapter 6 was determined from the process of the methodology itself, that is, the data collection techniques, rather than the actual research data collected. This Chapter describes the findings from the material gathered in the pilot study.

This section introduces the background to the first case study.

This Company has 30 employees. They repair and refurbish electronic and electromechanical components for the computer, robotic and machine tools industries. The Company started out as a partnership in a garden shed in 1989, and has since grown rapidly to become a limited company, occupying a 7200 square foot facility, with a turnover of about £1.5 million.

The Company, by the very nature of being a SMC, has less layers of management than a larger company. In this case, it has two layers of management: MDs (2), functional managers (3), and shopfloor staff. This makes it naturally more flexible. The Company has a customer base of over 100, and has retained many of its important customers for 10 years. It is BS EN ISO 9002 registered.

2. Customer Satisfaction

Seven order winners are identified in this section, and this explores further Research Question 2, on customer satisfaction. These order winners are at the heart of the customer order fulfilment process, and the ways in which information behaviour and its management can facilitate or impede the way in which they are carried out is shown in this Chapter. The order winners show that flexibility is the overall order winner.

Section 2.1 identifies the order winners, and 2.2 develops a theoretical model based on the findings.

2.1. Order Winners

The customer demands on the Company were represented as order winners, the idea based on the 'order winners' from Hill (1994, op.cit.) (Chapter 2, Section 4.4). They were defined as those factors which keep the Customers coming back. It can be seen that they do not simply refer to a product itself, but to the overall 'offering' as explained by Christopher and MacDonald in Chapter 2, Section 2.2.

In Case Study 1 the order winners were identified, before the nature of information could be identified. There were seven identified altogether. They were:

- High quality of repair and service
 - Informal, personal contact
 - Information and feedback service to customers
 - Delivery speed
 - Price
 - Never turning down an order
- and
- Customisation of orders.

These order winners are in no particular order. They were elicited through the combined research methodologies. The majority were identified through the interviews, some from the question on order winners, but they were also elicited indirectly from the other interview questions. For example, informal, personal contact with customers was elicited from the interviews, but was also elicited from the observation. (Appendix D). Also, some of the perceptions of order winners were shared by all the interviewees, or nearly all of them, and others were barely perceived as order winners at all. This is explained in more detail in Sections 4.2 and 4.3.

There were six interviewees altogether in the first set of interviews. (Appendix D).

2.2 Discussion - Flexibility

All of the above were positively identified by the author as order-winners, most of them coming from what people had said during the interviews, though not necessarily from the direct question on order winners. Even the one only identified twice as an order winner (6) was included because one of the quotes came from the MD himself.

By this stage it was possible to build a tentative theoretical model for this particular Company, beginning with these seven order winners. Figure 7.1 illustrates this:

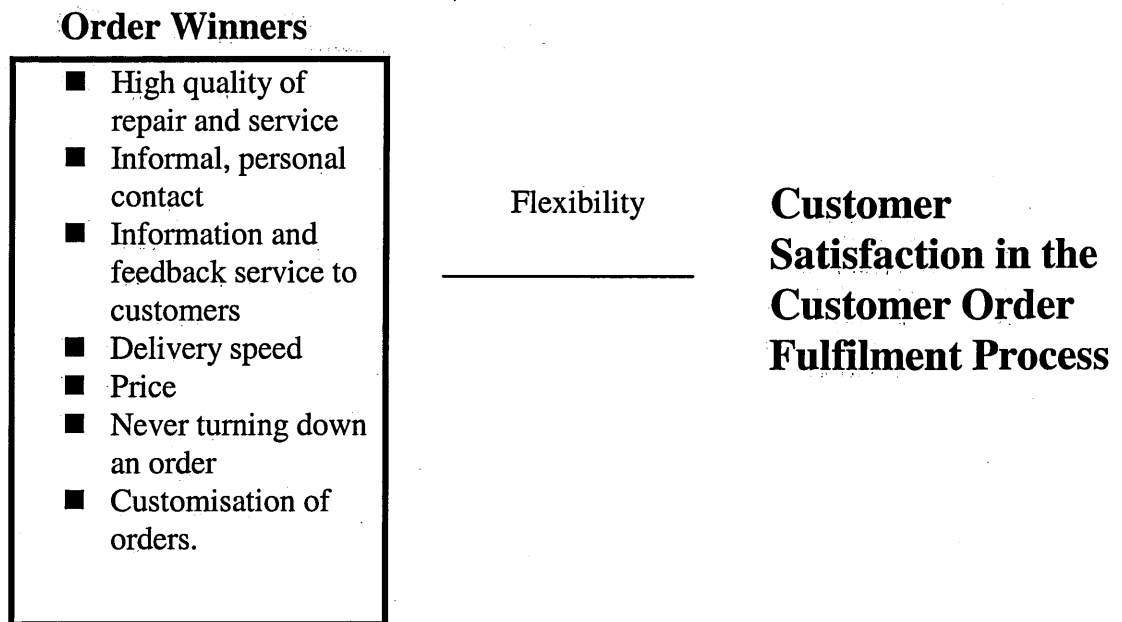


Figure 7.1: Customer Satisfaction in Case Study 1

The overriding aspect of these order winners is the fact that they provide flexibility towards customers.

3. *Nature of Information and the Link with Customer Satisfaction*

Research Question 3, the nature of information in customer-focused SMCs and the link with customer satisfaction, is further explored in this section, and the findings from both Chapters 3 and 6 are confirmed and developed further.

Information is systemic, but can be broadly categorised into:

- Activities/interpretations
- and
- Formal/informal information

Section 3.1 lists information resources in the first case study, 3.2 identifies types of information, that is, formal and informal, and 3.3 identifies information activities. At this stage, the author decided that interpretations belonged in the fourth research question - the management issues, as interpretations concern cultural issues. 3.4 develops the theoretical model.

This section shows that *behaviour* is the main driving force behind information. It also shows the link between information and customer satisfaction through the fact that activities and behaviours are about communication and storage of information, and that communication provides flexibility and storage provides traceability. It suggests that traceability, provided through formal information, may be as important to customer satisfaction as flexibility in integrating activities in the customer order fulfilment process.

3.1 Introduction

The purpose of this section was to identify the nature of information, and to answer Research Question 3, on the nature of information and the link with customer satisfaction. The nature of this information has already been identified in a general sense in Chapter 6, and it was shown to be systemic, with certain characteristics. This section develops these ideas further, using material gathered from the data collection.

The nature of the information was identified during the process of the interviews, observation and study of documents, and a list was built which helped to form the basis for the second round of interviews:

Electronic information i.e. Computer system, photocopier, phone, email.
Paper-based i.e. Job cards, BSI procedures, specifications, evaluations, customer orders, print outs, warranty cards, accept/reject forms, spares lists, quality manuals, numbers on computers, purchase orders, faxes, letters, catalogues, repair cards, client contracts, product manuals, invoices.
Voice i.e. Face to face conversation, especially with staff in customer-satisfaction cycle i.e. Sales and Engineers, spares meetings, phone calls from customers and shopfloor, distribution manager and customers.

Electronic and paper-based information is formal as it is 'in form', that is, codified. Voice-based is informal as it is not explicit or tangible to the same extent. Although it was possible for the author to separate all the different types of information to an extent, the systemic nature of information can be clearly seen through the next two sections.

3.2 Types of Information

3.2.1 Informal Information

There are two dimensions to the information system - people and informal information transfer. People are perhaps the true information resources, and are at the heart of the informal information system. It is difficult to separate people from information. They not only use, handle and manage it, they also create it, interpret it and use the information for different purposes (See Figures 6.1, 6.2 in Chapter 6, Section 5). For example, a technical evaluation is information on how to proceed for the shopfloor manager, but for the sales manager it forms the basis of a quote. This information, although written down on paper, often needs further negotiation and changes during the life cycle of the customer order (Appendix D).

People are at the heart of the management of information, and the way in which both formal and informal information is managed - their behaviour is what decides how information is managed.

Informal information transfer plays a pivotal role in the company, especially in regard to immediate customer satisfaction. It appears to provide flexibility in the customer order fulfilment process.

3.2.2 Formal Information

In this Company, formal information appears to be highly important to traceability, the recording of information. It takes a variety of forms, paper-based and electronic. For example, the job cards get passed around all the sections on the shopfloor, as well as the sales manager, and each person negotiates and adds their bit. The integrated information system is used for the logging of customer and product information, as well as BS EN ISO 9000 procedures.

This appears to reveal less reliance on memory than was perhaps once used, and a greater need for traceability (Appendix D).

3.3 Information Activities

3.3.1 Interpretations/Activities Split

Interpretations are very firmly rooted in people's minds, and they are also part of the informal system. Interpretations are also at the root of the information culture - how people understand customer satisfaction, language and the management of information in this Company. For these reasons, they are explored in more depth in Section 4 of this Chapter, the management issues.

The information activities are the combination of processes and behaviours which form the customer-order fulfilment process, or the transactional elements of the Christopher and MacDonald model. These are responsible for providing customer satisfaction in the form of the order winners.

3.3.2 Transaction elements

Information activities have two components - *communication* and *storage*:

Information Communication: Information is not only stored and processed, it is also *communicated*. Examples are: informal voice-based communication which is prevalent in the Company, the passing around of job cards, which are read and data added to by people directly involved in the COFP, and the fact that the integrated

information system can be read and accessed by a number of people from anywhere in the organisation. (Appendix D).

This is related to the argument in Chapter 3, Section 1.2 - information is not the same as knowledge, nor the same as technology. Information is the process of communication which is an interdependent and integral part of the overall process of knowledge creation and sharing. (Appendix D).

Information Recording: There is an increasing need for the formal storage of information, that is, formal logging in electronic form or hard copy. Information is not only communicated, it must also be recorded. Information can also be stored in people's heads, in the form of *knowledge* or *memory*. There is some evidence that the tradition of relying on memory in this Company is slowly becoming a hindrance, and perhaps this is to do with the fact that the need for formal logging is becoming more important, especially in regard to BS EN ISO standards and general customer records and procedures in the face of a complex environment. (Appendix D).

3.4 Discussion

The conceptual model can be further built to illustrate the nature of information in this Company, and is illustrated in Figure 7.2.

The nature of information was found to be a systemic combination of formal and informal information, with blurred boundaries between the two types, and information activities and behaviours which are based on communication and storage of information. Communication and storage provide flexibility and traceability.

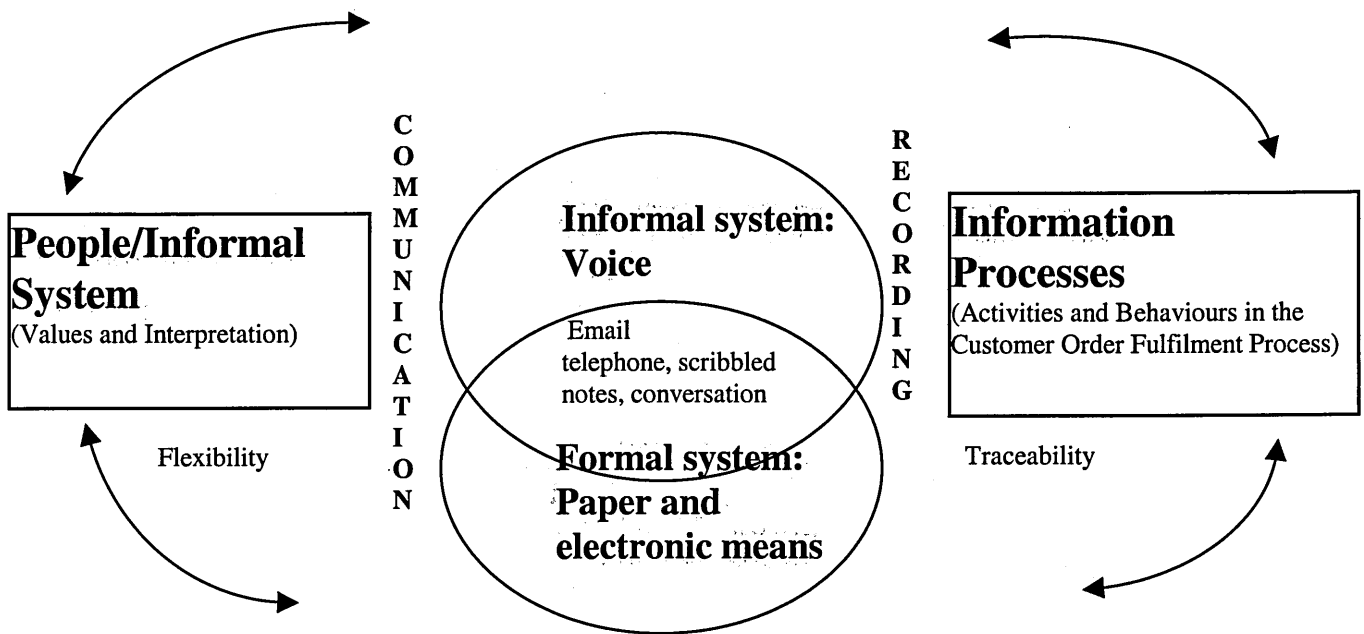


Figure 7.2: Nature of Information in Case Study 1

The nature of information can be broadly split into formal and informal which together make up the activities and behaviours in the customer order fulfilment process. However, the divide is thin - telephone conversation has the quality of both informal and formal, as it is an ad-hoc, conversation based form of communication, and also uses an electronic means. The same can be said for email - often the style used is conversational, and it can often take the place of phone or face-to-face conversation. Scribbled notes can be a 'rougher' form of email. This confirms the findings from Chapter 3, Section 3.7, and Chapter 6, Section 3.4.

4. Management Issues

This section provides an analysis of the management issues surrounding information in this particular Company. It shows what facilitates or impedes information for customer satisfaction, and shows that communication and storage are important in providing *flexibility* and *traceability*. Informal, voice-based information is what has provided flexibility to customers in the past - the ability to respond at short notice in an informal manner. However, there is an increasing need to maintain traceability in the form of formal, codified information - paper-based and electronic.

This section also shows the conflict between the customer demands, the MD policy to customers, the structure, power culture and the effect this has on the ability of the Company to develop an information culture.

Section 4.1 introduces the pre-transaction elements, which the management issues are based on. 4.2 shows how they facilitate information and 4.3 shows how they impede, with examples. 4.4 develops the theoretical model further.

4.1 Introduction

This Company has many factors which facilitate information activities and behaviour for customer satisfaction, and they are explained in this section. The author also found information activities which did not run so well, and behaviours which were not so conducive to the satisfaction of order winners.

Some problems were:

- Occasional poor information flow between senior management, sales staff and shopfloor. Important messages relating to customer orders were sometimes delayed, wrong or were not passed on at all. This was possibly exacerbated because the sales manager was offsite much of the time with customers. Although staff were encouraged to assume accountability to deal with situations, sometimes they were hesitant and therefore information flow suffered.
- Formal logging of information was sometimes careless.
- There was too much paper on the shopfloor - this sometimes led to confusion and untidiness.

Chapter 2, Section 4.4 explained that although the customer order fulfilment process was the focus of the research, it could not be taken in isolation from other factors, such as the management issues. This is similar to the transactional elements and the pre-transactional elements of Christopher and McDonald (Chapter 2, Section 4.4). The author has explained in the last section the nature of formal and informal information in the activities in the transactional elements, or customer order fulfilment process. The next stage identified what the *facilitors* and *inhibitors* of these order winners were, in terms of information, and in response to the fourth research question on the management issues.

This analysis was based on the first stage of the three stage Christopher and MacDonald Customer Service Model, as described in Chapter 2, Section 4.4. This stage is known as the pre-transaction elements.

The author adapted the Christopher and MacDonald model to suit the research question:

What can facilitate or impede the management of information (Or behaviour, as the author recognised it to be by this time).

1. - *Pre transaction elements (Policy to customers, structure, flexibility etc)*

- i. Policy to customers
- ii. Culture
- iii. Structure

4.2 Pre-transaction Elements (Facilitating):

4.2.1 Policy to Customers

Relationship Marketing: The Company appears to be developing long term relationships with its customers through informal information exchange and communication. This is a strategic move to combat uncertainty in the marketplace, and will lead to greater knowledge of customers and their needs, probably enabling long term trust and loyalty, and reducing uncertainty. This was already known from the Adapt/C.O.R.E. programme, as the author had been involved in designing customer surveys and general customer relationship building with this particular company.

Altogether, it appears that three people are officially involved with customers - the two MDs and the Sales Manager. (Appendix D).

Implementation of Formal Procedures and Standards: These have been selected because they are planned and designed methods to achieve greater efficiency in the customer order fulfilment process.

- **Integrated Information System:** It is designed to run the order-invoice process by itself, which it has done successfully for a long time. It still appears to serve the electro-mechanical side of the business best.
- **Business Plan:** The Company is in a state of flux and change, so the business plan is good to have - it shows the Company is thinking strategically and is customer-focused. Knowledge of the business plan was gained from studying the documents and also attending the presentation. The main focus appeared to be on how to implement procedures to satisfy customers better, and making engineers responsible for customer -service through information and skills.

This shows general awareness of customer satisfaction and information needs. (Appendix D).

Formal Strategic Meetings for Managers: The Company already has a good formal system of communication for managers from different departments - they meet every two weeks to discuss strategic issues, often related to customers.

Both MDs are usually present at these meetings.

4.2.2 Structure

At first it appeared possible to explore the management issues of information through an analysis of the organisational structure. The Company has management layers, appears to have functional divisions of a sort, and appeared to be centralised. However, during the analysis itself it became clear that this was too simplified and there was something much more subtle going on.

Flat Hierarchy: This was already known from the start.

Free Flow of Information and Informality: Staff appeared to communicate with ease. In everyday operations, functional boundaries appear to be fuzzy, as observed through the constant informal interaction between all the staff, especially horizontally in the customer order fulfilment process. This was reminiscent of the power culture, described in Chapter 2, and typical of SMCs. Informal information activities have already been referred to in Section 3, 3.3.

People communicated informally, and this appeared to contribute to the overall satisfaction of customer orders. Staff met ad hoc and there was much coming and going between all the sections of the company, both upstairs and downstairs. (Appendix D).

Staff Skills/Tasks: This is clearly a significant contribution towards customer satisfaction. They enable customer satisfaction through multi-skilling/tasking for flexibility:

- **Engineers:** They have gone from being primarily electro-mechanical to electronics. They are obviously flexible in terms of their knowledge of engineering.
- **Sales:** Relationship marketing is important to the Company. The sales manager can communicate with both customers and functions in the Company.
- **Others:** The special project co-ordinator is obviously proving an important link in the integration of functions. The distribution manager and purchasing officer seem to wear many hats, as probably many other staff members in the Company. (Appendix D).

This may be seen as a significant part of the power culture.

4.2.3 Culture

The outcome of the analysis of Company structure was the realisation that the study of the Company as a power culture could have more to offer.

This Company is a power culture (Chapter 2, Section 2.3). The two MDs were friends before they set up the business and three other members of the family of one of them also work there, in sales and administration. One of his daughters is the sales manager. Traditional to the power culture is informal information, communication and flexibility and the importance of this has already been shown in the section above. These aspects were all known from the beginning.

The structural analysis may just as easily have been done through the power culture approach. For example, the flexibility of staff and empowerment of staff illustrated above are more likely to be a manifestation of the power culture, which can have staff who can think in the same way as the MD, and can be left to get on with the job (Chapter 2, Section 2.3).

Not only was the traditional power culture recognised as a factor in the ability of customer-focused SMCs to deliver customer satisfaction, but with increasing uncertainty and complexity in the environment, the author recognised the development of an information culture as important.

This cultural approach consisted of the theories of culture as shared meaning, related to Davenport's idea of an information culture, as outlined in Chapter 3, Section 3.6.

For the purposes of answering the research questions, information culture was viewed on three levels:

Shared Understanding and Perception of Order Winners: Three of the order winners cited earlier appeared to be a shared perception to any extent. They were:

- *High quality of repair and service:* The quotes citing this were all elicited from the question on order winners. Five out of six of the interviewees mentioned this specifically as an order winner.
- *Delivery Speed:* These quotes were all elicited from the question on order winners. Four interviewees cited this as an order winner, therefore it was shared, out of six interviewees.
- *Price:* These quotes were all elicited from the question on order winners. Four interviewees cited this as an order winner, therefore it was shared, as before.

The other four order winners did not appear to be a shared perception as such to any extent, therefore it could be said that the culture was unitary only to an extent. It is interesting to note that these three order winners have already been cited by in Chapter 2, Section 4.5). (Appendix D).

Shared Language: Technical language appeared to be no problem. The observation revealed that staff generally communicate between functions and all over the company premises regularly. (Appendix D).

Understanding of the Nature of the Management of Information in their Company: The second interviews were more useful here, as they were based around people's understanding and perception of the value of both communication and traceability, the informal and the formal system.

As described above, the general nature of the management of information in this SMC was the fact that it needed to be both stored and communicated, and that there appeared to be an increasing need to formally record information, rather than relying on memory, to provide traceability. (Section 4.1).

The quantitative valuations gave a good idea as to people's perceptions of the value of the management of information in their organisation. Altogether, the valuations were high, which indicates good overall attention to communication and traceability.

4.3 Pre transaction elements (Impeding)

4.3.1 Policy to Customers

Lack of Formal Customer Contact with Workforce: In the Company, customer contact was restricted to only a few individuals. Nonetheless, informal customer contact happened with other members of staff, most notably the distribution manager. Although not directly evident, it may be possible that this lack of customer contact and the knowledge of customers being only restricted to sales and MDs results in poor knowledge of what customers really need in the activities and staff involved in the COFP. Perhaps if more staff were encouraged to talk to their counterparts in the customer companies, there would be more understanding of the complex order winners amongst more of the staff. There are problems when the sales manager is out visiting customers - messages do not get passed on, advice cannot be sought from her regarding customer needs. (Appendix D).

Inferior Implementation of formal procedures: The integrated information system: lacks enough memory, and is not compatible or sophisticated enough for the needs of the Company. (Appendix D).

No Opportunity for Feedback in Formal Strategic Meetings: They are held twice a fortnight for the two MDs, the three managers and the projects co-ordinator. However, there is little chance for feedback from the rest of the members of staff.

4.3.2 Power Culture

Analysing the impact of organisational structure on the management of information was difficult - the structure is loose and simple, and flat. It was to be more appropriate, once again, to analyse the management of information through the paradigm of a power culture, especially pertaining to the aspects above - empowerment of staff, flexibility of jobs/tasks, functional divisions and the vertical flow of information.

Vertical Information Flow: The Company, although flexible in its everyday operations, does have a problem with vertical information flows and power. There are complaints that information does not flow freely downwards to the shopfloor. (Appendix D).

Staff Skills: They are sometimes too flexible - staff sometimes spread themselves too thin and end up not being able to do everything. (Appendix D).

4.3.3 Information Culture

Functional Divisions (Sub-cultures): Various divisions within the company were pointed out, although they were not official. There was little sign of this during observation. However, divisions were perceived in various forms. This is less a problem of structure than individual perceptions. (Appendix D).

Poor Understanding and Perception of Certain Order Winners: There is some shared understanding of customer requirements and order winners, but not everyone shares them. It was shown that three of the order winners were shared. The other four identified order winners were not consciously realised or shared as order winners. There were six interviewees:

- *Personal relationship with customers:* This was harder to elicit - only one hint of this actually came from the question on order winners itself. The rest came from indirect analysis of the interviews and observation. It was more through a combination of indirect analysis and the observation that it was possible to see that the 'informal' system was actually a substantial indirect order winner.

The quotes cited in the appendix came from other questions. As only one interviewee mentioned this as an order winner, then obviously there was no shared perception of this order winner.

- *Information and feedback service to customers:* This was not gleaned from the question on order winners at all, but from other questions. Therefore,

this was not a shared perception of an order winner. In fact, it was not recognised as an order winner at all in the explicit sense.

- *Not turning down an order:* There were only two quotes, and only one came from the question on order winners.
- *Customisation of orders:* Only one quote came directly from the question on order winners. Therefore, this was not a shared perception of an order winner. (Appendix D).

The order winners which were gleaned from the actual question itself were of the more expected type, that is, price, delivery and quality. (Chapter 2, Section 4.5). 'Customisation' and 'Personal relationship with customers' were partly gleaned from the question on order winners and the rest not at all. 'Information and feedback service to customers', 'Not turning down an order' were not gleaned at all from the actual question on order winners.

This indicates a lack of shared perception and agreement on order winners, although most of the interviewees unconsciously share them. This implies that there are order winners which are not realised as order winners, either collectively or individually. This particular Case Study Company had not analysed their order winners, and only perceived them in general as the basic 'three' - price, quality and delivery. But for this particular SMC there are more order winners of which they are not aware, or are only partially aware of. (Appendix D).

Problems with Shared language: There were several complaints from staff that technical language contained too much jargon. (Appendix D).

Insufficient Understanding of the Nature of the Management of Information: The need for the management of information is generally understood, however, things do go wrong and it also appears that the notion of the management of information is understood to an extent, but not particularly understood in its holistic sense, as an integrated concept. People tend to stick to specific examples when talking about information. (Appendix D).

4.4 Discussion

The findings from the first case study gave rise to a new theoretical model based on the pre-transaction elements, and this is illustrated in Figure 7.3:

**Pre-Transaction Elements:
People, including MD and all staff.**

<p>1. Policy to Customers: (Facilitating)</p> <ul style="list-style-type: none"> ■ Relationship Marketing ■ Implementation of formal procedures:i.e. <u>Integrated Information System Business Plan</u> ■ Strategic Meetings for Managers ■ Company Brochure 	<p>(Impeding)</p> <ul style="list-style-type: none"> ■ Lack of formal Customer Contact with workforce ■ Inferior Implementation of Integrated Information System ■ No opportunity for feedback in Formal Strategic Meetings
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Culture

Facilitating

Impeding

formation

ower

<p><i>Shared understanding and perception of certain Order Winners</i></p> <p><i>Shared language generally</i></p> <p><i>some understanding of the Nature of The management of information in their Company</i></p>	<p><i>Functional divisions: (Sub-cultures)</i></p> <p><i>Poor understanding and perception of certain Order Winners</i></p> <p><i>Problems with Shared language</i></p> <p><i>Insufficient Understanding of the Nature of the Management of Information</i></p>
<p><i>Flat Hierarchy</i></p> <p><i>Free Flow of Information and Informality</i></p> <p><i>Flexibility of Staff Skills/Tasks</i></p>	<p><i>Poor vertical Information flows</i></p> <p><i>Staff skills sometimes too flexible</i></p>

Figure 7.3: Management Issues in Case Study 1

In this model it can be seen how the MD policy to customers may affect the power culture and the development of an information culture in this Company.

Questions 2,3 and 4 have been explored further and much light has been shed on all of them, especially Question 4, the management issues. The overriding discovery of this Chapter has been the realisation that the informal information system is highly important in terms of the flexibility it can provide, but the formal information system is equally as important to provide traceability. In the highly informal, ad-hoc culture of the power culture, people often resorted to memory, or to scribbled scraps of paper but this is no longer feasible in the face of increasing complexity and uncertainty. A formal information system, in both paper and electronic form, is becoming more important.

The effectiveness of both of these systems is down to the behaviour of people. This combination of both formal and informal information requires an information culture to make it work - one which realises this broader, richer style of the management of information based on the behaviour of people.

In this section it has also been discovered that the power culture affects information behaviour, and it was more appropriate to study the Company through this rather than its structure. The MDs policy to customers in the face to the customer's demands and the power culture appear to conflict with the ability of the Company to develop an information culture.

5. *Conclusions*

This section concludes the findings from the first case study.

This Chapter has shown from the findings that there are several important aspects relating to information and its management in customer-focused SMCs:

- Customer satisfaction and order winners: This Company has seven order winners, although flexibility is the most important overall order winner, and this can be supported and enhanced through traceability of information.
- Information can provide this through a systemic combination of formal and informal information activities through the customer order fulfilment process, and this is referred to by the author as *information behaviour*. Communication and recording of information are the behaviours which are enacted to integrate the activities in the customer order fulfilment process to achieve the order winners.
- These activities often do not run as they should, inhibiting customer satisfaction, and this is due to the management issues. Customer satisfaction is reliant on the development of an information culture, which requires and understanding of the management of information as an integrated concept - both formal and informal information. Information behaviour is based in an information culture, but this is often in conflict with the other factors which are rooted in the Company's past:

- The customer demands on the Company reflected in the order winners, which require an understanding and enactment of both informal and formal information.
- The MD/owner's policy to customers.
- The power culture influenced by the MD and the small size of these companies which encourages informal information flows.

The next two case studies were to take these initial theoretical models as a base and to test and develop them further through the method of theoretical sampling described in Chapter 6.

Summary of Chapter 7.

This Chapter has covered, through in-depth data analysis, the following areas:

1. An overview of the first Case Study Company.
2. Customer satisfaction in this Company - seven order winners were defined and a theoretical model built based on the findings. The overriding order winner is flexibility, supported by traceability.
3. The nature of information in this Company was established. Once again, information was recognised as systemic, broadly categorised into i. formal and informal and ii. interpretations and activities through communication and storage. The author decided that interpretations belonged under management issues, as part of the information culture. However, she recognised information as being in behaviour, rather than objectively rooted in technology or paper.
4. The management issues - what facilitates and what impedes information behaviour - MD policy, structure, power culture and information culture. Informal and formal information together can provide the flexibility and traceability which can deliver customer satisfaction, but sometimes there are problems concerning the management of this information.
5. The findings show that the power culture, the delivering of the order winners, and the MD policy to customers appear to impede and conflict with the development of an information culture and the necessary behaviour which it relies upon.

Chapter 8.

Further Data Analysis and Theory Building

1.

- The next two case studies were designed to test the theoretical model already developed from the pilot study, rather than attempting to repeat everything exactly the way it was done in the pilot study.

2.

- The order winners show, once again, that *flexibility* is the main drive of customer satisfaction in these Companies.

3.

- This section shows again that behaviour is the main driving force behind information. As before, the findings show that information in these Companies is systemic in nature, and both formal and informal information are a part of it.
- It also confirms the findings from the pilot study - that activities and behaviours are about communication and storage of information, and that communication provides flexibility and storage provides traceability.

1. Case Studies 2 and 3

This section introduces Case Studies 2 and 3. The next two case studies were designed to test the theoretical model already developed from the pilot study, rather than attempting to repeat everything exactly the way it was done in the pilot study.

Section 1.1 and 1.2 introduce the background to the next two case studies.

1.1 Case Study 2

This Company was again a company which is BS EN ISO 9002 registered, and had retained some of its important customers for more than ten years. It specialises in precision machined components via sub contract work from engineering specifications, and has about twelve regular, important customers in automotive, hydraulics, aerospace, robotics,

food processing, diesel engine manufacture, printing, bottling, photographic and industrial fastenings.

It was established in 1962 and in 1985 the Company moved to modern purpose built premises of over 10,000 square feet, with easy access to all major road, rail and air links, which provide good channels of communication to all regions throughout the UK and mainland Europe.

1.2 Case Study 3

Case Study 3 was eighty years old at the time of this research. It is an Engineering Pattern Makers, with a foundry, pattern shop, general machining shop and CAD/CAM facilities. They make models, although no conventional CNC work, and specialise in three to four types of goods, for example, tooling for bins, JCBs and fuel tanks. Their work involves cast aluminium rotational mouldmakers, press toolwork, prototypes patterns and casting and general work i.e. fibreglass, models.

The Company has 23 employees, and has a turnover of about 860,000 p.a. They get orders at short notice - drawings etc. They are low volume, mostly one offs and are not really into production. The present MD has been with the Company for 30 years, following on from his father, and has been MD for fifteen years. He has recently taken on a general manager.

They have a customer base of about 120-130, some of which they have had for thirty years or more.

2. Customer Satisfaction

The same seven order winners are identified for the second case study in this section, as well as one new order winner. In the third case study, seven order winners were defined, similar to the first case study except for one, and this was the new one discovered in the second case study. Again, this explores further the link between information and customer focus, and also the management issues, research questions 2 and 4. The order winners show, once again, that *flexibility* is the main drive of customer satisfaction in these Companies.

Section 2.1 identifies the order winners in the second case study, and 2.2 identifies the order winners in the third case study. 2.3 develops further the theoretical model for Case Studies 2 and 3.

2.1. Case Study 2: Order Winners

In the pilot study the order winners within the organisational context were identified, before the information could be identified. This was done again in Case Study 2, taking

into account the conceptual model developed in the previous Chapter and bearing in mind the second and third research questions.

The order winners in Case Study 2 were identified as:

- High quality of repair and service
 - Informal, personal contact
 - Information and feedback service to customers
 - Delivery speed
 - Price
 - Never turning down an order
- and
- Customisation of orders.

In this case an additional order-winner was established from the interview data:

- Rapid Response to order changes at short notice.

As before, these order winners are in no particular order. The majority were again identified through the interviews, mostly from the question on order winners, but they were also elicited indirectly from the other interview questions.

There were seven interviewees. (Appendix E).

2.2 Case Study 3: Order Winners

The order-winners in this Company were defined as:

- High quality of repair and service
 - Informal, personal contact
 - Information and feedback service to customers
 - Delivery speed
 - Price
 - Customisation of orders
- and
- Rapid Response to Order Changes at short notice.

In this case, there was no evidence for the order winner, 'Never turning down an order', elicited in the first two case studies.

There were five interviewees. (Appendix E).

2.3 Discussion

The order winners in the second case study were the same as the pilot study, with the addition of one new one. The differences were in the degree to which they were shared, and perceived as important, and this is explained below in Section 4.

The theoretical model was developed for the second and third case studies:

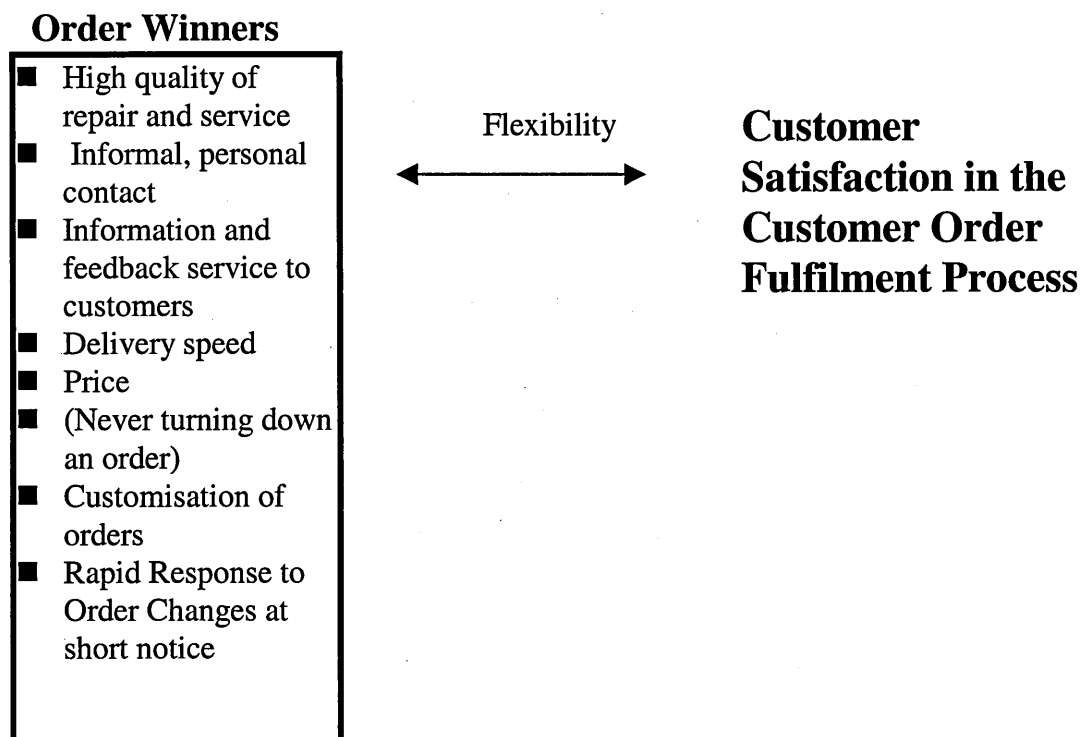


Figure 8.1: Customer Satisfaction in Case Studies 2 and 3

The order winners in the third case study were the same as the second, with the exception of 'never turning down an order', found in the first and second case studies.

These two companies displayed the wide variety of order winners needed to keep the customers coming back again and again, and they go beyond the traditional ones of price, conformance quality and delivery speed. Once again they show that *flexibility* is the main thrust of customer satisfaction. Progressing the findings from Chapter 7, Section 3.2, they also show that *traceability* can support this, for example, through fast feedback on the progress of customer orders. (Appendix E).

3. Nature of Information

The nature of information in customer-focused SMCs is further explored in this section through the second and third case studies, and the findings from Chapter 6 are built on and developed further. The findings from Case Study 1 are confirmed, and theoretical model developed further.

This section shows again that behaviour is the main driving force behind information. As before, the findings show that information in these Companies is systemic in nature, and both formal and informal information are a part of it. It also confirms the findings from the Pilot Study - that activities and behaviours are about communication and storage of information, and that communication provides flexibility and storage provides traceability.

Section 3.1 lists information resources in the second and third case studies, 3.2 identifies types of information, that is, formal and informal in the second and third case studies, and 3.3 identifies information activities. 3.4 develops the management issues and 3.5 sums up the findings.

3.1 Introduction

This section again identifies the nature of information in the second and third case studies. The nature of the information was identified during the process of the interviews, observation and study of documents, as in the pilot study. As before, lists were developed and the information was categorised into three different types - electronic, paper-based and voice-based:

Information Resources in Company 2.

Electronic information i.e. Office 'stand-alone' computers, production planning system, CNC machines, photocopier, phones, faxes.

Paper-based i.e. Route cards, BSI procedures and manuals, customer specifications, evaluations, customer orders, print outs, quality manuals, log books, purchase orders, faxes, letters, client contracts, invoices.

Voice i.e. Face to face conversation, especially with staff in customer-satisfaction cycle i.e MD and customers, face-to-face and on phone, his daughter(secretary) and customers on the phone, meetings with MD and managers, informal group chats on shopfloor, managers on phone to customers.

Information Resources in Company 3.

<p>Electronic information i.e. Office 'Stand-alone' computers, CAD linked to CNC machines,, photocopier, phones, faxes, email.</p> <p>Paper-based i.e. Route cards, BSI procedures and manuals, customer specifications, evaluations, customer orders, print outs, warranty cards,quality manuals, purchase orders, faxes, letters,client contracts, product manuals, invoices.</p> <p>Voice i.e. Face to face conversation, especially with staff in customer-satisfaction cycle i.e MD and customers,face-to-face and on phone, his family and customers on the phone, meetings with MD and supervisors, informal group chats on shopfloor.</p>

In terms of technology, Company 2 was slightly less sophisticated than Companies 1 and 3. For example, there was no email.

3.2 Types of Information in Case Study 2.

3.2.1 Informal Information

Again, this plays a pivotal role in the company, especially in respect of immediate customer satisfaction. Informal information seems to be a taken for granted, almost unthought of aspect. Once again, it is easy to see that people are at the heart of the informal information system. The author could observe staff communicating informally in small groups, and through ad-hoc meetings in offices and corridors.

Informal information transfer was found to be highly important to the organisation's everyday operations. (Appendix E).

3.2.2 Formal Information

Formal information was again found to be highly important, though perhaps to a slightly lesser extent than in the pilot study. For example, there was no email in this Company. The level of electronic information was less sophisticated and integrated, although there appeared to be as much paper, if not more. (Appendix E).

3.3 Types of Information in Case Study 3

3.3.1 Informal Information

People again revealed themselves as the heart of the informal system. Again, informal information plays a pivotal role in the company, especially in respect of immediate customer satisfaction through providing flexibility. Once again, informal information transfer was found to be highly important to the organisation's everyday operations. The

shopfloor was divided into three sections, according to work groups, and people appeared to move and communicate freely between the sections. (Appendix E).

3.3.2 Formal Information

The author could observe the importance of formal information, for example, the paper-based route cards flowing through the system, from the front office to the shopfloor, and between the sections. However, the more sophisticated information technology was concentrated in the front office. (Appendix E).

3.4 Information Activities in Case Study 2

The lists of information resources referred to above combine through activities to form a systemic whole which can integrate activities in the customer order fulfilment process.

Once again, communication and storage appear to be at the heart of information activities and behaviours. The above examples illustrate the importance of both informal and formal information activities. Informal information activities provide the flexibility needed for fast response to customers, both internally and externally. Formal information activities provide the traceability to support this. For example, BS EN ISO standards have been cited as providing customer satisfaction. (Appendix E).

3.5 Information Activities in Case Study 3

The lists of information resources referred to above combine through activities to form a systemic whole. Once again, communication and storage appear to be at the heart of information activities and behaviours, as in the first two Companies. Formal and informal information combine to form activities, and they provide both flexibility and traceability, which is at the heart of customer satisfaction (Appendix E).

3.6 Discussion

Similar findings can be confirmed between both case studies. The nature of information was found to be similar - a systemic combination of formal and informal information, with blurred boundaries between the two types, and information activities and behaviours which are based on communication and storage of information. Communication and storage provide flexibility and traceability. These results can again be summarised in the theoretical model of Figure 8.3 below:

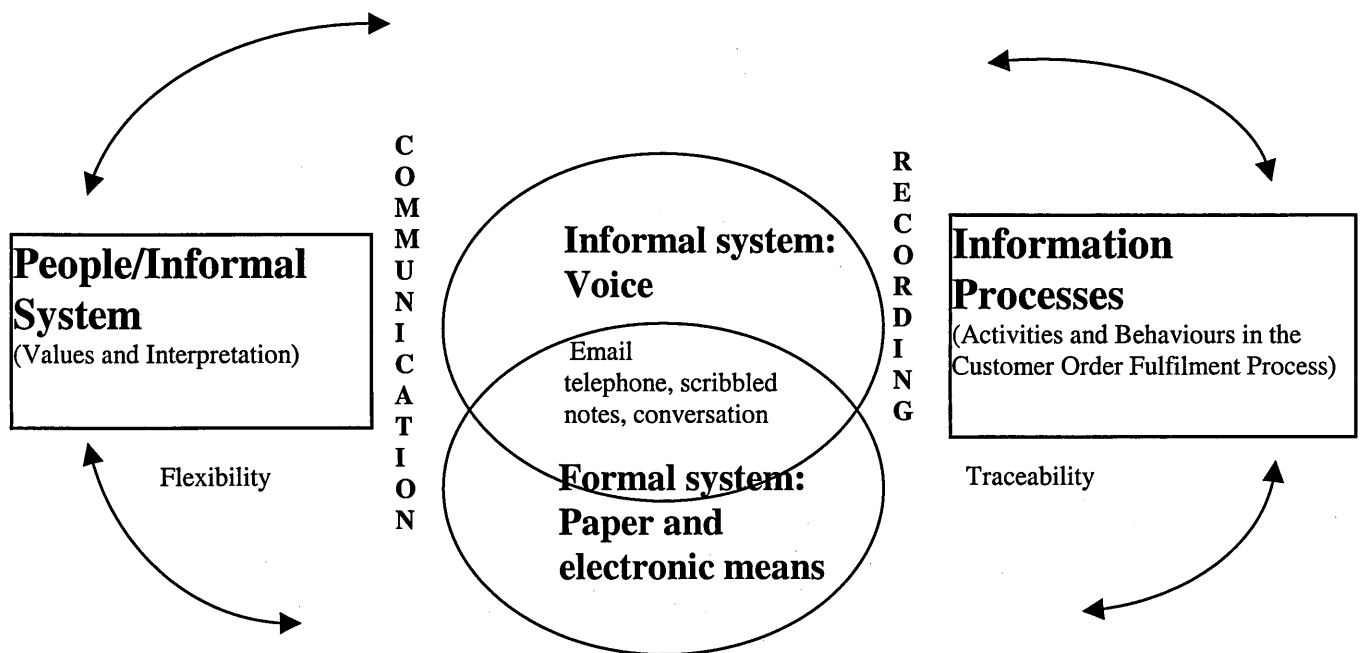


Figure 8.3: The Nature of Information in Case Studies 2 and 3

This also builds on the findings summarised in Chapters 3 and 6, and adds much strength to the argument for the nature of information. Again, the importance of both types of information in regard to flexibility and traceability has been realised.

This time certain differences were noted between the first Company and the second and third Companies, especially in regard to the level of technology utilised and the complexity of operations. For example, the second Company was slightly less technologically sophisticated. It also had less customers than the first and third, and the range of its products was narrower. In spite of this, a similar trend was realised in regard to the formal system. It appeared to be increasingly more important in both the second and third Companies, as well as the first.

4. Management Issues

As in the pilot study, this section again provides an in depth analysis of the management issues of information in Case Studies 2 and 3. The findings confirm and develop those found in the first company - an increasing need to maintain traceability in the form of formal information while still maintaining flexibility through the informal system. This is the nature of customer satisfaction. It also develops the idea of the power culture inhibiting the development of an information culture.

Section 4.1 introduces the changes made to the pre-transaction elements.. 4.2 shows how they facilitate information and 4.3 shows how they impede in the second and third case studies. 4.4 develops the theoretical model further.

4.1 Introduction to Management Issues in Case Studies 2 and 3

Again, the general information processes and activities ran well in both second and third case studies, although there were aspects which were problematic. The overall average was: (Appendix E). As in the pilot study, post-transaction elements were included in the transaction elements, as they were simply part of the overall operations.

There was much room for improvement in the information behaviours and activities in the customer order fulfilment process in both the next two case study Companies. Things were going wrong concerning both formal and informal information activities:

- Again, some poor informal information flow between senior management, shopfloor and other staff in the customer order fulfilment process. Sometimes important messages were not passed on.
- This applied also to formal information procedures - there was occasionally lack of care and discipline.
- There was also too much paper on the shopfloor, especially where quality management was concerned, and this applied to both companies.

These could be explained through a further examination of the management issues.

The next stage identified what the facilitators and inhibitors of these order winners were, in terms of information, as in the pilot study. The analysis was based, as before, on the three stage Christopher and MacDonald Customer Service Model. However, by this time the second case study was begun, the framework had been adjusted to take account of several emergent issues. By the time the third case study was begun, the framework for analysis was settled on to be the same as the second case study:

4.2 Case Studies 2 and 3 - Framework for Analysis

The framework for analysis was changed slightly due to the findings from the first case study:

- Not only the MDs policy to customers, but also his policy to the management of information was considered important. This emerged in the pilot study, as a crucial aspect of both his policy to customers and an information culture. For example, the implementation of the integrated information system was both part of the policy to customers, and information culture.
- The power culture, was used in place of structure. The first Company appeared to possess the characteristics of a power culture in terms of information, therefore it

could safely be assumed that the second two would possess them too, according to the definition of a customer-focused SMC given in Chapter 4. The author tested this idea in the next two case studies and found it to be true.

- The information culture was realised as an important aspect to consider. As an aspect of pre-transaction elements, and a necessity for customer satisfaction, this deserved a section on its own.

The new model, based on Christopher and McDonald, now looked like this:

What can facilitate or impede the management of information:

1. - Pre transaction elements (Policy to customers, structure, flexibility etc)

- i. Policy to Customers and Policy towards the Management of Information
- ii. Power Culture
- iii. Information Culture

The framework was kept exactly the same for Case Study 3, as it worked well in Case Study 2.

4.3 Case study 2: Pre-transaction Elements (Facilitating)

4.3.1 Policy to Customers and Policy towards the Management of Information

The management of information was now included in the MD's policy , especially in relation to customer satisfaction, in keeping with the research questions. The pilot study showed that the understanding of the management of information was understood, but only implicitly, by the MD. For example, frequent management meetings, relationship marketing were indicators of the realisation of informal information, and the adoption of BS EN ISO standards and electronic systems indicated the realisation of the formal system. However, there was no recognition of the management of information *as an integrated concept*.

Implementation of Formal Procedures and Standards:

- Formal Improvement Programmes: The Company had recently gone on a WCM Improvement programme, run by consultants at Cranfield University. (Appendix E).

- **Computer System:** Their electronic systems are improving, but are a long way from being integrated. (Appendix E).
- **Business Plan:** It is not called a business plan as such, but they do have a 'Company Profile and Plant List'. It focuses on customer satisfaction, quality improvement, and its 24 hour shift system. In it they also recognise the need to develop long-term business relationships and currently support many firms with regular small batch supplies for those who are embarking on, or who employ 'Just in Time' delivery requirements. They also mention inspection facilities, total quality management, employee development and team working.

Formal Strategic Meetings for Managers: As illustrated through observation, the management team and team leaders have a meeting every Monday morning, one of which was observed by the author.

4.3.2 Power Culture

It was decided to analyse the Companies in terms of a power culture, especially pertaining to the aspects above - empowerment of staff, flexibility of jobs/tasks, functional divisions and the vertical flow of information.

Flat Hierarchy: This was already known from the start, as in the Pilot Study. The Company, like the pilot study, has less layers of hierarchy than a larger company. In this case, as in the pilot study, it has three layers: MDS (1), functional managers (4), and shopfloor staff. In this case however, it has only one MD.

Free Flow of Information and Informality: As the pilot study, the informal exchange of information appeared to facilitate customer-focus, and this was enabled through the power culture. (Appendix E).

Multi-skilled/flexible staff: Again, this is clearly a very significant contribution towards customer satisfaction. Staff skills include the ability to drop one task at a moment's notice to work on something more pressing. (Appendix E).

4.3.3 Information Culture

Shared Understanding and Perception of Order Winners: Four of the order winners cited earlier appeared to be shared perceptions to any extent. They were, as in the pilot study:

- High quality of product and service
- Delivery speed

- Price

and the addition of

- Personal relationship with customers.

1) High quality of product and service: There were seven quotes citing this as an order winner, and this was mostly elicited from the question on order winners. Six out of seven of the interviewees mentioned this specifically as an order winner. Therefore, it was a shared perception.

2) Personal relationship with customers: Unlike the pilot study, six of the interviewees cited this as an order winner. Therefore, it was jointly perceived as an order winner, to a much larger extent than in the pilot study.

4) Delivery Speed: This was all elicited from the question on order winners. Four interviewees cited this as an order winner, therefore it was shared.

5) Price: Again, this evidence was all elicited from the question on order winners. Five interviewees cited this as an order winner, therefore it was shared. (Appendix E).

The other four order winners did not appear to be explicitly recognised as such. Therefore it could be said that the culture was unitary only to an extent, though perhaps more than in the pilot study, due to the recognition of the extra order winner.

Shared Language: Once again, technical language appeared to be no problem. (Appendix E).

Understanding of the Nature of the Management of Information in their Company: Once again, the general nature of the management of information in this SMC was the fact that it needed to be both stored and communicated, and that there appeared to be an increasing need to formally record information, rather than relying on memory, to provide traceability .

As in the Pilot Study, the quantitative valuations gave a good idea as to people's perceptions of the management of information. Altogether, the valuations were high, which indicated good overall attention to the management of information. There were indications that people realise the importance of logging, and passing on important messages. (Appendix E).

4.4 Case study 3: Pre-transaction Elements (Facilitating)

4.4.1 *Policy to Customers and Policy towards the Management of Information*

Relationship Marketing: As in the pilot study, this Company had many customers, over 100 in total. Relationship Marketing was being practiced once again, though apparently only with the MD and general manager. (Appendix E).

Implementation of Formal Procedures and Standards: Again, this shows the importance of logging and recording information:

- **Computer System**

The CAD systems and the office systems were in the front office, and used by the MD, administrative staff and design engineers. (Appendix E).

Strategic Meetings for Managers: As illustrated through observation, the management team and team leaders have a meeting every Monday morning with the MD, one of which was observed by the author. They appeared to get through much work in this period.

4.4.2 *Power Culture*

Flat Hierarchy: Again, the company is small and there are really only two levels of management. The new general manager is really the MD's right hand man.

Free Flow of Information and Informality: As in the first two case studies, this was recognised to be part of the power culture. (Appendix E).

Multi-Skilled/Flexible Staff: Again, this is clearly a very significant contribution towards customer satisfaction, though perhaps to a lesser extent than the first two case studies, as the Company was slightly more functional. (Appendix E).

4.4.3 *Information Culture*

Shared Understanding And Perception Of Order Winners: Again, as in the first two Case Studies, the ones most likely to be recognised as order winners were the 'traditional' ones of product quality, delivery and price, though perhaps to a lesser extent than the other two case studies. This possibly indicated a less unitary culture in terms of expectations and understanding. However, only one of the order winners cited earlier appeared to be a shared perception. It was:

Delivery Speed: Three out of five of the quotations were elicited from the question on order winners. Therefore it was shared as an order winner. (Appendix E).

Shared Language: There were few problem with language. (Appendix E).

Understanding of the Nature of the Management of Information in their Company: Once again, the second interviews were useful here, or in this case, the second part of the interviews, as they were based around people's understanding and perception of the value of information.

As in the pilot study, the quantitative valuations gave a good idea as to people's perceptions of communication and traceability, and the need for good management of information. Again, the valuations were high, which indicates good overall attention to communication and traceability.

There was a good understanding of the need for information communication and recording, although perhaps not as an integrated concept, not even as a particularly explicit concept. (Appendix E).

4.5 Case Study 2: Pre-transaction Elements (Impeding)

4.5.1 Policy to Customers

Occasional Inferior Implementation of Formal Procedures

- **Integrated Computer System:** There was sometimes a lack of discipline in using formalised databases and other electronic information. (Appendix E).

No MD Attendance at Formal Strategic Meetings for Managers: Management meetings are held every Monday morning. The MD does not attend these meetings, however.

No Opportunity for Feedback in Formal Strategic Meetings: They are held twice a fortnight for the two MDs, the three managers and the projects co-ordinator. However, there is little chance for feedback from the rest of the members of staff.

4.5.2 Power Culture

Vertical Information Flow: There were complaints that information flowed downwards, but not upwards, and even then, it did not always flow downwards very well. (Appendix E).

4.5.3 Information Culture

Poor Understanding and Perception of Certain Order Winners: As in the pilot study, there is some shared understanding of customer requirements and order

winners, but they are not shared by everyone. This leads to some functional divisions, lack of awareness and knowledge of customers needs and the needs of other functions in the Company as a whole.

- 3) *Information and feedback service to customers*: Only one interviewee out of seven cited this as an order winner. Therefore, this was not a shared perception of an order winner, although it was slightly more recognised as one than in the pilot study where it was not shared at all.
- 6) *Not turning down an order*: Only one person cited this, though not directly as an Order Winner. As the Company have had a small number of loyal, regular customers for many years, it may be assumed that this is an order winner, though not shared.
- 7) *Customisation of orders*: Unlike the pilot study, there was only one mention of this, but not recognised as an order winner.
- 8) *Rapid response to order changes and customer demands*: This was a new order winner, not found in the pilot study. There was much evidence for this - eight quotes in all. However, only two interviewees recognised this as an order winner, therefore generally there was no shared perception of it.

(Appendix E).

Insufficient Understanding of the Nature of the Management of Information: The need for the management of information is understood, however, as in the pilot study, things do go wrong and it also appears that the notion of the management of information is understood to an extent, but not particularly understood in its holistic sense, as an integrated concept. As before, people would stick to specific examples. (Appendix E).

4.6 Case study 3: Pre-transaction Elements (Impeding)

4.6.1. Policy to Customers

Lack of Formal Customer Contact with Workforce: In the third Company, customer contact was restricted to only two or three individuals, as in the Pilot Study, and mostly the MD. However, unlike the pilot study, staff in general did not appear to have much unofficial contact. The only ones who appeared to were the MD, general manager and quality manager on any regular, official basis. The arrival of the general manager has added another 'layer' in a way to the structure, and thus staff supervisors do not have any direct contact with customers. (Appendix E).

Lack of a Formal Business Plan: There was no business plan or mission statement, or indeed, anything in writing like a company brochure. This may indicate a lack of clarity and purpose, and possibly a lack of overall understanding of what the company is trying to achieve, especially towards customers.

Occasional Inferior Implementation of Formal Procedures: This happens, especially between front office and shopfloor.

No Opportunity for Feedback in Formal Strategic Meetings: Once again, in the third Company, a meeting was held every Monday morning. This time, as in the pilot study, it was run by the MD. However, there is little opportunity for workforce to give feedback, or participate, only the team leaders. (Appendix E).

Lack of an Integrated Computing System: There is no integrated computer system. The only sophisticated technology is the CAD/CAM system, which only the general manager and a couple of the designers use, and a Windows based office system. The quality system is all on paper, and is vastly outdated. None of the shopfloor staff have access to a terminal. (Appendix E).

4.6.2 Power Culture

Vertical Information Flow: There appears to be little communication flowing efficiently between shopfloor and senior management and vice versa. (Appendix E).

Management Layers: Once again, this Company is a similar size to the other two. However, unlike the other two, it has an extra layer of management. A general manager was recently recruited by the MD to oversee day to day operations, on behalf of the MD. This provides an extra layer of hierarchy, between the MD and the shopfloor supervisors, creating four layers in all. It is part of the power culture because the general manager had been recruited by the MD to be his right hand man. (Appendix E).

4.6.3 Information Culture

Functional Divisions (Sub-cultures): There appear to be defined functional divisions in this Company, much more so than in the second Company, although there are also other types of divisions as in the pilot study. That is, the front office and the shopfloor split. Again, members of the MDs family are in the front office.

Poor Understanding and Perception of Certain Order Winners: As in the first two case studies, there is some shared understanding of customer requirements and

order winners, but they are not shared by everyone. This leads to some functional divisions, lack of awareness and knowledge of customers needs and the needs of other functions in the Company as a whole.

- *1) Informal, personal relationship with customers:* Two of the interviewees cited this as an order winner. This was also elicited indirectly from other questions. Therefore, although recognised as very importance, it was not a shared perception of an order winner. In addition, this was also elicited indirectly from other questions.
 - *2) High quality of repair and service:* This was all elicited from the question on order winners. However, only two cited this as an order winner, therefore it was not particularly shared.
 - *3) Information and feedback service to customers:* Only one interviewee cited this as an order winner. Therefore, this was not a shared perception of an order winner, nor really appeared to be recognised as important at all.
 - *4) Customisation of orders:* Only one interviewee recognised this as an order winner. Another three quotes citing this as important came from indirect questions. Therefore, this was not a shared perception of an order winner, although it was recognised as one indirectly, to a certain extent.
 - *5) Rapid Response to Order Changes and Customer Demands:* This was obviously an important order winner as 10 quotes were elicited, although it was not a shared order winner. All the quotes came from indirect questions.
 - *6) Delivery Speed:* Three of these were elicited from the question on order winners. One was elicited indirectly. Therefore it was not shared as an order winner.
 - *7) Price:* Two quotes were elicited from the question on order winners. One was elicited indirectly. Therefore, it was not a particularly shared perception of an order winner.
- (Appendix E).

Problems with Shared Language: Mostly the language is fine, but sometimes it is a problem, that is, 'porous' can have several meanings. It is worse over phone with customers. (Appendix E).

Insufficient Understanding of the Nature of the Management of Information in their Company: Again, it appears that the notion of the management of information is understood to an extent, but not particularly understood in its holistic sense, as an integrated

concept. Much of it seemed taken for granted, almost unthought of. As before, people tend to stick to specific examples, rather than talking about the management of information per se. (Appendix E).

4.7 Discussion

In these models the author has shown how the MD policy to customers may affect the power culture and the development of an information culture in these Companies. Once again, Research Questions 2, 3 and 4 have been answered.

This Chapter has again shown that the informal information system is highly important in terms of the flexibility it can provide, but the formal information system is equally as important to provide traceability. Both these Companies were power cultures and people would resort to memory, or to scribbled scraps of paper when often they should have been formally recorded due to increasing complexity and uncertainty in the face of their customer demands. The need for a formal information system, in both paper and electronic form, is becoming more important.

This combination of both formal and informal information requires an information culture to make it work - one which realises this broader, richer style of the management of information based on the behaviour of people. These concepts are once again illustrated in Figures 8.3 and 8.4.

Case Study 2: Pre-Transaction Elements:

<p>1. Policy to Customers and the Management of Information: (Facilitating) (Facilitating)</p> <ul style="list-style-type: none"> ■ Relationship Marketing ■ Implementation of formal procedures and standards: i.e. <u>Formal Improvement Programmes: Business Plan Computer System:</u> ■ Strategic Meetings for Managers ■ Company Brochure 	<p>(Impeding)</p> <ul style="list-style-type: none"> ■ Occasional Inferior Implementation of formal procedures i.e. <u>Computer System</u> ■ Little opportunity for feedback in Strategic Meetings ■ No MD Attendance at Formal Strategic Meetings for Managers
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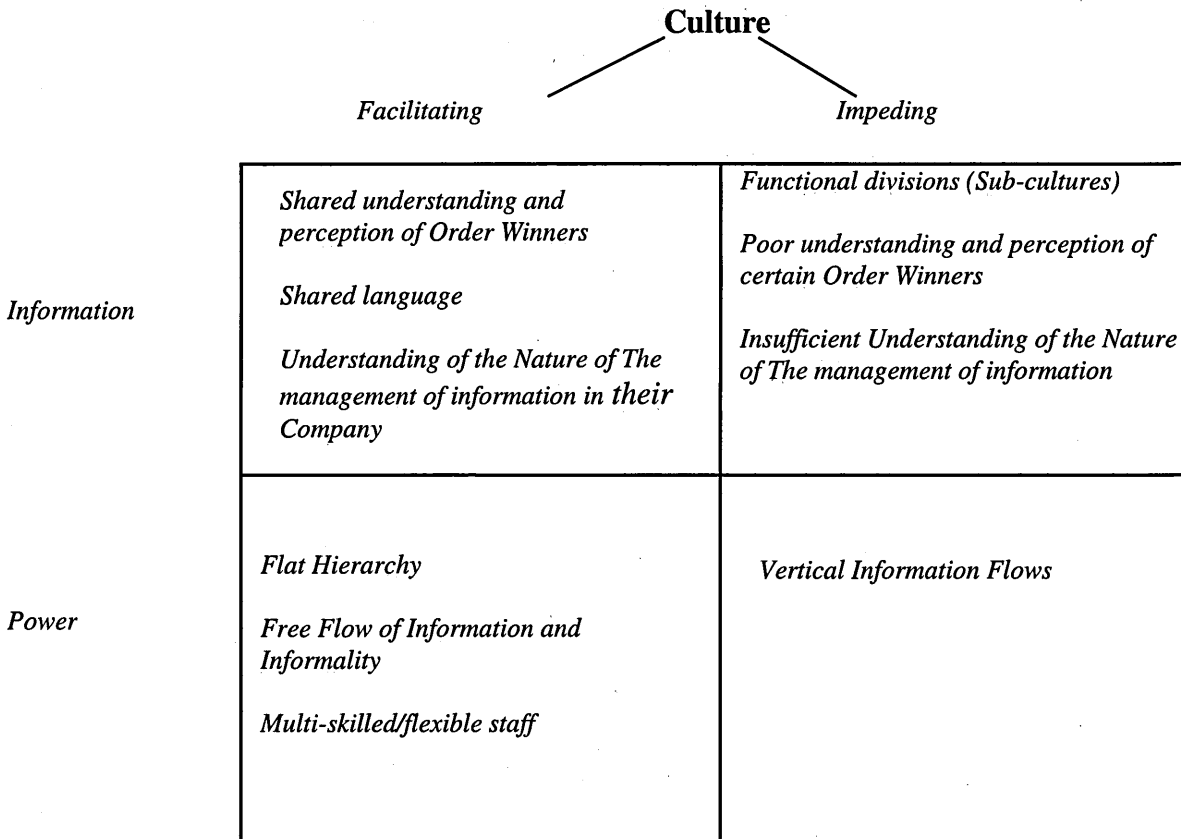


Figure 8.3: Management Issues in Case Study 2

Case Study 3: Pre-Transaction Elements:

Pre-Transaction Elements:

<p>1. Policy to Customers and the Management of Information: (Facilitating)</p> <ul style="list-style-type: none"> ■ Relationship Marketing ■ Implementation of formal procedures and standards: i.e. <u>Computer System</u>: ■ Strategic Meetings for Managers 	<p><i>(Impeding)</i></p> <ul style="list-style-type: none"> ■ Lack of Staff Integration in Relationship Marketing ■ Occasional Inferior Implementation of formal procedures i.e. Computer System, ■ Little opportunity for feedback in Strategic Meetings ■ Lack of Business Plan
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Culture

Facilitating

Impeding

<i>Information</i>	<p><i>Shared understanding and perception of Order Winners</i></p> <p><i>Shared language</i></p> <p><i>Understanding of the Nature of The management of information in their Company</i></p>	<p><i>Functional divisions: (Sub-cultures)</i></p> <p><i>Poor understanding and perception of certain Order Winners</i></p> <p><i>Language</i></p> <p><i>Insufficient Understanding of the Nature of The management of information</i></p>
<i>Power</i>	<p><i>Flat Hierarchy</i></p> <p><i>Free Flow of Information and Informality</i></p> <p><i>Multi-skilled/flexible staff</i></p>	<p><i>Vertical Information Flows</i></p> <p><i>Management Layers:</i></p>

Figure 8.4: Management Issues in Case Study 3

Once again, as in the pilot study, the similarities outweigh the differences. The main differences are in the amount of customers they had. The second Company have only 10-

15, compared with the first and third which has over one hundred, and the level of formal plans and procedures used. The first and second Companies have business plans and improvement programmes while the third does not, but the second Company has less well - developed electronic systems. The differences are summarised in Chapter 9.

In these models it can again be seen how the MD policy to customers may affect the power culture and the development of an information culture in this Company. Research questions 2,3 and 4 have been explored further and developed and confirmed from the pilot study, especially the management issues.

Again, these two Case Studies show that the informal information system is highly important in terms of the flexibility it can provide, but the formal information system is equally as important to provide traceability. Increasing complexity and uncertainty ensure that this cannot be the norm any more, and these companies appear to need a good formal information system. These aspects can be realised through the development of an information culture, which works and is expressed through the behaviour of people.

5 Conclusions

This section concludes the findings from the second and third case studies, building an overall theoretical framework developed from the pilot study, to help explain information behaviour in these Companies.

Section 5.1 confirms the findings as hypotheses and illustrates them in a theoretical model, and 5.2 confirms again that the findings do not establish cause-effect relationships but do what the author intended - to explore in depth the nature of information and its management in the three Companies and to generate some initial hypotheses.

The three case studies have been analysed in depth, and they have revealed a multitude of similarities in terms of the research questions:

- **Customer Satisfaction:** Six of the order winners were prevalent in all three. The overriding element of customer satisfaction appears to be *flexibility*, provided by the order winners, supported once again by traceability.
- **Nature of Information:** Highly systemic, the types of information were common to all three - they were all systemic combinations of formal and informal information, and activities. Once again, the author realised that information is rooted in behaviour, and that behaviour towards formal and informal information supports and enhances flexibility and traceability.
- **Management Issues:** Information behaviour and customer satisfaction were affected by the customer demands reflected in the order winners, the MD policy, the prevailing

power culture in these companies and the degree to which they were able to develop an information culture.

This Chapter has analysed the findings from Case Studies 2 and 3, and similar conclusions and theoretical models to the first case studies have been derived, although obvious differences have also been pointed out.

It was said in Chapter 4 that the aim was primarily to explore issues of information and its management in customer-focused SMCs, and this was intended to be in depth. Generalisation was only the secondary aim, and although three customer-focused SMCs have been explored, and similarities have been found, the author still realised that there were also differences. These are summarised in more detail in Chapter 9. The main focus was the hypotheses which could be generated from the detailed analysis of these three companies. These could only be drawn through detailed analysis, and the conscientious methodology illustrated the care taken in the generation of these hypotheses.

Summary of Chapter 8.

This Chapter has covered, through in-depth data analysis, the following areas:

1. An overview of Case Study Companies 2 and 3
2. Customer satisfaction in these Companies - order winners were defined and a theoretical model built based on the findings. As in the pilot study, the overriding order winner is flexibility, supported by traceability.
3. The nature of information in these Companies was confirmed. Once again, information was recognised as systemic, broadly categorised into i. formal and informal and ii. interpretations and activities through communication and storage. Information was confirmed as being rooted in behaviour.
4. The management issues explored and confirmed. The MD policy, power culture and information culture were the important aspects, but they all appear to conflict with each other in certain circumstances, producing poor information behaviour.
5. These factors have been illustrated and confirmed in the theoretical models, built from the findings. It shows that the power culture, the delivering of the order winners, and the MD policy to customers in all three case studies appear to impede and conflict with the development of an information culture and the necessary behaviour which it relies upon.
6. Conclusions- these findings helped to confirm the findings from the Pilot Study.

Chapter 9.

Contributions to Knowledge and Final Conclusions

1.

- This section reminds the reader of the original research objectives and deliverables, and describes step-by-step how they were achieved throughout the process of the research.

2.

- The research has provided an understanding of the four major research questions. They are summarised in this section in the form of hypotheses, and can be directly related to the initial research questions in Chapter 1, Section 2.3.
 - *Hypothesis 1: The customer-focused SMC has the characteristics referred to in Chapter 2, that is, component suppliers, engineer to order and suppliers business customers. It is worth investigating because of the difficult environment it faces and its importance to the UK economy.*
 - *Hypothesis 2: Customer satisfaction is the link between customer-focused companies, and the activities in the customer order fulfilment process which keep them customer focused. They are reflected in the order winners. The large variety of order winners show that customers demand flexibility, and this is supported by traceability.*
 - *Hypothesis 3: The nature of information is a systemic combination of formal and informal information, acted out through activities and processes in the customer order fulfilment process. Information is based in behaviours. Order winners can be satisfied through the activities involved in the customer order fulfilment process, and information can link them together. However, information needs to provide both flexibility and traceability to integrate these activities, and this is the way in which it is linked to customer satisfaction.*
 - *Hypothesis 4: Information can be facilitated by the development of an information culture, but this can be inhibited by the conflicting demands and aspects of the MD policy, customer demands and the power culture.*

3.

- An important focal point is not only the similarities of the companies, but also the differences between all three. Further research has emerged as a result of both the similarities and the differences.

1. Achievement of Research Objectives and Deliverables

This section reminds the reader of the original research objectives and deliverables, and describes how they were achieved throughout the process of the research. Section 1.1 goes over the research objectives and 1.2 summarises the deliverables.

1.1 Research Objectives

The research objectives were laid out in Chapter 1, and this Chapter shows how they were achieved:

1. Review and evaluate the literature

- The areas of customer-focus and customer satisfaction, the customer order fulfilment process, small to medium-sized enterprises and small manufacturing companies were explored in the literature review of Chapter 2. It was found that small manufacturing companies which were customer-focused had certain characteristics, and that there were certain order winners which could provide customer satisfaction. Customer satisfaction was found to be more than simply a tangible product - it was described as the overall service, or the 'offering', and there was some evidence that information is a resource in SMCs. Examples of the management of information for customer satisfaction were examined in large companies, and it was seen that the customer order fulfilment process means the activities which are integrated for the provision of order winners. The management of information and the softer, more interpretive approaches were explored in Chapter 3. It was found that the more informal, tacit side of information based in culture and behaviour would be a useful way to analyse the information in these SMCs, which rely upon informal information flows and communication.

2. Identify, describe and understand customer-focused small manufacturing companies

- The reason it is important for the UK economy to understand more about small manufacturing companies was described in Chapter 2, where it was seen that the SMC sector forms a particularly large percentage of the UK manufacturing sector.
- The type of small manufacturing company which is described as being customer-focused, which was studied through this research, and why it was important to research this type of company was also described in Chapter 2. The author found that customer-focused SMCs which are engineer to order, supply business customers and are component suppliers are more vulnerable in the supply chain, but are naturally closer to their customers.

3. Identify, describe and understand the nature of customer satisfaction in these small manufacturing companies

- How these companies achieve customer satisfaction through their customer order fulfilment process was illustrated in Chapter 2, and it showed how the activities in the customer order fulfilment process could be integrated through information. Chapters 7 and 8 further illustrated this through the identification of the order winners.

4. Identify, describe and understand the function and nature of information in these companies, and the link with customer satisfaction

- Chapter 2 established the link between information and customer satisfaction, through the activities in the customer order fulfilment process, and Chapters 7 and 8 established the order winners and the information activities in the customer order fulfilment process which could provide these order winners. Information in these Companies was recognised to be based traditionally in the power culture, composed largely of informal information and communication. This was established in Chapter 2, and developed further through Chapters 3, 6, 7 and 8, where it was also established that formal information may also increasingly play an important role in these Companies.
- These information activities were defined as being a systemic combination of formal and informal information, based in activities, and they were established through Chapters 3, 6, 7 and 8. All three parts of the thesis were involved in establishing this - the literature review, methodology itself and the analysis of the findings. Information was established as being rooted in behaviours, rather than technology.

5. Explore and understand the management issues

- Insight was gained into management issues surrounding the facilitation or impeding of information in the customer order fulfilment process in these companies. The author looked at the power and information cultures in Chapters 2 and 3, and they were built on in Chapters 7 and 8. The author found that the MD policy, customer demands on the Company reflected through the order winners, and the power culture which they were still rooted in could impede the development of an information culture.

6. Show how the methodology was developed to answer the research questions

- The methodology was carried out through much painstaking work, developed over three Chapters, in parallel with and carrying on from the literature review. Chapter 4 showed how the need for in-depth, exploratory research could be carried out through case studies, and how boundaries could be drawn through sampling strategies. In Chapter 5 the author showed how this was

done, through data collection techniques, and how the need for flexibility in the methodology could potentially conflict with rigour. However, multi-methods and triangulation made the research more valid and trustworthy. Chapter 6 illustrated in detail the care the author took in carrying out the process of research.

- The findings were elicited both from the process of carrying out the methodology, and actual data collected. Chapter 6 illustrated the nature of information as systemic and based in the behaviour of people, demonstrated by the need to constantly review the methodology. Chapters 7 and 8 analysed the findings from the research subjects themselves, and showed the link between customer-focus and information through the order winners, confirmed further the nature of information, building upon the findings from Chapter 6, and illustrated the management issues in greater depth than before.

7. Present the research findings

- Descriptive accounts and theoretical models of the case study findings have been presented in Chapters 6, 7 and 8 and 9. The weaknesses and strengths of the findings, including possible further research is presented in this Chapter.

1.2 Deliverables

1. A written thesis was proposed which achieved the following:

- The research objectives and how they were achieved was described, complete with full descriptive Chapters of the research process. The achievement of the research objectives in Chapter 1 were explained above and the process of achieving them explained throughout the rest of the thesis. This was done over nine Chapters.
- The large variety of literature available in relevant areas was reviewed. Part 1 delivered a wide-ranging literature review on issues pertaining to the customer-focused SMC and the nature of information and its management relevant to knowledge in those areas which are currently considered important to both academics and practitioners.
- A clearly laid out methodology which clearly shows how the research questions could be explored in the most detail was covered and explained in depth throughout the three Chapters of Part 2. This part clearly laid out the purposes, methods, process and issues of validity pertaining to the research.
- The management of information which enables these small manufacturing companies to provide customer satisfaction and maintain customer focus, taken from case study research material was clearly described in Chapters 6, 7, 8 and 9. Three customer-focused small companies were explored, and the results illustrated through both descriptive text and theoretical models.

- Theoretical models which define what customer-focus means for small manufacturing companies, the link with information, the nature of information and the management issues were presented throughout the thesis.
 - An explanation of how the findings contribute to knowledge is undertaken below, in Section 2. It explains that the author's original contribution to knowledge cited in Chapter 1 expanded as she went through the learning process, and goes on to illustrate how the research questions generated four hypotheses.
 - Indicators to a possible continuation of research in this area is explained below. The generation of hypotheses was begun in Chapter 7, through the analysis of the research data and the explanation of how the findings answered the research questions. The hypotheses were developed through Chapter 8 and summarised in this Chapter, Section 2.2.
2. A list of publications and reports which show how the research findings were disseminated was given at the beginning of this thesis.
 3. Research findings were also disseminated through reports to the collaborating companies. The author had already written reports to the collaborating companies as part of the Adapt/C.O.R.E. programme (1999).

2. Contribution to Knowledge

The research has provided an understanding of the four major research questions. They are summarised in this section and the similarities between all three Companies are shown, together with the hypotheses drawn from them.

Section 2.1 introduces the contribution to knowledge, 2.2 presents the table of results, showing similarities between all three case study companies. 2.3 draws them together through referring to the research questions, and shows how they can be turned into hypotheses. 2.4 continues these arguments, and illustrates them through a theoretical model.

2.1 Introduction

The contribution to knowledge was defined at the outset of the research programme, before the generation of the research questions. (Chapter 1, Section 1.4). At this stage the author was working only with some basic background knowledge and assumptions. She had an idea that information in these companies may be about the behaviour of people, as opposed to a rational technology-driven phenomenon, and this would affect the ability of information to be managed. As the research progressed evidence was gathered which supported this argument. About halfway through the research programme she decided to change the title from 'The Management of Information' to 'Information Behaviour'. Therefore, by the end of the research the author had learned that information is based in

the behaviour of people, enacted through social networks rather than being something which can be objectively managed and manipulated (Chapter 1, Section 1.4).

The final contribution to knowledge expands on the original stated in Chapter 1. For example, there was no mention of information behaviour in the original contribution to knowledge. The contribution to knowledge is expressed below, through the four main research questions, and they go on to form the hypotheses.

2.2 Table of Results

Table 9.1 illustrates the similarities between all three Companies:

<p>CUSTOMER-FOCUSED SMALL MANUFACTURING COMPANIES</p>	<ul style="list-style-type: none"> ◆ <i>Less than 50 employees, manufacturing or manufacturing related</i> ◆ <i>BS EN ISO quality standards registered</i> ◆ <i>Have retained important customers for more than 10 years</i> ◆ <i>Engineer-to-order</i> ◆ <i>Business customers</i> ◆ <i>Component suppliers</i> ◆ <i>Family firms/owner managed</i> 	
<p>CUSTOMER SATISFACTION (ORDER WINNERS)</p>	<ul style="list-style-type: none"> ◆ <i>Price</i> ◆ <i>Delivery speed</i> ◆ <i>Quality of product</i> ◆ <i>Informal, personal contact</i> ◆ <i>Information service</i> ◆ <i>Customisation of orders</i> 	<ul style="list-style-type: none"> ■ <i>Flexibility main order winner, supported by traceability</i>
<p>NATURE OF INFORMATION AND LINK WITH CUSTOMER SATISFACTION</p>	<p><i>Systemic - combination of</i></p> <ul style="list-style-type: none"> ■ <i>Types - formal and informal</i> ■ <i>Activities (communication and logging)</i> ■ <i>Rooted in the behaviour of people</i> 	<ul style="list-style-type: none"> ■ <i>Provide flexibility and traceability</i> ■ <i>Behaviours integrate activities in the customer order fulfilment process</i>

MANAGEMENT ISSUES		
Policy to Customers and The Management of Information	<u>Facilitating</u> <ul style="list-style-type: none"> ■ Relationship marketing ■ Implementation of formal procedures: i.e. <u>computer system</u> ■ Strategic meetings for managers 	<u>Inhibiting</u> <ul style="list-style-type: none"> ■ Lack of formal customer contact with workforce ■ Inferior implementation of integrated information system ■ No opportunity for feedback in formal strategic meetings
Information Culture	<u>Facilitating</u> <ul style="list-style-type: none"> ■ Shared understanding and perception of certain order winners ■ Shared language generally ■ Some understanding of the nature of the management of information in their Company 	<u>Inhibiting</u> <ul style="list-style-type: none"> ■ Functional divisions: (sub-cultures) ■ Poor understanding and perception of certain order winners ■ Insufficient understanding of the nature of the management of information as an integrated concept
Power Culture	<u>Facilitating</u> <ul style="list-style-type: none"> ■ Free, informal flow of Information ■ Flexibility of staff skills/tasks 	<u>Inhibiting</u> <ul style="list-style-type: none"> ■ Poor vertical information flows, especially downwards

Table 9.1: Table of Research Findings (i)

2.3 Research Questions and the Generation of Hypotheses

Four major hypotheses have been generated from the four research questions.

Question 1: What is a customer-focused Small Manufacturing Company, and why is this type of company worth investigating?

—————▶ This was defined through the introductory Chapter and the literature review.

Hypothesis 1: The customer-focused SMC has the characteristics referred to in Chapter 2, that is, component suppliers, engineer to order and suppliers business customers. It is worth investigating because of the difficult environment it faces and its importance to the UK economy.

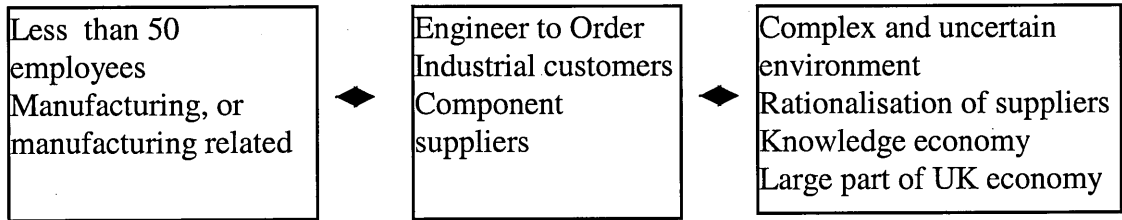


Figure 9.1: Hypothesis 1

A small manufacturing company has less than 50 employees and manufactures, or supplies manufacturing companies. For examples, the first Company did no manufacturing, but repaired components for manufacturing companies. The second and third companies were purely manufacturing companies.

A customer focused small manufacturing company supplies components and/or has little product development capability, supplies business customers, and engineers or makes to order. The ones selected for this study were also family firms and owner managed, and had retained important customers for ten years or more. These companies are important to the UK economy, because they make up such a large part of it in terms of sheer numbers, and it was important to study them because of their vulnerability in the supply chain.

These definitions were finalised by the end of Part 1, and no further research was undertaken in this area. This helped focus the research, and provide some measures of standardisation which contributed to the overall validity of the research.

2. What is customer satisfaction in these Companies?



This was already defined to a certain extent in literature review, and through experience on the ADAPT/CORE programme, but was defined further during data collection and analysis.

Hypothesis 2: Customer satisfaction is the link between customer-focused companies, and the activities in the customer order fulfilment process which keep them customer focused. They are reflected in the order winners. The large variety of order winners show that customers demand flexibility, and this is supported by traceability.

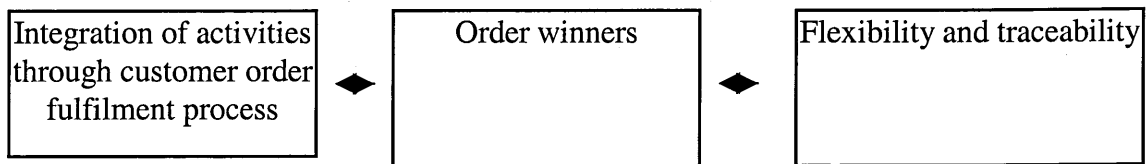


Figure 9.2: Hypothesis 2

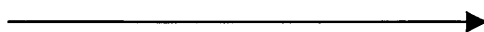
Customer satisfaction can be achieved through the integration of activities in the customer order fulfilment process, which deliver the order winners. The order winners are based not so much on tangible products, but ‘offerings’, incorporating many service aspects which need all types of information to make them work. Customers demand flexibility from their suppliers, and traceability of formal procedures and records supports this ability to be flexible.

Added to the various order winners are the variety of externally imposed standards they are supposed to comply with. Implementation of BS EN ISO quality standards or similar, usually imposed on them by their customers, is still a daily challenge for these companies, even though registration was passed years ago. This can result in a huge amount of paper, manuals, computerised logging and checking procedures. Furthermore, Investors in People, Health and Safety regulations, environmental laws and other standards and regulations are also important to these Companies.

These Companies are agile with co-ordinated and integrated processes to cope with this complexity. Complexity generally increases with the number of customers they have, and two of these Companies have over one hundred. Flexibility towards their customers can be maintained, however working in an increasingly uncertain and complex environment requires an increasing amount of traceability to support flexibility.

These operating procedures were a mixture of formal and informal. It was seen from the observation that the informal access customers have to the Companies is a major order winner. This enables them to remain flexible and responsive towards customers. In addition, the hectic logging of information feeds directly into quality, customer feedback, delivery and overall efficiency through traceability, the ability which enables them to have detailed, up to date information at their fingertips which aids or replaces their reliance on memory alone.

Question 3: What is the nature of information in the customer-focused small manufacturing company, and how is it linked to customer satisfaction?



This was already defined to a certain extent in literature review, and through experience on the ADAPT/CORE programme, but was defined further during data collection and analysis..

Hypothesis 3: The nature of information is a systemic combination of formal and informal information, acted out through activities and processes in the customer order fulfilment process. Information is based in behaviours. Order winners can be satisfied through the activities involved in the customer order fulfilment process, and information can link them together. However, information needs to provide both flexibility and traceability to integrate these activities, and this is the way in which it is linked to customer satisfaction.

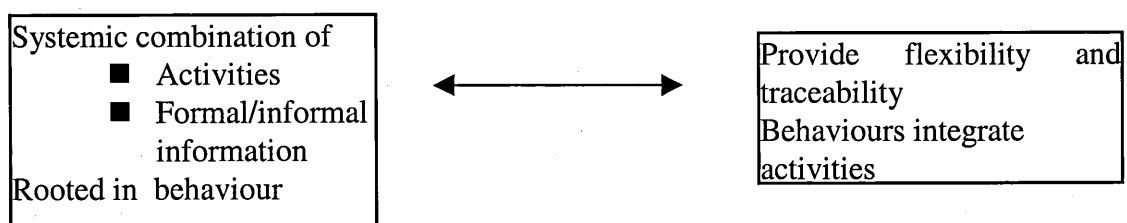


Figure 9.3: Hypothesis 3

Information in these customer focused SMCs is systemic - it is difficult to rationalise and break down. It is based in activities, and these activities are formed through varieties of formal and informal information, combined in many ways. They are formed through the behaviour of people, who both communicate information and are responsible for recording it.

Information behaviour provides flexibility and traceability to support order winners, and integrate activities in the customer order fulfilment process. Information can be divided into formal and informal information, although the line between them is very fine. People are the informal system, and they create, interpret, store and communicate information in a variety of ways.

The way in which people understand and interpret information, claimed in this thesis to be related to culture, directly affects the way in which they behave in acting out the information activities. This resulted in information processes which could be either effective or poor. Information behaviour is associated with communication and recording, and this in turn appears to affect order winners, and the ultimate aim of customer satisfaction - flexibility and traceability.

The variety of order winners makes the satisfaction of them a complex affair. For example:

- **Quality:** This requires strict adherence to ISO standards, through the careful recording of information, as well as the knowledge and expertise in people's heads, which they often communicate informally.
- **Delivery speed:** This requires careful and efficient co-ordination of parts and accompanying information at rapid speed.
- **Price:** Efficient co-ordination of operations can mean cost reductions which can allow lower prices. Careful evaluation processes can mean a premium price for customers.
- **Customisation:** This requires a wide variety of knowledge and skills, and flexibility of staff to be able to give each customer individual attention, often at short notice. This happens especially in unit or low volume work, common to these three companies. All combinations of information activities can contribute to this.
- **Personal contact:** Much effort is made to get onto customer sites in person, which can mean less time in the office. With so few staff anyway, even the MDs or sales manager can be missed, and information often does not get logged or communicated.
- **Information feedback:** This service requires information to be in the right place at the right time so that it is accessible to all. Staff should know immediately the status of work in progress at a moments notice. This necessitates the need for traceability.
- **Never turning down an order:** This increases the amount of information needed, as complexity increases.

Quality, delivery speed and price are the three common order winners, and in these Companies, are recognised explicitly as order winners. Giving their customers these order winners are all part of the flexibility they need to have towards their customers, to give them what they want. The other four order winners identified shows that more covert factors are at work, which may or may not be realised, but are all part of the everyday operations which enable this company to provide customer-satisfaction through the customer order fulfilment process.

These Companies must be able to deliver low price, good quality and fast delivery, while at the same time providing information in demand, rapid response to change, saying yes, personal and customisation. The 'traditional' order winners are giving way somewhat to 'flexibility' - the overall package, referred to as 'offerings'. They usually have to provide what the customers want on their terms - they have little say themselves. This has already been pointed out from the literature on the vulnerability of SMCs in the supply-chain. Information itself is a substantial part of the overall 'offering', and this includes such aspects as information feedback service and informal contact.

However, there is an increasing need to record information formally both on paper and in electronic form, not only for BS EN ISO standards but to maintain *traceability*. The recording of information in codified form is needed for the integrated co-ordination of processes. Being able to keep customers updated on their orders, allowing staff to have

access to the immediate status of orders, making sure information flows effectively through the organisation improves not only immediate customer satisfaction but frees up more time to concentrate on long term customer service

Question 4: How does management facilitate/impede their ability to maintain customer-focus through information?



This was already defined to a certain extent in literature review, and through experience on the ADAPT/CORE programme, but was defined further during data collection and analysis, especially management issues

Hypothesis 4: Information can be facilitated by the development of an information culture, but this can be inhibited by the conflicting demands and aspects of the MD policy, customer demands and the power culture.

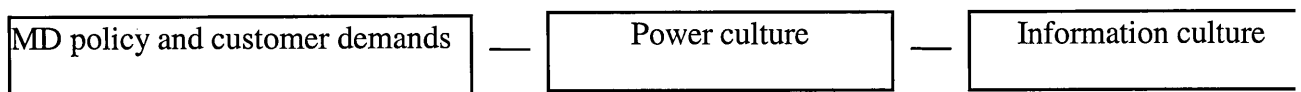


Figure 9.4: Hypothesis 4

The nature of information in these three Companies shows a systemic combination of tasks, activities and behaviours which either run effectively in support of customer satisfaction or go wrong somehow. The management issues show how the MD and culture can facilitate or impede these processes:

- *MD policy and customer demands:* The ability of these Companies to be an information culture is affected by a variety of factors and conflicts. Customer demands, as defined through the order winners are becoming ever more complex and uncertain, especially in the companies which have more than one hundred customers. Customisation and scheduling changes contribute towards more functional structures, especially in the first and third company, and general increases in demands for fast delivery, quality and lower cost increase the need for effective information.

The order winners, which reflect the customer demands on the Company, are accompanied by the MD's strategy and policy to customers and information. In all three of these Companies, there are increasing customer demands which go beyond the order winners of price, quality and delivery speed. Customer satisfaction and the nature of order winners never stay still - they are constantly changing. There is more emphasis on the overall service - the

informal contact and information feedback and the flexibility provided through customisation and never turning down an order. In the case of the first Company, the MD appears to be responding to this and also creating this to some extent, through his policy to relationship marketing, formal procedures, management meetings and Company publicity. In addition, in Company 2, there was the new order-winner, of rapid response to order changes at short notice, and this greatly increases the need for flexibility. Company 3 also has this as an order winner.

In Company 1, the orders have become more varied, and this has led to more divisions in the Company shopfloor layout. This has also meant divisions in tasks and skills, and slightly more 'specialisation' in certain areas. The MDs in both the first and third Companies are planning growth, to larger premises and in the case of the first Company, diversification and new products.

The MDs understanding and knowledge of IT issues differed slightly, though in all three there appears to be a tendency not to realise the importance of IT to its full extent. A full appreciation could be useful to deal with traceability issues in the customer order fulfilment process. However, they may be impeding these processes through not incorporating more of the workforce into the relationship marketing, or into the formal management meetings. The workforce understand a lot about the products and could bring much valuable knowledge to the order winners. Also, the electronic system could be better in terms of memory and efficiency in Company 1.

These factors were not recognised by the MDs in any of these Companies.

To sum up, the customer demands and MD policy cause:

- Functional divisions and sub-cultures, for example, sales/engineers divisions in Company 1, the front office and back workshops in Company 3. This has come about through diversification and customisation of products, and divisions between the MD's family and other staff.

- A need to formalise more information - memory and informal information is no longer enough.

- *The Power Culture:* The power culture appears to set a certain style of *behaviour* in these Companies:
 - Informal information flow based on verbal communication and sometimes informal jotting down of notes and messages.

- This is usually effective because a power culture is unitary - that is, in a culture where the staff wear many hats and work together as a team, it can be assumed that they generally share perceptions and understandings of order winners and the management of information.
- Often poor vertical flow of information, both upwards and downwards from the MD. The MD often goes through his trusted management team to communicate with shopfloor, and there is little 'open-door' culture.
- Sub-culture in terms of the MDs family - in two of the companies this had an effect on information flow and understanding.
- Occasionally, staff skills are sometimes too flexible resulting in a lack of focus on their main job.
- Inefficient formal information capacity - too much paper and under-investment in IT.

The power culture appears to be quite strong in all Companies. The flat hierarchy and flexibility of staff skills and tasks manifest themselves in a free flow of information, usually conversation-based. However, the hierarchy was more complex in the third Company than it was in the first or second Company, because of the extra manager.

However, the variety of customer demands, order winners and MD policy have been causing certain functional divisions, resulting in some poor understanding and perception of certain order winners, problems with shared language and insufficient understanding of the nature of the management of information.

In Company 2, this appeared less exacerbated than in the first and third Companies. This was probably due to the less functional divisive nature of the Company, perhaps because they had a lot less customers. However, the same basic problems appeared to be there in all Companies:

It was also cited in the literature review that there were two main strengths of small companies - entrepreneurial dynamism and flexibility of workforce, typical of the power culture so often associated with these companies. It may be that what was once a strength may now be contributing to weaknesses. In all three cases, the power culture appears to be holding back the development of a good information culture, and this was especially noticeable in the first and third Company, where there appeared to be more divisions in perception amongst the functions. The third Company, for example, only appeared to explicitly share one order winner in the perceptions of the staff. This was perhaps not a problem when times were more stable, when there was less uncertainty and complexity in the business environment.

Now, however, the MD strategies, and the customer demands, are showing up the limits of the power culture. The MDs in each of the Companies appeared to trust

only themselves and/or close family members or colleagues. Information often did not flow down vertically to the shopfloor, and almost certainly did not flow upwards either.

- *Information Culture:* These factors appear to give rise to an information culture which does not function as it could, manifested in activities and behaviours: occasional poor understanding of the Company in its environment, and poor understanding of the need for the management of information as an integrated, systemic concept. This applies to both the workforce and the MD. The often poor information processes and activities in all three Companies revealed that there could be room for improvement and adaptation in the face of a changing business environment and unpredictable customer demands.

Customer satisfaction generally requires an information culture which integrates its activities. The informal power culture went a long way to achieving this. There were problems in certain areas in addition to the above:

- Sub-cultures caused by functional divisions, that is, between engineers and distribution in one company, and the pattern shop and foundry in another.
- This sometimes led to differing perceptions about order winners and the management of information in their company, and occasionally a problem of multiple meanings surrounding certain words or terms.

The power culture is having to make way for a slightly more structured type of organisation, and this is having further detrimental effects on the development of an information culture. To summarise, the information culture which is necessary for customer satisfaction is problematical on two counts:

- The power culture, blocking information flows and understanding in some areas.
- Changing demands and a wider range of customer demands, causing the Company to become slightly more fragmented.

Those divisions in the Companies (MD and family/workforce, functional) may contribute to poor management of information. If people do not communicate, or if there is any misunderstanding in the interpretation of it, then this will affect their *behaviour* towards the management of information - their behaviour towards the recording and communication of information.

2.4 Theoretical Model

These concepts are illustrated in Figure 7.4:

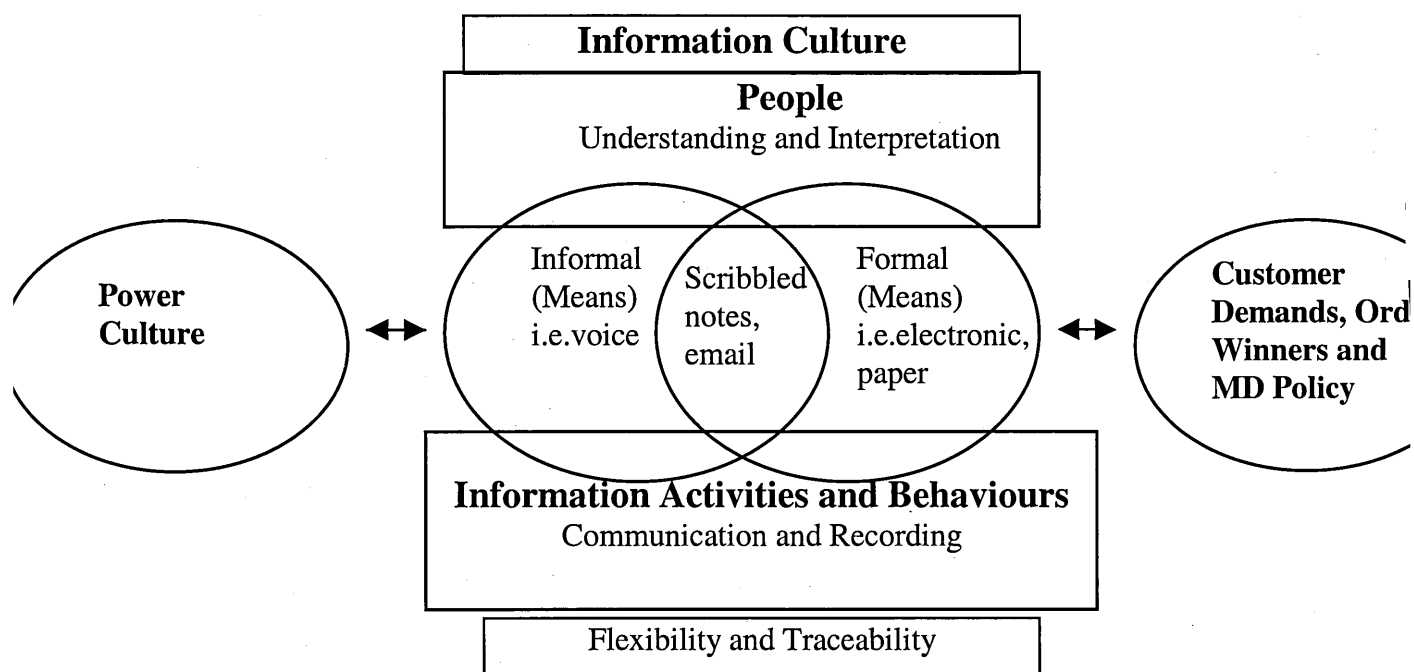


Figure 9.5: The Management Issues Interacting with Information Behaviour and Customer Satisfaction

The Companies' information behaviour and ability to develop and information culture is affected by the power culture, the customers demands reflected through the order winners and the MD policy. The overriding element of the model is people, and all combine to interpret information and act out information processes through their behaviours. Here, the analysis of the data transcended the methodology, and was able to build on the results.

It is important at this stage to point out that the pre-transaction elements may facilitate or inhibit the transactional elements, that is, the information activities, actions and behaviours, both formal and informal. These, in turn, may influence the customer satisfaction elements (order-winners). However, this thesis does not set out to validate cause-effect relationships in this way. To do so would require much measuring and testing of hypotheses. As was pointed out in the methodology Chapters, the research is fundamentally qualitative, and the purpose was primarily exploratory. Hypothesis generation is part of the deliverables of this thesis, and they were developed gradually throughout this thesis and summarised in Section 2.3 and in figure 7.4, above.

It has already been shown that the nature of information in this Company is systemic, that is, all the activities and perceptions about it are interrelated and interdependent. The

initial theoretical model presented above is only one way of looking at the phenomenon. It is not necessarily correct to claim that the nature of the phenomenon is linear, that the policy and culture affect the transactional elements which in turn affect the ability of information to satisfy customers. It may be as easy to claim that the order winners affect the transaction elements, which in turn affect the pre-transaction elements. For example, customer demands on the company, such as customisation or the need to be BS EN ISO registered enable the need to log information formally, and the need for an efficient computer system. The informal contact which customers expect may to a large extent be manifested in the tradition for this Company to prefer informal methods of information procedures. Therefore, in this thesis no claim to specific cause-effect relationships is made.

The above model is laid out in this way so that it can be easily understood, and any cause-effect relationships are merely inferred, not claimed to be factual.

3. Value of Research and Reflections

This section shows the value of this research to both academics and practitioners. Section 3.1 shows that an important focal point is not only the similarities of the companies, but also the differences between all three, and this is part of the purpose of in-depth research. Section 3.2 explains the relevance the findings have in the modern business world. Section 3.3 explains further research which has emerged as a result of the findings. 3.4 reflects on the research.

3.1 Differences Between the Companies

The author had to be aware of differences between these three companies, as much as she was aware of the similarities, as the focus of the research was in depth knowledge of the research domain in each of the Companies. They are illustrated below, in Table 9.2 , based on the research questions. They can be used to generate further research, explained in Section 3.3.

- These customer-focused SMCs have different numbers of customers, and produce in batches ranging from unit to medium-sized. This means that complexity varies, in terms of activities needed to satisfy customers, and the second Company appears to be less complex than the others.
- Order winners are similar to all three, although there are certain differences. Company 3 appears to have the ability to say 'no' to some customers, and Company 1 does not appear to have the problem of rapid response at short notice.
- Information is similar to all three companies. Noticeable differences are in the sophistication of electronic systems - Company 1 has a fully integrated system, Company 2 has no integrated system at all, or email, and Company 3 has a sophisticated system, but it is not integrated.
- The management issues appear to have some differences:

- Policy to customers and information: Company 3 has no company brochure. The MD of Company 2 does not attend the weekly meetings.
- Power culture: In Company 1 staff skills appear to be too flexible at times. Company 3 has one more layer of management than the other two.
- Information culture: Companies 1 and 3 appear to have more divisions between functions, and more problems with language between those functional divisions.

	Company 1	Company 2	Company 3
CUSTOMER-FOCUSED SMALL MANUFACTURING COMPANIES	<ul style="list-style-type: none"> • Over 100 customers • Variety of product types • Different volumes - unit to large batches 	<ul style="list-style-type: none"> • About 10 regular customers • Little variety of product types • Regular small batch volumes 	<ul style="list-style-type: none"> • Over 100 customers • Variety of product types • Normally unit, occasional small batch volumes
CUSTOMER SATISFACTION (ORDER WINNERS)	<ul style="list-style-type: none"> • Never turning down an order 	<ul style="list-style-type: none"> • Never turning down an order • Rapid Response to Order Changes at short notice 	<ul style="list-style-type: none"> • Rapid Response to Order Changes at short notice
NATURE OF INFORMATION AND LINK WITH CUSTOMER SATISFACTION	<i>Integrated database</i> <i>Email</i>		<i>CAD system</i> <i>Email</i> <i>Less paper on shopfloor</i>
MANAGEMENT ISSUES			
Policy to Customers and the Management of Information	<ul style="list-style-type: none"> • Company Brochure • Business Plan 	<ul style="list-style-type: none"> • Company Brochure • No MD Attendance at Formal Strategic Meetings for Managers 	<ul style="list-style-type: none"> • Lack of Business Plan
Information Culture	<ul style="list-style-type: none"> • Functional divisions: (Sub-cultures) • Slight problem with language 		<ul style="list-style-type: none"> • Slight problem with language • Functional divisions: (Sub-cultures)
Power Culture	<ul style="list-style-type: none"> • Staff skills sometimes too flexible 		<ul style="list-style-type: none"> • Management Layers

Table 9.2: Table of Research Findings (ii)

It was stated in the methodology that three case studies cannot generalise to any great extent, and indeed this thesis was intended to be exploratory - to discover some new knowledge about the nature of information and its management in these three customer focused SMCs. This has now been done, and a table of similarities has been drawn up. However, the author does not claim that these three Companies are completely representative of other customer -focused SMCs which match the pre-determined external criteria. To validate the generalisations would require some type of full scale survey, and this would be a natural progression of this research.

3.2 Relevance to Current Knowledge

There is much current interest in the management of information, knowledge management and small companies in both academia and industry:

- *The Management of Information:* A new concept on the management of information has been provided through this research, by showing that information is based in people, in the organisational culture, and enacted through behaviours. Small companies have been useful to illustrate this, as they tend to be low in technological sophistication, and rely more on informal information. This also has shown how formal information is becoming more important.

Formal information has always been important, and Chapter 3 showed the wide-ranging effects of the rational, technology-driven approach in large companies.. However, it was shown that this paradigm is not so useful for studying information in SMCs. Information and its management is a huge area, and this thesis set out to show this as one of its major objectives. Information culture, manifested through behaviour, was seen to be the most important aspect of the management of information. The holistic, wide-ranging aspects of information is not generally recognised by academics or industrialists.

One of the main questions is the extent to which the information culture, and information behaviour, can actually be managed. This thesis does not go into this. Managing corporate culture and managing change is the subject of much academic literature and theory, and it is probable that many of the theories from these areas could be adapted for an information culture.

The management of information in its broadest, systemic sense has much value to all companies of any size, not matter what their level of technology. They must consider formal and informal information as an integrated whole. All organisations involve people - even virtual companies and automated factories are designed by people, need some form of management control, and

also have human customers. Organisations are always bigger than their information systems, but still the technology-driven paradigm persists.

- *Knowledge Management:* There are diverse views on knowledge management, and there is neither the time nor the intent to explain them all in this thesis. This research has shown how information is a crucial and integral part of knowledge in organisations.

These ideas may be transportable to any type or size of company. Information has been shown to be a naturally occurring phenomenon, and the ideas of activities, behaviour, culture and formal and informal information may be used in any company. They could be used as a management tool, and information culture may be developed through managing change and organisational learning, although once again, these areas are not the main focus of this research.

Knowledge management has exploded as an academic subject in recent years. When the author began this thesis in 1996, knowledge management was not nearly such a huge area. However, knowledge management is closely related to, and overlaps with the management of information, and obviously it would have proven difficult and senseless to carry out the research without referring to certain aspects of knowledge management. In fact, through clarifying the nature of information, the author has also clarified the nature of knowledge to a large extent as a holistic and systemic phenomenon. Knowledge also has aspects of technology, and formal and informal information which is crucial to the knowledge cycle of creation, learning, sharing and recording. This view can draw together opposing views on knowledge management, and the management of information is essential to any company which is implementing a knowledge management strategy. For example:

- **Knowledge Creation and Sharing:** Based on Nonaka and Tagueuchi (1995), this is a combination of explicit and tacit knowledge. Explicit knowledge has much in common with information, as it can take many forms of codification such as dialogue or text. Nonaka and Tagueuchi's knowledge creation cycle of tacit and explicit knowledge allows knowledge to be shared, and effective communication and learning to take place.
- **Learning:** approaches such as Soft Systems Methodologies and Neurocybernetics tend to emphasise learning, that is, questioning perception and reflection in regard to IT/IS.
- **Recording:** Sophisticated electronic knowledge management tools can allow knowledge to be kept in the company when experts leave. This is similar to the need for traceability. However, like information, these tools need to enable and support flexibility and allow companies to adapt to change. This flexibility of people is sometimes referred to as

communities of practice or interest, especially across boundaries. Culture and behaviour are issues for management.

- *Small Companies:* This research has provided an insight into information in customer-focused small companies. Such research has not been done in any depth, to the author's knowledge. This new knowledge may be useful for academics who are interested in small company culture, entrepreneurs, supply-chain partnerships and innovation.

For practitioners, the ability of small companies to survive in today's competitive knowledge economy may be aided through using the methodology in this thesis as a tool for the identification of information and the management issues, and helping the managers of these companies to realise the true nature of information. The theoretical models can be used as a practical management tool. The MDs can use them to assess their own order-winners, the nature of information and their own management of information, including the companies' cultural issues. It is especially useful in those small companies which are customer-focused, but the ideas about information can be taken and used in any small company.

In general, research in the SME sector is limited to studies of start-ups and failures, and entrepreneurship. There is a lack of research in the SME sector from the social sciences, and especially from organisational studies. However, there may be an even greater need for research and knowledge of SMEs as organisations. Being limited in resources, especially material and financial, they need to understand and utilise their human resources. Analysing how people interpret and behave with respect to information, and also with respect to the organisation as a whole may greatly enable SMEs, and SMCs in particular, to remain, or become even more competitive.

Another contribution of this thesis is the recognition that small company owners and managers may find knowledge of their organisations more relevant than academic studies on start-ups, failures and entrepreneur characteristics. At present, research appears to be mostly for the interest of academics rather than the interest of small company owners or managers.

3.3 Further Research

The most relevant research is that which could come from the generation of hypotheses. There were only three case studies, and a full scale testing the results would improve the

generalisability of the findings. This research was focused on the small details of these companies, not on generalisations.

The four hypotheses can be further tested in similar types of small companies through a large scale survey, in the UK or internationally, and this would test the findings from this thesis. Alternatively, further case studies could also be done in similar companies, and they would not only support or falsify the findings from this thesis, they would also test the methodology developed by the author for the identification of information and the management issues in these type of companies.

There were some other research problems which surfaced as a result of this thesis. Referring to Table 9.2:

- The differences concerning order winners and the nature of information, information behaviour and its management may be substantially affected by the number of customers and size of batches as complexity increases or decreases, and this could be explored either by means of a survey, case studies or even some types of quasi-experiments.
- Customer satisfaction may differ in small companies, according to the product they make. For example, Company 1 does not actually make any products. It may also differ according to the personality of the MD, for example, the MD of Company 3 appears to be able to say no to customers. These theories could be tested further in small companies through surveys or case studies.
- The management issues bring up several points of interest:
 - Whether or not the MD takes an active part in meetings with his team leaders may affect information behaviour and hence customer satisfaction. The MD of Company 2 did not attend weekly meetings.
 - Information behaviour may be affected by the degree of flexibility in staff skills - there is a chance in Company 1 that overflexibility could detract from good information processes. There could also be some interesting research in the extent to which layers of management affect the power culture.
 - Research in the extent to which functional divisions according to jobs and skills affect the information culture, especially the sharing of a common language, may be highly relevant to small companies, especially those which are complex and have many customers, as Companies 1 and 3.

There were also some other areas of interest which emerged from the findings:

- Customer-focus: This may have different definitions in different companies, compared to the three companies defined as customer-focused in this research. This could be explored in greater detail.
- Customer satisfaction in the form of these various order winners may not apply to other customer-focused SMCs.

- Nature of information and its management: Information and behaviours associated with it may vary in different types of small companies, for example, companies using more sophisticated technology may have more emphasis on managing this, or may not even be power cultures.
- These theories are easily transported to any type of organisation, regardless of size, industry sector or technological sophistication. Information is a naturally occurring phenomenon, and it would be interesting and relevant research to find out the ways in which different types of companies manage and enact formal and informal information systems.
- Regarding the management of information, the development of an information culture expressed through behaviour has been the focus of this research. There may be other issues which affect information behaviour, and its ability to be managed. Power and politics, for example, has not been considered in this thesis, except in relation to the power culture. A study of these companies in terms of power and politics may reveal new and useful insights into information.

3.4 Reflections

This research has brought new knowledge to bear on which there was either little previous knowledge (customer-focused small manufacturing companies) or so much previous knowledge that much of it was misinterpreted and misunderstood (the management of information and knowledge management). The research is highly relevant to the management of information and knowledge management today, and small companies in particular may benefit from an approach to analysing information based on this research.

Further research has been generated directly from the four hypotheses, but also suggested further research from questions arising as a result of inconsistencies in the three case studies. The rich knowledge gained from the three parts of the thesis, the literature review, methodology and analysis, have not only clarified many areas, but also brought up new questions. The author has not only provided solutions to past problems but raised new problems for researchers and practitioners to work on in the future.

Summary of Chapter 9.

1. The author showed how the objectives and deliverables were achieved, by referring to the original objectives and deliverables
2. The contribution to knowledge was explained, through the generation of hypotheses, which came originally from answering the research question
3. The generalisations from all three Case Study Companies were illustrated in a table and a theoretical model
4. The in-depth analysis pointed out differences between the three case studies, in the form of a table
5. The value of the research was explained, and pointers to further research were laid out as a direct result of the findings.

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Appendix A: CORE Programme

The author had had much experience of working with the Small to Medium-sized Enterprise sector, especially the latter, as part of the Adapt/CORE programme. This, as well as the literature, helped to formulate the research question (See Author's Biography). As part of the Adapt/CORE programme, much time was spent in and around factory floors, talking to managers and employees at all levels of the Company¹. The author undertook:

1. Facilitated SMC Learning Clusters: They were thought of as a way to allow these small companies to gain the knowledge they need through *self-help*. An initial definition of the philosophy behind a cluster was given in a paper written for a conference:

“The rationale behind facilitated clusters is based upon the premise that all members are equal - there is no control structure and emphasis is placed upon responsibility of participants for contributions and empowered decision-making. The aim is the facilitation of knowledge-transfer for the benefit of the participants - they define their own needs and find ways to resource them accordingly.”

(Nelder and Martin 1997)

The clusters were intended to embrace issues which the companies themselves were interested in, with the facilitator acting alternatively in a leading or supporting role depending on the circumstances. They ran successfully for two years, and covered topics and activities such as - Hosted Factory visits, Change, Technology, Growth, Lean Production, Team-Working, Customer-Focus, Marketing and Health and Safety.

2. Carrying out Needs Analyses: This provided opportunities to talk to management and staff at all levels of SMCs about strengths and weaknesses, opportunities and threats. It also provided opportunities to observe all sections of the company in their everyday operational context.

3. Auditing SMCs for their suitability as to being 'exemplars' for other SMCs to visit and benchmark: Again, as above, these visits and questionnaires provided opportunities to talk to and observe the company in its everyday context, at management, shopfloor and functional levels.

¹ European Social Fund project, running from January 1997 to January 1999

4. Helping SMCs to build better relationships with their customers, and to construct customer surveys: This work enabled the author to understand more about the customers of a SMC, and how SMCs can be customer focused and build loyalty.

These programmes provide an insight into certain aspects of SMCs, especially informality of operations, customer satisfaction and information management, which were described in the previous section.

Appendix B: ASLIB IRM Network

The author is a member of the Association for Information Management (ASLIB) Information Resource Management Network. This group meets every two months or so, and invites experts in this area to speak. They are usually Senior Managers, Consultants, or Academics.

The group was started up eight years ago by several enthusiasts of Burke and Horton's 'Infomap' (1988). Over the years it has gradually moved from a focus on 'formal' 'hard' information to a broader scope which covers areas which are usually known today as knowledge management.

The last six presentations were:

Practical Examples of Knowledge Management by Dr David Skyrme, author and consultant

Foundations for Knowledge Management by Liz Orna, author and consultant

Knowledge Management - YOU Can Make a Difference by Kevin Miles, Senior Information Manager, Surrey Police

Knowledge Management - Role of the Information Professional by Daniel Berhin, Information Professional with Booz-Allen and Hamilton

Creating E-Knowledge by Alan Garvey, Managing Director of TMS Information Solutions Ltd

Managing Knowledge in B.G. Technology by Ken Pratt, Knowledge Manager, BG Technology

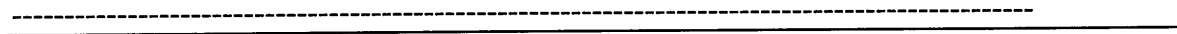
These themes cover a wide variety of perspectives and techniques on knowledge management and show the ways in which information management and knowledge management are linked.

Liz Orna has written a well-known book on managing information flows in organisations, though even she cannot ignore the focus and interest in knowledge management, and this is revealed in the second edition (Orna, 1991, Orna, 1999). She stresses the importance of what organisations need to know, and how managing information flows can help achieve this.

Kevin Miles talked about the experiences of Surrey Police and how they developed an integrated information system throughout the entire force to provide officers with the knowledge that they need when they need it. He stressed the significance of understanding *information*, rather than *Information Technology*, as the way to provide and share this knowledge for and with people.

The network draws out three elements which are interdependent:

Information Technology ——— Information ——— Knowledge



Appendix C: Samples from Data Collection, Chapter 6.

This section supports the findings from the research process, described in Chapter 6.

2.2 First Interviews

Interview 1. - Questions asked

MD - Sales Director

- *Background to company:*
- *Size, complexity, market certainty:*
- *Structure, flexibility, functions:*
- *Goals for i)market development:*
ii)product development:
- *Threats and opportunities:*
- *Human resources i.e. teams, quality, communication:*
- *Order-winners:*
- *Does everyone agree:*
- *How many important customers:*
- *Forecasting:*
- *Distribution:*
- *Electronic systems:*
- *Quality procedures:*
- *Who has customer contact:*
- *Formal or informal:*
- *How is order dealt with:*
- *Key players in customer-satisfaction process:*
- *Role of information in this:*
- *Is communication good:*

Interview 2 - Questions asked
2nd MD - Technical Director

The following questions were added to the original interview structure:

■ *Language*

- *Meaning of 'customer satisfaction':*
'communication':
'quality':

to find out more about a shared understanding of these terms.

■ *Formal procedures*

- *Communication:*
- *Business plan:*
- *Customer order process:*
- *Standards:*
- *Surveys:*
- *Complaints:*
- *Other quality procedures:*
- *Sales forecasts:*

to elaborate on certain aspects of formal information.

■ *Codified Information*

- *Computers:*
- *Do they work well:*
- *Paper:*

to elaborate on certain aspects of codified, formal information

**Interview 3 - Questions asked
Sales Manager**

These questions were added:

- *Other functions helpful, informative?*- to elaborate on informal communication
- *Better communication for customers?* and
- *Is system compatible for customers?*
to find out more about customer interface

and

- *Sales Forecasts?* was taken out as, in their industry, there was little need for forecasting

**Interview 5: Questions asked
Production Manager**

The question:

- *How do you communicate?* was added for more data on intangible areas

These three below, drawn out for more data, were added:

- *Communication with customers?*
- *Who has customer contact?*
- *Formal or informal?*
- *What communications could be made better?*

The following were taken out as they were difficult to answer from a non-strategic viewpoint:

- *Business plan?*
- *Customer order process?*
- *Other quality procedures?*

2.5 Next Interview Design

2.5.2 Pre-design and Emergence of Method

MEANS

Electronic information i.e. Computer system, photocopier, phone, email

Quality of Information itself:

Accuracy	Reliability
Comprehensiveness	Relevance
Credibility	Simplicity
Currency	

Precision, Pertinence and Validity were not used - the former because it was similar to Accuracy and the latter two because they might be difficult to understand

Utility of Information Holdings:

Adaptability	Format and presentation
Browsability	Physical stability
Ease of access	Selectivity
Ease of use	

(Accessibility was not used because of its similarity to Ease of Access. Reproducibility and Unreproducibility were not used because they were not considered important in the context)

Paper-based i.e. job cards, BSI procedures, specifications, evaluations, customer orders, print outs, warranty cards, accept/reject forms, spares lists, quality manuals, numbers on computers, purchase orders, faxes, letters, catalogues, repair cards, client contracts, product manuals, invoices etc

Quality of Information itself:

Accuracy	Reliability
Comprehensiveness	Relevance
Credibility	Simplicity
Currency	

Utility of Information Holdings:

Adaptability	Format and presentation
Browsability	Physical stability
Ease of access	Selectivity
Ease of use	

Voice i.e. face to face conversation, especially with staff in customer-satisfaction cycle i.e. Joy and Engineers, Chris and Diane, spares meetings, phone calls from customers and shopfloor, Chris and customers etc

Quality of Information itself:

Accuracy

Comprehensiveness

Credibility

Currency

Reliability

Relevance

Simplicity

Utility of Information Holdings:

Adaptability

Browsability

Ease of access

Ease of use

Format and presentation

Physical stability

Selectivity

A few qualitative questions, for a better idea of the people who drive and implement the organisational objectives:

2) PEOPLE

3) IMPACT ON ORGANISATIONAL PRODUCTIVITY

4) IMPACT ON ORGANISATIONAL EFFECTIVENESS - IN THIS CASE, IMPROVED CUSTOMER SATISFACTION.

5) WHAT OTHER RESOURCES SHOULD THERE BE – WHAT IS MISSING?

Interview 1. - Sales Manager

- *Currency* was changed to *timeliness* - for better comprehension
- *Physical stability* was not included in 'paper based' for obvious reasons

- *Adaptability*
- *Browsability*
- *Ease of use*
- *Format and presentation*
- *Physical stability*
- *Selectivity*

were all missed out in voice based information - the only one used was 'ease of access' referring to people themselves.

Interview 2 - Production Manager

- *Selectivity*: was dropped from electronic
- *Reliability*: dropped from paper based - they were both too ambiguous

In this interview again, eighteen of the variables were answered quantitatively only.

- *Currency*: 5
- *Reliability*: 3.5
- *Simplicity*: 5
- *Browsability*: 4
- *Selectivity*: 4
- *Reliability*: 4
- *Ease of use*: 4
- *Format and presentation*: 3
- *Selectivity*: 3.5
- *Relevance*: 4
- *Simplicity*: 4
- *Ease of use*: 4 - 5
- *Format and presentation*: 5
- *Credibility*: 4 - 5
- *Reliability*: 4 - 5
- *Accuracy*: 5
- *Credibility*: 5
- *Reliability*: 5

4.3 Interviews

4.3.2 Case Study 2

Interview 1: Questions asked

MD

1) Background/context:

- *Background to company, age, turnover, product etc - context from MD*
- *Size, complexity, market certainty - as above*
- *Goals for i)market development ii) product development - as above*
- *How has your product changed over the years - as above*
- *Threats and opportunities - as above*
- *Human resources i.e. teams, quality, communication, skills - Structure and Culture*
- *Order-winners - obvious*
- *Does everyone agree - perceptions*
- *Policy to customers - obvious*
- *How many customers and which are important - policy*
- *Quality standards - policy*
- *Uncertainty/complexity of orders - policy and order-winners*
- *Customer relationships/retention - as above*
- *Degree of centralisation/autonomy - structure (when was participation/ownership added)*
- *What functions - structure*
- *Vertical information flows - structure*
- *Key people in order-invoice cycle - to start next interviews*

2) The Formal system

- *Formal procedures in the order-invoice cycle i.e. products themselves and invoicing etc (Everyday)*
- *Information resources: Electronic and paper based - what are they? (Identifying)*
- *How valuable are they? Based on variables such as (Valuing)*

(Constantly back up with examples of what works and what doesn't)

3) The Informal System

- *People - how they cope with exceptions, procedures which are not routine - what are their information resources for this?(Identifying)*
- *How valuable are they? (Valuing)*

4) Some general comments on information resources and communication. Is it good overall? Could it be better? Are people helpful and communicative? Is information generally logged in the system?

Interview 2 - Quality Manager

- *Human resources i.e. Teams, quality, communication, skills:* was not asked- this was difficult to express
- *Credibility - 8. As above:* this showed that the variable was not really needed

The following were all given quantitative values only in first section:

- *Currency*
- *Relevance*
- *Simplicity*
- *Adaptability*
- *Ease of access*
- *Format and presentation*

and

- *Simplicity*
- *Ease of access - in the second section and*
- *Format and presentation*

were not asked at all in the informal section for obvious reasons.

Interview 3. Questions asked: Sales Director

This was the same as Interview 2, except

- *Policy to customers*
- *Key people in order-invoice cycle*

not necessary, they were already known. They were left out.

- *Credibility* - was taken out completely, as before

Again, the following were all answered quantitatively only:

- Currency - 9.
- Relevance - 9.
- Simplicity - 10.
- Adaptability: - 10.
- Ease of access - 10.
- Format and presentation - 10.

in the formal information section, and

- Accuracy - 10
- Credibility - 10
- Currency - 10
- Relevance - 10
- Simplicity - 10

in the informal information section were all answered quantitatively only.

Interview 5. Production Manager

Same as Interview 4, except

- *Credibility* was missed out in both sections

- *Ease of access* and

- *Format and presentation*

were both given quantitative values only in the formal information section, and

- *Simplicity*

in the informal section was given a qualitative value only.

4.3.3 Case study 3.

Interview 1. - MD

- *Policy to customers:* was not answered, but data on this was elicited earlier in the interview, and
- *What functions/languages*

was answered separately indirectly as part of another question

Interview 2. - General Manager

The first four were not asked, as before.

- *How many customers and which are important* - this was known already.
- *What functions* and
- *Key people in order-invoice cycle* - they were known already so were not asked

Interview 5. - Foundry Foreman

First four not asked, and

- *Human Resources and*
- *Does everyone agree*
- *Policy to customers*
- *Key people in order-invoice cycle*

were also not asked

In the formal system:

- *Credibility*
- *Relevance*
- *Adaptability- were not asked, and*

- *Format and presentation - 10 - -only quantitative measure given.*

In the informal system:

- *Credibility*
- *Relevance*
- *Format and presentation*

were not asked.

Appendix D: Samples from Data Collection, Chapter 7

2.1. Order Winners

1) *High quality of repair and service*: Five out of six of the interviewees mentioned this specifically as an Order Winner. There were five quotes in all:

- “Being a trouble free vendor i.e. always saying yes, low cost, product quality, durability, conformance to specifications, forgetability”

2) *Personal relationship with customers*: There were ten quotes in all from the interviews which implied that this is indeed an important order-winner:

- “Informal, face to face”
- “For J, N and the MD, face-to-face a lot of the time, for others phone usually”

In addition, some of the observation revealed the extent of the personal contact:

- “C phones a customer about an order no. - he is on first name terms”.

3) *Information and feedback service to customers*: There were seven quotes in all which implied that this is indeed an important order-winner:

- “Can answer customers quickly”
- “Can give information to customers immediately sometimes”

4) *Delivery Speed*: Four interviewees cited this as an order winner:

- “5 day turnaround”

5) *Price*: Four interviewees cited this as an order winner

- “Low cost”

6) *Never turning down an order*: Two people, including MD, cited this as an order winner:

- “Always saying yes”

7) *Customisation of orders*: There were nine quotes on this:

- “Customers have differing needs”

2.2 Discussion - Flexibility

From Interviews:

“A high level of flexibility because of skills”.

Flexibility: “Fairly accountable and multi-skilled, but not enough yet”.

Flexibility: “Very responsive”.

Flexibility: “Responsive, spread slightly throughout org. Ramon doing a course at college. Customers *do* listen”.

Perception of SWOT: “Flexibility to customers - strength”.

Order-winners: “Price main thing, flexibility, quality, customers have differing needs”.

3.2 Types of Information

3.2.1 Informal Information

From Interviews:

- How do you communicate? “Phone, email, meetings planned and impromptu”.
- Formal or informal? “For J, N and the MD, face-to-face a lot of the time, for others phone usually.”
- “J’s happy nature and relations with customers”.
- How do you communicate? “Informal, but sometimes falls outside scope of job: enabled through multi-skills of staff.”

From Observation:

Observer as Participant type observation revealed much more of the extent of informal communication. The following text is taken directly from the author’s narrative:

- Engineers having a ‘quick word’ with each other is an important informal communication. As is J querying D, and vice versa.
- There is much informal negotiation with customers over spares and changes in quotes. J and others often has to come to the shopfloor to talk about things and vice versa

3.2.2 Formal Information

From Interviews:

“Formalised information is important to stop people forgetting things, and helps keep records for customer satisfaction: enabled through shared understanding of information management, and implementation of formal computer and paper based systems and ISO Quality Standards”

“Can answer customers quickly, BOSS used for customer reports, ordering , invoices : this is enabled through implementation of the computer system and understanding of Information Management”

“Computers: BOSS system, whole org., compatible, also vendor CDs, Email perhaps soon for customers, A.T. for sales”.

From Observation:

The ‘talkthroughs’ were used to glean data on formal information:

“Frequent forms, cards etc. are sent upstairs and downstairs and between functions to report on job status.”

Documents:

The studies of company documents, including computer printouts and monitors, show the reliance and importance of maintaining traceability. For example:

- Warranty Card Report
- ECS Training Policy
- Quality Audit

3.3 Information Activities

3.3.2 Transaction elements

Information Communication:

From first interviews:

“Procedures poor, especially computer print outs.”

“Sometimes information is not entered, especially if there is a delay. Engineers presume Joy doesn’t need to know”.

“No problem with language when communicating with other functions generally, but occasionally blinded by technical language - then she has to play by ear.”

Formal communication in org. and with customers?: “ Email, in person, phone, fax, ad hoc meetings, and formal management meetings.”

From observation:

- I then go to N on the shopfloor. She is doing a quality audit - trying to match up status (position of WIP) to what it says on BOSS. Sometimes it doesn’t match i.e. people forget, move things, don’t enter information. Communication is sometimes poor.

From Second Interviews:

“Comprehensiveness: 4 – lack of discipline, understanding. Awaiting forms – people won’t put right numbers down against parts.”

“Ease of access: 4 - 5 - again, filing etc and people hanging on to paper.”

Information Recording:

From Interviews:

“Management review of this every two months. Formalised information is important to stop people forgetting things, and helps keep records for customer satisfaction (MD thinks).”

“We are pushing towards formalising communication, email, N works through presentations, reports.”

From Observation:

“Logging of information about a part means that another person can immediately access the status/WIP information: enabled through ISO Standards, Computer system, multi-skilled workforce”.

4.2 Pre-transaction Elements (Facilitating):

4.2.1 Policy to Customers

Relationship Marketing

Examples: from Interviews:

“We have every day contact with customers”

“For J, N and the MD, face-to-face a lot of the time, for others phone usually.”

“She does a lot of listening.”

“J is offsite a lot with customers.”

Implementation of Formal Procedures and Standards

■ Integrated Information System

Examples from Interviews:

Computers: “BOSS system, whole organisation, compatible, also vendor CDs, email perhaps soon for customers, A.T. for sales.”

“Formalised information is important to stop people forgetting things, and helps keep records for customer satisfaction (MD thinks).”

■ Business Plan

Examples from Documentation

- *Education* of employees, not only technically but also in the needs of customers and the marketplace in which they are competing, and also
- *Empowerment*, allowing them more discretion in everyday decision regarding their tasks and dealing with customers
- *Communication*, allowing employees to respond *directly* to the appropriate member of the decision making unit in the customer organisation

■ Formal Strategic Meetings for Managers

From Observation at a Management Meeting:

- Presentation of ‘Business Plan’ to key members of staff, and also the once weekly meetings

Free Flow of Information and Informality

From Interviews:

- Other functions helpful, informative: “yes, very, they are honest about problems”

From Observation:

- Then N comes in to talk to C about a part. D grabs her about a wrong card. MD is now on shopfloor talking to J, and an engineer and a man in a suit. They wander around talking to people. J is talking to D in the distance, C and D are rushing around.
- J is talking to C, informally, about an order.

Staff Skills/Tasks

Examples from Interviews:

“A high level of flexibility because of skills”.

Examples from Observation:

- D does several jobs - packing, goods in and logging of information and purchasing
- “If everyone only did their job then they wouldn’t be working as a team”.

4.2.3 Culture

Shared Understanding and Perception of Order Winners

1) *High quality of repair and service*: this was all elicited from the question on Order Winners.

Examples:

- “Being a trouble free vendor i.e. always saying yes, low cost, product quality, durability, conformance to specs., forgetability”

Five out of six of the interviewees mentioned this specifically as an Order Winner.

4) *Delivery Speed*: this was all elicited from the question on Order Winners: Examples:

- “5 day turnaround”

Four interviewees cited this as an Order Winner, therefore it was fairly shared, out of six interviewees.

5) *Price*: this was all elicited from the question on Order Winners. Examples:

- “Low cost”

Four interviewees cited this as an Order Winner, therefore it was fairly shared, as before.

Shared Language

Examples from Interviews:

From the question on language:

“No problem with language when communicating with other functions generally.”

Understanding of the Nature of Information Management in their Company

From Interviews:

Empowerment: “Not really, not much dissemination of information, but trying to move with EFQM.”

“Formalised information is important to stop people forgetting things, and helps keep records for customer satisfaction (MD thinks).”

4.4 Pre transaction elements (Impeding)

4.4.1 Policy to Customers

Lack of Formal Customer Contact with Workforce:

From interviews:

Customer contact: "Sales, MDs, Admin, Reception, and sometimes C - don't encourage customer contact with engineers in general."

"Also, engineers don't understand why orders have to be back in 5 days."

From second interviews:

Ease of access: "No, J and D often offsite. K is very good on Sales Team. Sometimes C needs information there and then, which can lead to customer delays. e.g. relates to certain customer, i.e. not enough information from customers, and can't go ahead without a purchase order. It should be J's job to issue purchase order, with quotes etc. Not my job to sift through paperwork."

"Any feedback from customers is fed to engineers."

Inferior Implementation of Formal Procedures

■ Integrated Information System

From first interviews:

Compatibility for customers: "BOSS system is not entirely compatible - E has to convert software for customers, 5 days a month."

"The database is kept up to date, generally no problems though a bit slow - needs more memory."

"There is no facility for putting C's evaluation on the BOSS system."

From second interviews:

Format and presentation: "2 - not user-friendly, have to go through a lot of parts and documents to find things."

Vertical Information Flows

From Interviews:

“MDs have to sign purchase orders.”

Two-way communication: “Downwards, but not vice-versa.”

Staff Skills

From Interview:

“C can’t book in and do all the paperwork as well - there is not time. He doesn’t know for sure that J has not given quotes on the job he is presently working on.”

Functional Divisions: (Sub-cultures)

From Interviews:

Functional divisions: “Upstairs and downstairs.”

Functional divisions “Family and non-family.”

Functional divisions: “Goods and Dispatch, Finance, Personnel.”

Functional divisions: “Yes, skills levels.”

Poor Understanding and Perception of Certain Order Winners

- 2) *Personal relationship with customers*: this was harder to elicit - only one hint of this actually came from the question on order winners itself. This was the quotation on 'J's happy nature'. The rest came from indirect analysis of the interviews. It was more through a combination of indirect analysis and the observation that it was possible to see that the 'informal' system was actually a substantial indirect order winner.
 - "Informal, face to face"
 - "For J, N and the MD, face-to-face a lot of the time, for others phone usually"These quotes came from other questions. As only one interviewee mentioned this as an order winner, then obviously there was not shared perception of this order winner. However, there were ten quotes in all from the interviews which implied that this is indeed an important order-winner. In addition, some of the observation revealed the extent of the personal contact:
 - "C phones a customer about an order no. - he is on first name terms."
- 3) *Information and feedback service to customers*: This was not gleaned from the question on order winners at all, but from other questions:
 - "Can answer customers quickly",
 - "Can give information to customers immediately sometimes."Therefore, this was not a shared perception of an order winner. In fact, it was not recognised as an order winner at all, although there were seven quotes in all which implied that this is indeed an important order-winner.
- 6) *Not turning down an order*:
 - "Always saying yes."was in the question on order winners
 - "We look at any product, build up reputation with existing customers."was not in the question on order winners, therefore it was not a shared perception. However, these two quotes may imply that this is indeed an order winner, especially the first one came from the MD.
- 7) *Customisation of orders*: Only one quote came directly from the question on order winners:
 - "Customers have differing needs."Therefore, this was not a shared perception of an order winner. However, it definitely appeared to be an order winner as it was quoted nine times.

Problems with Shared Language

From second interviews:

Comprehensiveness: “3 – occasionally information is too detailed, especially with technical language.”

“But he can cope with technical jargon, not realising that other people can’t.”

Simplicity: “4 - 5 - sometimes jargony.”

Insufficient Understanding of The Nature of Information Management

From Interviews:

“Sometimes wrong information, lack of discipline.”

“AWAIT forms – there is not always enough information for me to order parts. The lads are sometimes a bit lazy and don’t write everything down. Maybe it is because the ‘lads’ don’t understand what she requires. I might need more information on i.e. serial numbers for suppliers.”

Appendix E: Samples from Data Collection, Chapter 8

2.1 Case Study 2: Order Winners

1) *High quality of repair and service*: There were seven quotes indicating this as an order Winner

- “Quality of product on a regular basis - very consistent”.

2) *Personal relationship with customers*: There were nine quotes indicating this:

- “No problems with taking customers round the site - open culture and relationship. Trust.”

3) *Information and feedback service to customers*: There were three quotes in all

- “Information service.”

4) *Delivery Speed*: There were four quotes indicating this as an Order Winner

- “Get measured by customers on delivery.”

5) *Price*: There were five quotes indicating this as an Order Winner

- “Lead times reduced.”

6) *Not turning down an order*: Only one person indicated this

- “Answer must be ‘yes’ to customers.”

As the Company have had a small number of loyal, regular customers for many years, it may be assumed that this is an Order Winner.

■ 7) *Customisation of Orders*: Only one person indicated this

- “One and two offs to several hundred off - not more. But have machines ready for this.”

■ 8) *Rapid Response to Order Changes and Customer Demands* - this was a new order winner, not found in the pilot study . There was much evidence for this - eight quotes in all.

Examples:

- “Bend with the wind” - flexible.
- “Helping them out - ie. urgent help, they have night-shift. Information service.”

- 1) *Informal, Personal relationship with customers:* There were eight quotes citing the importance of this:

- “Alan went in person to see them . Sometimes visits customer, specially for quotes.”

This was also elicited indirectly from other questions. Example:

- “Yes, definitely - informal system is important.”

- 2) *High quality of repair and service:* There were tow quotes giving evidence of this:

- “Quality of work.”

- 3) *Information and feedback service to customers:* Only one interviewee cited this:

- “Most of the time can give them fast feedback, has a list of jobs in front of him.”

- 4) *Customisation of orders:* There were four quotes indicating this as an order winner:

- “Wide variety in product”
- “Engineering Pattern Makers, with foundry, general machining and CAD/CAM facilities. Model making, not conventional CNC work. More complex than Hilmax. Not really into production. 3 or 4 types of goods. Make tooling for bins etc., JCBs also, fuel tanks etc. They do - Cast aluminium rotational mouldmakers. Press toolwork. Prototypes patterns and casting. General i.e. fibreglass, models.”

- 5) *Rapid Response to Order Changes and Customer Demands:* This was obviously an important order winner as 10 quotes were elicited from the five interviewees:

- “Get orders at short notice.”
- “These schedules change because customers change minds.”

- 6) *Delivery Speed:* There were four quotes indicating this as on order winner:

- “Delivery side - on time delivery is important”.

- 7) *Price:* Three interviewees cited this:

- Reasonable price

2.3 Discussion - Flexibility

Case Study 2

“He agrees that the informal system is important for flexibility”.
“Flexibility is an order winner”.
Does it provide for flexibility? “Main vehicle. It’s best way. If anyone has a problem, N is on floor a lot, they would go to N for backup”.

Case Study 3

“Yes, the informal system maintains flexibility. The MD changes jobs informally etc”
“A big advantage is flexibility, have a good informal relationship with customers. Things change quickly in prototyping in the supply chain, so need to be flexible”.
“Yes, lead with this. Yes, it maintains flexibility. I can’t understand firms that run on paperwork alone”.

3.2 Types of Information in Case Study 2.

3.2.1 Informal Information

From Interviews:

“Visits, informality etc, rapid response, first name terms. Very flexible, will change minds on the phone.”

“Agrees that the informal system is important for flexibility.”

“Customers will phone first to specify orders, than fax, out of courtesy.”

From Observation:

JC is rushing around looking harassed, going from one person to another and ‘trying to sort things out’.

A man comes in to see B.

3.2.2 Formal Information

From Interviews:

“The customers will change minds on the phone, but I need it in writing for our own security, to make sure.”

“ISO information has to be kept.”

“We’re still improving - we’ve now got production planning on computer, want another machine loading system for future visibility and planning.”

From Observation:

When material comes into factory, they are matched up for their conformity with a certificate in a folder in his office.

From Documents:

Minutes of a meeting of the FHL team held on 7th December 1998.

3.3 Types of Information in Case Study 3

3.3.1 Informal Information

From Interviews:

“People in the Company are often on phone when he needs them.”

“Once again, the participant as observer type observation revealed that communicating information in this Company is important.”

“People were seen frequently talking on the phone or face to face.”

“He can go down and stop a job anytime, and get people working on different things - multitask etc.”

From Observation:

- The two nameless men are sitting in front of CAD system, discussing a drawing and measurement very intensely, in much detail. They are talking about measurements, lines etc
- D picks up phone and then both the MD and D are on phone at the same time. MD appears to be discussing a ‘breakdown’ - appears to be a query about costs. Then continues to talk about the pattern he’s sent.
- People were seen frequently talking on the phone or face to face.

3.3.2 Formal Information

From Interviews:

“Yes, there is a need for traceability. We need drawings for repeat work and repeat customers.”

“Most of the time we can give them fast feedback, has a list of jobs in front of him.”

“Important for traceability. Majority of information is at my fingertips.”

From Observation:

- B is checking Fixture Inspection Report. No back-ups. Big books of what things go wrong i.e. customers complain or return, or scrap. Some customers are more critical than others.

3.4 Information Activities in Case Study 2.

Communication

From Interviews:

“Visits, informality etc, rapid response, first name terms. Very flexible, will change minds on the phone.”

“It is easier to talk.”

From Observation:

- JC is rushing around looking harassed, going from one person to another and trying to sort things out.
- A man comes in to see bob. Bob is setting up big machines for testing. Looks at a drawing on a piece of paper. B has his own office on the side. The lights go off to see better. Goes over figures with man, discussing what they should be.

Recording

From Interviews:

- “Ask JC - every job is on system. Whole history of company on computers - details.”
- “But good thing about it (BS EN ISO 9000) is people do things properly, but not always necessary at time for customer satisfaction, but will get caught out later if data not logged.”
- “Would go back to paperwork sometimes for security. Keeps all physical paperwork.”

From Observation and Documents.

- When material comes into factory, they are matched up for their conformity with a certificate in a folder in his office. FHL are only suppliers for their conformity. Suppliers batch no. Must match with their certificate. He then goes through past handwritten log books, to look for this specific material.

Information Activities in Case Study 3

Communication

From Interviews:

“I am a firm believer in getting his men involved. If they have a large job as opposed to repetitive stuff he will get them together ad hoc and get everyone to talk.”

“Yes, we lead with this informality. Yes, it maintains flexibility. He can't understand firms that run on paperwork alone.”

From Observation:

- D is talking to a man at the big CNC machine.
- Then suddenly three of the men in second section get together in a little group, and talk.

Recording

From Interviews:

“Not for me personally, but may be for M who does majority of recordings. It is important for traceability. Majority of information is at my fingertips.”

“On the CAD system, we have email and ISDN link.”

“Job cards work - everyone adds little bits - get order, job card issued.”

From Observation and Documents

- Stamped copy of drawing, which goes back to customers.
- Coloured forms - invoices from customers. Complaints log. Pink forms for delivery notes to their customers.

4.3 Case study 2: Pre-transaction Elements (Facilitating)

4.3.1 Policy to Customers and Policy towards Information Management

Relationship Marketing

From Interviews:

“Visits, informality etc, rapid response, first name terms. We are very flexible, customers will change minds on the phone, but I need it in writing for our own security, to make sure. They go to either M or N.”

“We are doing a presentation for another company on their quality standards. But our customers are prepared to help us with quality.”

From Observation and Documentation:

- B shows a report from aa on quality meeting, and his six point ACTION PLAN. Tomorrow he has a quality meeting with customer , him and J. (99.9%) on quality
- J’s presentation with customer - overheads - focus on performance measurement i.e. customer surveys, breakdowns, also teamworking, colour coding for deliveries, communication and talking.

Implementation of Formal Procedures and Standards:

- Formal Improvement Programmes:

From Interviews:

“TWCM and change programmes improved. Since we’ve been on this ‘culture’ change we’ve had regular briefings.”

“But management listens to shopfloor - now they do, but didn’t before. Now all on same wavelength.”

■ Computer System:

From interviews:

“ We have got production planning on computer now, I want another machine loading system for future visibility and planning. We’ve only been running it 2 weeks now. Instead of looking at many customer orders, I only have to look at one - my own. Improvement already - communicates to everyone ie. Schedules, time, capacity. Reliable, because only I enter data.”

“Every job is on system. Whole history of company on computers - details. Windows-based.”

4.2.2 Power Culture

Free Flow of Information and Informality

From Interviews:

“We encourage people to make their own decisions, even if they make a mistake.”

“No big departments or anything. Everyone overlaps.”

“We have total empowerment.”

“We’re a big team. Help each other out.”

From Observation:

- A man comes in to see B, in his office off the side of the shopfloor.
- In addition, the general observation shows that the shopfloor is large and movement is free within it and between it and the offices.

Multi-Skilled/Flexible Staff

From interviews:

“They rely on customers surplus work. One and two offs to several hundred off - not more. But they have machines ready for this.”

“Evidence that teamworking is a success - recognition on shopfloor that times are hard. Very highly skilled workforce – Investors in People have enabled them to identify skills gaps. Train people in house. Attitude to play was negative. Have team leaders.”

“Urgent help, they have night-shift”

4.2.3 Information Culture

Shared Understanding and Perception of Order Winners

- 1) *High quality of repair and service*: There were seven quotes citing this as an order winner, and this was mostly elicited from the question on order winners. Examples:
 - “Quality of product on a regular basis - very consistent”Six out of seven of the interviewees mentioned this specifically as an order winner. Therefore, it was generally a shared perception.
- 2) *Personal relationship with customers*: Unlike the Pilot Study, six of the interviewees cited this as an order winner. Example:
 - “No problems with taking customers round the site - open culture and relationship. Trust.”Therefore, it was jointly perceived as an order winner, to a much larger extent than in the Pilot Study.
- 4) *Delivery Speed*: this was all elicited from the question on order winners. Example:
 - “Get measured by customers on delivery.”Four interviewees cited this as an order winner, therefore it was fairly shared.
- 5) *Price*: Again, this evidence was all elicited from the question on order winners. Examples:
 - “Lead times reduced.”
 - “Thinks if price is right, will get order.”Five interviewees cited this as an order winner, therefore it was fairly shared.

Shared Language:

From Interviews:

“Language not a problem, everyone understands technical language.”

From Observation:

- In the participant as observer observation, frequent voice conversations were witnessed both near and at a distance as in the pilot study, and this time there was nothing at all to suggest a language problem.

4.4 Case study 3: Pre-transaction Elements (Facilitating)

4.4.1 Policy to Customers and Policy towards Information Management

Relationship Marketing:

From Interviews:

“I go to see them in person.”

“There are other people who deal with customers i.e. M, J and S.”

Implementation of Formal Procedures and Standards

■ Computer System

From Interviews:

“On the CAD system, have email and ISDN link. Only MD uses email. Their e-drawings work better than fax. Some drawings only available on fax – sometimes they’re too old.”

4.3.2 Power Culture

Free Flow of Information and Informality

From interviews:

“Information flows well, except for customer interface.”

“If they have a large job as opposed to repetitive stuff he will get them together ad hoc and get everyone to talk. Might gain an hour or so on the job because of this.”

From Observation:

- D is talking to a man at the big CNC machine
- S came in and chatted. Then talked to J in machining - enjoys working here, likes everyone, though sometimes things go wrong.

Multi-Skilled/Flexible Staff

From interviews:

“Versatility and ability to pick up a job straight away. The workforce is versatile. And multiskilled.”

“He can go down and stop a job anytime, and get people working on different things - multitask etc. Juggling act.”

4.3.4 Information Culture

Shared Understanding and Perception of Order Winners

6) *Delivery Speed*: Three out of five of the quotations were elicited from the question on order winners. Example:

- Delivery side - “On time delivery is important.”

Therefore it was fairly shared as an order winner.

Shared Language

From Interviews:

Simplicity - 9-10. “Yes, simple. Straightforward. ‘when and how much?’ from customers.”

Relevance - 8. “Passed on to people who need to know. Speaks the same language as customers generally.”

From Observation:

- In the participant as observer observation, as in the first two case studies, frequent voice conversations were witnessed, and there was nothing at all to suggest a language problem.

Understanding of the Nature of Information Management in their Company:

From Interviews:

- “Yes, it affects them, work must be rescheduled. Sometimes, fairly regular, have to be prepared. Lack of information on jobs, get changed around often. We can’t read drawings, now they’re faxed. Most jobs they do, there is a lack of information.”
- “Workforce could be involved more - we could have rotating project managers and problem-solving groups. This would make information flow better. MD - General Manager - Foreman etc - too many links in chain. Touched on it with MD - but not in any detail.

4.5 Case study 2: Pre-transaction Elements (Impeding)

4.5.1 Policy to Customers

Occasional Inferior Implementation of Formal Procedures

- Integrated Computer System

From Interviews:

“Physical stability - 5. Crashes about once a week. As the day goes on and more and more information goes into database, the slower it gets.”

“JM does not realise the need for technology. Email is informal, its good for customers.”

4.4.2 Power Culture

Vertical Information Flow

From Interviews:

“Communication is still a problem. From top level it sometimes doesn’t flow down to middle management”

“Team briefings - staff will give feedback to M, which should flow up to senior management. Not directly up and down i.e if one of the senior management go on to shopfloor then sometimes things will be found out.”

“They have empowerment, but its overridden by management. It is difficult for M. N will accept a change in order without consulting the shopfloor.”

4.4.3 Information Culture

Poor Understanding and Perception of Certain Order Winners

- 3) *Information and feedback service to customers*: only one interviewee cited this as an order winner. Example:
 - “Information service.”Another two comments were gleaned from other questions. Examples:
 - “Customers can get feedback and production planning with martin is improving this.”
 - “But they phone in a lot about progress of orders. Usually straight answers then and then. Have screen in front.”Therefore, this was not a shared perception of an order winner, although it was slightly more recognised as one than in the Pilot Study where it was not shared at all.
- 6) *Not turning down an order*: Only one person cited this, though not directly as an Order Winner. Example:
 - “Answer must be ‘yes’ to customers.”
- 7) *Customisation of Orders*: Unlike the Pilot Study, there was only one mention of this, but not recognised as an Order Winner
 - “One and two offs to several hundred off - not more. But have machines ready for this.”
- 8) *Rapid Response to Order Changes and Customer Demands* - this was a new Order Winner, not found in the Pilot Study . There was much evidence for this - eight quotes in all. Examples:
 - “Bend with the wind - flexible.”
 - “Helping them out - ie. Urgent help, they have night-shift. Information service.”Those two were cited as Order Winners. The other quotes were elicited indirectly.
 - “Very flexible, will change minds on the phone.”

Insufficient Understanding of the Nature of Information Management

From Interviews:

“Forgetting to log information, for example, batch no.s don’t get entered. It causes long term problem., but not persistent, occasional. It is probably because people don’t realise the importance of logging.”

4.4 Case study 3: Pre-transaction Elements (Impeding)

4.4.1. Policy to Customers

Lack of Formal Customer Contact with Workforce

Examples from Interviews:

“I usually deal with customers through M, do not deal with customers myself.”

“I used to have contact with customers a lot, now only 2 or 3.”

“Some direct contact, although less than there used to be for me.”

No Opportunity for Feedback in Formal Strategic Meetings

From Interviews:

“The MD has Monday meeting with managers, he states thoughts and asks for feedback. No feedback encouraged from total workforce. M feels there should be more ‘involvement’ because workforce work hard.”

Lack of an Integrated Computing System

From Interviews:

“Some drawings are only available on fax - sometimes they’re too old.”

“D knows about CAD system only.”

From Observation:

- A lot of it is because the quality system has not been updated since '92. Nothing on the CAD side has been joined on to Quality System. CAD system is really another division. If the quality system was electronic, it would improve quality of work. MD would know immediate knowledge and get a picture of the organisation.

4.4.2 Power Culture

Vertical Information Flow

Examples from Interviews:

“The workforce could be involved more - they could have rotating project managers and problem-solving groups.”

“I think there should be more involvement for the guys, pats on backs. They are good teams, and MD doesn't realise really.”

“6 Depts really, including quality and Office Communication could be better, they will blame each other.”

“Not as much as he would like. A lot of work goes from one section to another i.e. foundry to Pattern Shop.”

“Only MD uses email.”

Management Layers:

From Interviews:

“Workforce could be involved more - could have rotating project managers and problem-solving groups.”

“This would make information flow better. I.e. MD - D - foreman etc. too many links in chain.”

“Touched on it with MD - but not in any detail.”

4.4.3 Information Culture

Functional Divisions (Sub-cultures)

From Interviews:

“6 Depts really, including quality and Office Communication could be better, they will blame each other.”

Accuracy - 7-8. “People stuck in their own sections, difficult to understand problems of other sections.”

“D is ideal for managers job, but he does not know much about technicalities - goes through office first - Chinese whispers. Too many people in chain. Gets things third hand. Worse since D arrived.”

Poor Understanding and Perception of Certain Order Winners

- *1) Informal, Personal relationship with customers:* two of the interviewees cited this as an order Winner. Example:

- Alan went in person to see them . Sometimes visits customer, specially for quotes.

This was also elicited indirectly from other questions. Example:

- Yes, definitely - informal system is important

Therefore, although recognised as very importance, it was not a shared perception of an Order Winner. In addition, this was also elicited indirectly from other questions. There were another six quotes from ? people citing this as important. Example:

- Rapid personal response to customers. Yes, lead with this. Yes, it maintains flexibility

Therefore, this was not a shared perception of an Order Winner, although ti was recognised to be important by many people.

- *2) High quality of repair and service:* this was all elicited from the question on Order Winners. Examples:

- Quality of work

However, only two cited this as an Order Winner, therefore it was not particularly shared.

- *3) Information and feedback service to customers:* only one interviewee cited this as an Order Winner. Example:

- Most of the time can give them fast feedback, has a list of jobs in front of him.

Therefore, this was not a shared perception of an Order Winner, nor really appeared to be recognised as important at all.

- *4) Customisation of orders:* Only one interviewee recognised this as an Order Winner:

- Wide variety in product

Another three quotes citing this as important came from indirect questions. Example:

- Engineering Pattern Makers, with foundry, general machining and CAD/CAM facilities.

Model making, not conventional CNC work. More complex than Hilmax. Not really into production. 3 or 4 types of goods. Make tooling for bins etc.,, JCBs also, fuel tanks etc. They do - Cast aluminium rotational mouldmakers. Press toolwork. Prototypes patterns and casting. General i.e. fibreglass, models.

Therefore, this was not a shared perception of an Order Winner, although it was recognised as one indirectly, to a certain extent.

5) *Rapid Response to Order Changes and Customer Demands*: this was obviously an important Order Winner as 10 quotes were elicited, although no-one recognised it as an Order Winner. All the quotes came from indirect questions. Examples:

- Get orders at short notice
- These schedules change because customers change minds

Therefore it was fairly shared as an Order Winner.

■

6) *Delivery Speed*: Three of these were elicited from the question on Order Winners. Example:

- Delivery side - on time delivery is important

One was elicited indirectly:

Fast turnover is ultra important

■ 7) *Price*: Two quotes were elicited from the question on Order Winners. Examples:

Reasonable price

- Cost (3rd)

One was elicited indirectly:

- Get a premium on some jobs

Problems with Shared Language

From Interviews:

“It depends on speaking the same language, sometimes phone is difficult and we need to have a head to head.”

“D is ideal for managers job, but he does not know much about technicalities - goes through office first - chinese whispers.”

“Mostly language is OK, but sometimes it is a problem ie. ‘porous’ can have several meanings. It is worse over phone with customers.”

Insufficient Understanding of the Nature of Information Management in their Company

From Interviews:

“It is difficult to ‘manage’ and write records etc. down at the same time. Sometimes the job will resurface next month, and stuff is not on job card. But sometimes they are not signed off, and lie around unchecked. It is getting better now, anyone can sign off.”

“Logging helps efficiency of the organisation, it makes jobs idiot proof and leaves no excuse for errors.”