Graduate School of Environmental Studies

University of Strathclyde

# The Sour-dough Model of Knowledge Development, the influence of business epistemology on the environmental performance of Scottish small and medium sized manufacturing enterprises

Catriona Jane Andrews

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# Declaration of Author's Rights

# Contents

*The produce of the earth is a gift from our gracious creator to the inhabitants, and to impoverish the earth now to support outward greatness appears to be an injury to the succeeding age.*

John Woolman, 1772
Quaker Faith and Practice, 25.01

# Chapter One

## Introduction

Why is it that some small companies have profitably embraced an idea of sustainable business, while many others do not give it a passing thought? What are the features that make some businesses open to more sustainable opportunities, but leave others closed to the idea? This work identifies a range of important influences on business responsiveness to sustainability and presents a theoretical framework, referred to as *business epistemology*, to describe their interaction. By analysing the business epistemology, it is possible to identify the barriers to sustainable business within individual companies. The framework also highlights the wide range of supportive influences necessary to enable the development of sustainable business practice. The companies who have embraced sustainable business have benefited from a supportive combination of internal and external influences. Few companies currently enjoy such wide-ranging support for sustainable business.

There is literary evidence that a large number of small and medium sized enterprises (SMEs) have engaged in improving environmental performance and, to a lesser extent, some have also considered the social implications of business activities. Early work by Welford (1994) and by Johnston and Stokes (1995) identified a range of business benefits gained by those firms with a proactive approach to environmental performance. More recently, Andrews and Barakat (2004) described the experience of small business ventures which addressed some of the social justice elements of sustainable business. The benefits of such engagement include reductions in cost

base, increased access to markets, and new strategic opportunities. However, in spite of these attractions, very many SMEs have done little to address the environmental or social effects of their business activities. Holt et al (2000) and Tilley (1999) suggest that most SMEs remain largely uncommitted to any consideration of sustainability, and preliminary research for this study supports that perception. The problem is therefore to explain this gap between the lauded benefits of engagement in sustainable business and the practice of most small businesses.

Welford (1994) identified lack of information and support as a significant barrier to SMEs engaging in environmental management and, since that time, government funding has provided support for a range of small business environmental networks. Envirowise provides a wealth of inspiring case studies to demonstrate the business benefits of environmental management. By 2000, some time after the commencement of this study, evaluative work was published which identified a number of limitations of this approach. Shearlock et al (2000) note poor co-ordination of support services available to businesses. Holt et al (2000) noted that despite success among companies who were recruited to such schemes, there was little effect on the majority of small businesses. Although the support services appeared to be successful for businesses they reached, there remained many firms untouched by this support. The original question remains – why does greening work for some, but leave many unaffected?

A number of potentially useful theoretical perspectives came to mind, based on the researchers previous experience. One of these was the use of educational theory to examine the process of learning, based on the interplay of practical and conceptual knowledge, highlighted by David Kolb (1984). Another, related approach drew on the developing discipline of knowledge management to consider organisational features that can encourage learning within business organisations (Nonaka and Takeuchi, 1995). However each of these approaches were based on work conducted in very different practical contexts from the subject of this study. It was unclear at the outset how useful these approaches might be in developing a theoretical understanding of small business behaviour. Foucault's analysis of divergent epistemologies, *The Archaeology of Knowledge* (1969) highlighted how the development of theoretical structures was influenced by the social and institutional

features guiding the emergence of certain 'discursive formations'. It was important for this research to be guided more by the practical experience of small businesses than by preselected theoretical concepts. The research approach therefore sought to build up a theoretical framework by an iterative process of empirical investigation and conceptual development, following the example of Weick (1995) and Orton (1997). The emerging theory was then used to analyse the experience of case study companies to assess how well it could account for their relative environmental performance over a period of two years.

In practice this called for a general investigation of environmental improvement among SMEs and detailed investigation of the experience of a small number of actively engaged businesses. It began with a preliminary investigation of existing literature and a series of interviews with individuals providing environmental support services for businesses. These provided some initial ideas for further investigation, such as the influence of regulators, efficiency motives and general business awareness. A telephone survey was conducted to assess the levels of engagement and awareness among manufacturing SMEs in one area of Scotland which had been relatively well supported through an environmental business club. This was followed by detailed examination of a number of case study companies, using a method for the development of grounded theory, similar to that advocated by Glaser and Strauss (1967). The emergent theoretical framework was used firstly to describe the original case study experience, and then to evaluate the changes in practice among those businesses after two years.

The study identified a rich variety of influences on business behaviour, some of which were related to the external business environment and some of which were internal characteristics. It also became clear that there was significant interaction among the influences, such that they could not be evaluated in isolation from one another. Any theoretical framework would require come conceptual coherence to bind together these disparate influences. That binding concept was knowledge, not only in the sense of information, but in terms of the evaluation and validation of certain forms of knowledge. The term 'business epistemology' is used to describe this internal system of knowledge development. The framework of business epistemology

was developed, using the analogy of baking sourdough bread, highlighting the nature of a continuing enrichment of knowledge resources within an organisation.

This framework allows us to identify features of a business that can support or undermine the development of sustainable business knowledge. The case studies demonstrated that the more sustainable businesses benefited from many different, mutually reinforcing supportive influences. They also showed how the absence of a few key influences could prevent the continuing development of sustainable business knowledge.

This introductory chapter begins by presenting the research question within the wider contexts of sustainability, sustainable business and environmental practice in small businesses. It also highlights the scope for alternative theoretical perspectives on the question. This leads, in section 1.2, to the presentation of the specific aims and objectives of the research. Section 1.3 explains the philosophical approach to the research and describes the broad research strategy. This is followed by a summary of the key findings of the research and an outline of the structure of the dissertation as a whole.

## 1.1 Research Context

Concern for the well-being of our children and of future generations is a human instinct and a driving force for much social activity. This research was conducted during my early years of motherhood when that instinct was particularly strong. In the closing years of the 20th century threats to the well-being of future generations were becoming increasingly apparent and much public discourse engaged with the challenges of climate change, habitat loss and resource scarcity.(eg. Meadows et al, 1972, IPCC, 1990) The capacity of the earth to sustain life for future generations was called into question. However, for most people in the world, who live in developing countries, the concern was not for future generations, but for the survival of current generations, in particular the need for economic growth and better standards of living for those in poverty. Improved global communications ensured that policy makers in

the wealthy countries could no longer ignore the needs of the majority of the population of the planet. The events of September 2001 were a brutal reminder that political dissatisfaction and social unrest on one part of the planet could cause profound social harm to a very distant part. The concept of sustainable development articulated in the Brundtland report (WCED, 1987) attempted to bring together those twin concerns for people and planet, the needs of current and future generations. Sustainability therefore came to embrace the concepts of economic, environmental and social well-being .

The business world is not immune to the concerns of society for sustainable development, although it uses the term with a much narrower meaning. When the International Chamber of Commerce launched its Business Charter for Sustainable Development in 1991, its objectives were predominantly environmental (Brophy 1996). In the late 1990s much of the sustainable business discourse concentrated on the promotion of Environmental Management Systems (EMS) to meet the international standard, ISO 14001, which was published in 1996. The more recent growth in Corporate Social Responsibility (CSR) reporting has encouraged large companies to consider some of the social impacts of their activities, inspired by Elkington's concept of the 'Triple Bottom Line'. (Elkington 1997). The mechanisms for turning this concept into a coherent evaluative framework are as yet underdeveloped. CSR activities are firmly fixed within the context of corporate investment and cannot therefore begin to evaluate the wider social impacts of that institutional setting.

However, business is not only conducted by large corporations. Small and medium sizes enterprises are a significant part of the economy -in Scotland they represent 99% of private enterprises and provide 53% of employment (Scottish Corporate Statistics, 2003). Many small businesses are active in the local economy, providing employment, social contact, opportunities and support for local organisations. It has been estimated (SME-nvironment 2003) that SMEs generate 60% of commercial waste and account for between 50% and 80% of pollution incidents in England and Wales. There is evidence that there are very many SMEs which are highly attuned to the business advantages of systematic resource efficiency - the large number of case

studies produced by Envirowise, a government sponsored programme of business support, testifies to this. Survey evidence (Welford (1994), SME-nvironment 2003) does suggest that environmental awareness within SMEs is growing, although it still lags far behind the investments made in larger companies. It seems that there are highly successful SMEs who have fully engaged with the challenges of sustainability to their economic advantage, but the majority of small businesses remain unaware and uninterested in those challenges. Many writers, including, Welford(1994), Hillary(2000a) and Johnston and Stokes(1995) have identified a range of features of SMEs which can discourage them from improving environmental performance, but none of these features alone can explain why such barriers were overcome by the successful firms. This contrast was the initial inspiration for the research presented here.

Although the research is set within the wider context of sustainability, the literature on SMEs has focussed mainly on the environmental aspect, and sometimes on the narrower field of waste minimisation. It should be clear that waste minimisation is a very small part of the wider concept of sustainable business. While the researcher was interested in wider thinking on sustainability, the evidence from support services and from business only addressed some environmental aspects of sustainability. The term 'sustainability' or 'sustainable business' was not volunteered by the research subjects and, with a few notable exceptions, the social aspects of sustainability were not considered by the businesses interviewed. The emergent theoretical framework helps to identify how the wider concept of sustainable business may develop, given the full range of supportive influences.

As David Kolb (1984) commented, one of the features that distinguishes humanity is the capacity to adapt to changed circumstances within a generation by the process of learning. We do not depend on genetic evolution to develop new capacities and skills, but through communication and innovation we can adapt rapidly to a highly diverse range of habitats. Sustainability depends crucially on our ability to learn, and this study concentrates on the experience of learning in small businesses, as an important part of that wider challenge. The literature on knowledge management suggests that organisational features can encourage or inhibit that learning process,

but most of this research has, so far, been based on the experience of large corporations. It was unclear at the outset to what extent it might be possible to adapt some of the concepts of knowledge management to a small business context. This research sought to explore the potential application of knowledge management to the development of sustainable business thinking among SMEs.

Foucault (1969) argued that institutional arrangements could influence the selection of concepts applied to the analysis of experience, and indeed they could influence the selection of experience for analysis. Much of the literature on SME engagement in sustainable business has been conducted within the context of evaluating government action in support of such engagement. It has therefore tended to concentrate on the roles played by support agencies. However, this research was intended to draw on the experience of a general business population, rather than those engaged via government support. It suggests that the role played by government bodies, either as support agencies or regulators, is less significant than many of the other elements of the business epistemology.

## 1. 2 Aims of the research.

The principle aim of the research was to develop a theoretical basis for understanding the wide variation in responsiveness to the challenges of sustainability among SMEs. This framework was intended to draw on existing theories of education and organisations, but also to be firmly based on the practical experience of SMEs. It was neither purely inductive nor purely deductive, but sought a middle path, utilising the approach of iterative grounded theory to integrate theoretical and empirical perspectives on the problem.

It was clear that the behaviour of SMEs was influenced by very many external features, including government policy and wider business standards, as well as internal organisational features. A framework for understanding this behaviour should therefore give due attention to the full range of internal and external influences at work. The theoretical framework should allow businesses and external

observers to analyse the effect of the range of influences affecting the behaviour of a particular business. It may also allow for a clearer understanding of the effect of alternative policy approaches.

When this research commenced, the understanding of sustainable business was not well advanced, at least in terms of government policy. However, there was some experience of promoting environmental good practice among SMEs, through a range of support measures. When the research began, there had been very little evaluation made of support services for SMEs, although this lacuna has now been filled to some extent. A preliminary objective of the research was to identify and evaluate the effect of support services for SMEs with respect to environmental improvement within a limited geographical area. This could serve to highlight the strengths and limitations of government action in support of sustainable business. In order to develop this understanding the research drew on the experience of support providers as well as the general population of businesses they were intended to support.

To the extent that sustainable business is different from traditional business practice, it is necessary to understand how firms have changed from one way of thinking to another. Has the change been a gradual learning process or has it been the result of a radical altering of perceptions, in Khun's terms a 'paradigm shift', an 'epistemological break'. The research aims to draw on the disciplines of philosophy, educational theory and organisational theory to assess the process of altering attitudes to business and sustainability. It draws together a theoretical understanding of behaviour change with direct observations of business practice in order to characterise the shift towards sustainable business.

The specific objectives of the research were therefore:

- To identify what support was available for SMEs in central Scotland seeking to improve their environmental performance.
- To gain an indication of the level of environmental awareness and engagement among SMEs in North Lanarkshire, where support was relatively high.

- To test the influence of a range of potential 'drivers' for improved environmental performance among these SMEs.
- To identify a small number of companies which were relatively advanced in their thinking on sustainable business.
- To gather evidence of good practice from these companies to evaluate the extent of sustainable business thinking.
- To examine the learning processes involved in the development of sustainable business practices, at individual and organisational levels.
- To develop a theoretical framework to analyse the range of interacting influences on business behaviour
- To test how effectively this framework could usefully explain the progress of sustainable business thinking within SMEs.

The research aims therefore involved two levels of investigation. At one level, the intention was to provide some evidence for the effect of government support for sustainable business. At another level, the work was intended to develop conceptual understanding through the development of a theoretical framework to explain business behaviour.

## 1.3 Research Approach

The primary research aim was to provide a theoretical framework for understanding why some firms are so much more responsive to sustainability than others. The review of the limited literature concerned with SME environmental engagement suggested a number of practical explanations, but there was very little pre-existing theory to work with. The theoretical literature included educational and organisational perspectives, derived from very different practical contexts. The work of Michel Foucault (1969) highlighted how the formation of theory was influenced by the social and institutional structures allowing voice to certain forms of experience. It therefore seemed appropriate to develop a theory based predominantly on practical business experience in order that it should accurately reflect contemporary reality, while drawing on a number of potential theoretical

perspectives. This approach, referred to as 'iterative grounded theory' has been used to analyse dynamic organisational processes. (Meyer 1982, Porac et al 1989, Tushman et al 1986)

The research aims were both practical and conceptual, but the underlying principle was that theoretical development should be based firmly on evidence of practical experience. The following section therefore describes how the practical evidence was selected in order to inform the theoretical development.

The research was based on broadly two fields of experience – that of government supported business support services and that of their intended beneficiaries, small and medium sized businesses. Preliminary investigations identified the range of services available to SMEs within central Scotland, which highlighted the role played by environmental business clubs. These were generally not concerned with the broad theme of sustainable business, but with the narrower field of environmental performance, and often focused on the even more specific concern of waste minimisation. These investigations identified North Lanarkshire as one area where there was significant support from local, national and European government for environmental improvement, suggesting that it would be a good area in which to evaluate the effectiveness of such support.

Other research has provided evidence for the business benefits of support services, mainly based on the experience of participating businesses. However, this research was intended to evaluate the wider effect of the availability of the support services. In the investigation of business experience, the decision was made to evaluate the effect on the wider business population, not simply those who had participated in an environmental business club. A telephone survey of small manufacturing businesses in North Lanarkshire was conducted to test the level of awareness of, and engagement in the improvement of environmental performance. Manufacturing businesses were selected on the basis that these were the principle target for the environmental business club support. This survey confirmed the initial premise that engagement among SMEs was highly variable and it suggested a very low level of awareness of the business support services.

These investigation of support services and general business awareness provided some evidence for the third research aim of assessing the effect of support services. However, in order to meet the other aims, more detailed research was required. The meaning of sustainable business for SMEs , nature of the distinction from traditional business practice and the theory to explain their behaviour – these aims could only come from more detailed engagement with small business experience. Case studies were selected as the most appropriate method for engaging with that experience, and eight companies were chosen to participate in the study. These companies were selected from among the phone survey respondents and they all demonstrated higher levels of engagement in environmental improvement. The decision was made to choose firms that were relatively advanced in their thinking in order to understand what features contributed to that state.

In order to understand the meaning of sustainable business in practice, the research examined the experience of eight case study companies, evaluating the extent of their activities which could be identified with sustainability. Interviews and site visits were conducted to assess the range of business practices of relevance to sustainable business and to investigate the historical development of their thinking on sustainability and the processes by which their practices had changed. This highlighted the process of knowledge development and indicated a number of features which influenced that process. Literature research and reflection allowed for the creation of a theoretical structure to explain the change process, how, in a limited sense, these small businesses had become more sustainable.

This research has been strongly influenced by the work of Michel Foucault, particularly the methods described in *The Archaeology of Knowledge,* Foucault (1969). In this he identifies the range of social and institutional structures that allow for the emergence of a 'discursive formation'. This research compares the wider discursive formation of sustainability with the non-discursive practice of small business, identifying areas of overlap and of absence. It is by examining the gap between business reality and the ideal that we can explore the scope and limitations of the concept. In order to understand the practical meaning of sustainable business,

it was necessary to gain detailed insights into small businesses which were progressing in that direction. This would provide some evidence of the extent of sustainable business thinking in those organisations and a richer understanding of the meaning of the term in practice. A multiple case study approach was used to allow sufficiently detailed investigation of the study area. This method provided far more specific evidence than could be obtained from a more generalised study.

One of the most challenging aims of the research was to develop a theoretical framework to understand why some firms are more responsive to sustainable business than others. The development of theory is a creative process of investigation, theorising, evaluation, refinement and adaptation. It does not derive from a linear procedure leading simply from one stage to the next, but rather, it demands a cyclical or iterative learning process in which earlier stages are re-examined in the light of later findings. The approach used was derived from the methods of Glaser and Strauss to discover 'grounded theory', based firmly on empirical evidence. However, this approach was adapted to include some influence of pre-existing theories, such as organisational and educational theory. Orton (1997) describes an iterative process of theoretical development using this approach. This approach allows the development of a theory that fits within a specific context, drawing on selected theoretical perspectives, but modified in the light of the evidence. As well as allowing for the refinement of theory, it also allows for an integration of alternative approaches to understanding a particular context. This approach was particularly appropriate to this study, given the lack of existing theoretical understanding and the wide range of potential explanatory theories to be drawn from other disciplines. In practice, this approach demanded the examination and analysis of the case study evidence in the light of a range of theoretical and practical perspectives in order to derive a structure that could convey the complexity of the knowledge development process. The resulting model was then used to compare the behaviour of the study companies.

The prime concern of the research was the development, rather than the testing of the theoretical framework. However, in order to make some preliminary evaluation of its usefulness, a follow-up study was conducted after two years, to test how well the

model could explain the changes over that period.

## 1.4 Key findings

The primary aim of the research was met in so far as it generated a model, or theoretical framework for understanding the behaviour of SMEs with respect to sustainability. This framework is referred to hereafter as the sourdough model, based on the analogy of baking sourdough bread. This demonstrates the significance of the *process* of knowledge development within SMEs, the influence of external knowledge *sources* or influences and the role of key individuals or, to use the analogy, the method, the ingredients and the baker. The model identifies a range of process elements that influence behaviour, including management systems, internal organisation, both formal and informal, systems of selecting knowledge resources for development and the objectives of the owner/manager, the authority of limitation. These internal features interact with a range of possible knowledge sources, such as customers, suppliers, extended business networks, regulators, support agencies as well as existing internal knowledge resources.

The case studies demonstrated that environmental knowledge developed most successfully in those cases where most of the model elements favoured improved environmental performance. The absence of a few of these elements could effectively undermine the process, allowing early initiatives to lapse. The baking analogy clearly illustrates the problem, if a few ingredients are missing the cake may fail to live up to expectation.

Within this framework, environmental management systems did not play a significant role for many firms, although the 'best'[1] performers did have such systems in place and used them to stimulate their learning processes. Features of internal organisation were very important in maintaining momentum for improvement. While all of the companies had some form of 'environmental champion', many of them were

1 The environmental performance of the case study companies was heuristically ranked according to a procedure described in Chapter 3.7.1.

isolated within the organisation and had difficulty in keeping up the general interest in improvement. In contrast, those firms where environmental responsibility was more widely shared demonstrated a far stronger and sustained learning process. This sharing of responsibility itself influenced the 'rules of formation', the selection of information worth discussing. Effectively these rules tuned people in to thinking about and learning about environmental good practice. The role of the owner/manager was also critical, whether or not this person was the environmental champion. Their objectives and attitudes had a profound influence on the success of environmental initiatives.

With regard to the external influences, customers and suppliers had an important role to play in supporting or undermining the significance of environmental performance for commercial success. Suppliers were also important sources of information on current standards of good practice within their specialist areas. Wider business networks such as trade associations, were a trusted source of practical knowledge and information, based on existing shared experience. For most companies, these played a more significant role than environmental business networks. The research indicated that the role of support agencies is severely limited by internal characteristics of SMEs. Although their effect was positive among companies that they interacted with, most firms were unaware of or uninterested in the support that was available. Similarly, regulators appeared to have a positive influence only on the middling[2] range of businesses. At one end of the spectrum were those who were unaware of regulations affecting their business and at the other end were those firms whose performance was better than that required to meet the regulatory standards.

In respect of the specified objectives, the research was successful, in the following terms.

- The preliminary research identified a broad range of support services available within central Scotland, and revealed a number of issues faced by the providers of such support. This suggested a number of potential drivers for improving

2 See section 3.7.1 for a fuller definition of this term.

environmental performance among SMEs, such as regulations and efficiency motivations.

- The phone survey revealed a low level of engagement with the support services, and widespread disinterest in environmental issues among the sample surveyed. However, it also revealed that there were many companies which had engaged actively in improving environmental performance, supporting the initial presumption of a wide variation in responsiveness.
- The survey results clearly demonstrated that the influences on responsiveness were highly varied among different companies and no single driver could account for behaviour.
- Case study companies were identified from the phone survey and their practices were examined through site visits.
- This demonstrated that the social perspective of sustainable business is far less well developed than the environmental, with the studies showing very little consideration for the social impacts of their operations.
- These studies also showed that companies which made conscious efforts to develop their knowledge of environmental impacts demonstrated better environmental performance than those with a more ad hoc approach. Learning processes were clearly associated with improved performance.
- These processes formed the basis of the theoretical framework for understanding business behaviour.
- The framework was used to analyse the case study experience and seemed to reflect the full range of influences on their response to environmental considerations. When it was used to analyse their progress after two years, it helped to explain the changes in practice over that period.

## 1.5 Structure of thesis

There are inherent difficulties in presenting any research based on iterative grounded theory methodology due to the complexity of the research process. Orton (1997) suggests that the researcher must manage four interwoven storylines, namely the story of the data, the story of the theory, the story of the process knowledge or the

resulting model, and finally the story of the research process itself. An attempt has been made to present this thesis in conventional order of literature review, methodology, results and conclusions (there is no distinct analysis chapter, because the analytical process runs throughout the work). Nonetheless, the reader must bear in mind that this ordering does not represent the sequence of the research. The literature research and the empirical research were interwoven, such that relevant literature was selected on the basis of empirical findings and subsequent empirical research was guided by theories suggested by the literature search. Some readers may feel uncomfortable with this approach, which might appear messy and disorganised, but it is a feature of this method of integrating theory with data to produce new, empirically based, but theoretically informed models.

Chapter 2, the literature review, begins by placing the research within the context of sustainability and the developing concept of sustainable business. While there has been much interest in the application of the principles of sustainability to the corporate sector, the relevance to SMEs is still poorly understood. The review therefore continues with a discussion of the published literature on SMEs and environmental improvement, since it is that facet of sustainability which has attracted research interest to date. Again, it should be borne in mind that much of this literature was published some time after the research commenced, and is used to demonstrate how the discourse developed during the research period. The review then changes direction, to introduce a range of theoretical perspectives that were tested against the evidence. It begins with a discussion of learning and innovation, followed by a more detailed consideration of the work of Michel Foucault (1969), leading to an exploration of organisational theory. These perspectives were used to influence the theoretical framework which is the major result of this research.

The methodology chapter, Chapter 3, begins by presenting the philosophical basis of the research, leading to a fuller explanation of the approach used to generate iterative grounded theory, justifying the continual interplay between theory and evidence in the formation of a theoretical framework. This chapter also describes the thinking behind each of the stages of empirical investigation and the methods of data collection.

Chapter 4 outlines the theoretical framework that resulted from the research, the sourdough model, drawing in both the theoretical and empirical perspectives. It was difficult to identify the appropriate place to introduce this model, since it relies on both theoretical and practical storylines. The model emerged from the analysis of the case studies, and provides a structure within which to present the evidence of these studies. Therefore the model itself must be presented before the case studies. However, it also relies on a reasonable understanding of a variety of theoretical contexts, so must come after the theoretical discussion. This is one of the difficulties of presenting the results of iterative grounded research mentioned earlier and the reader is trusted to forgive this structural anomaly.

The findings of the exploratory research are presented in Chapter 5, demonstrating the institutional motives for environmental business clubs as a means of supporting environmental improvement in SMEs. A key finding of this stage of the research was the perception among support providers that most SMEs were not interested in environmental improvement at all, and that efficiency or regulatory pressures were the main motivations for engagement.

Chapter 6 presents the results of the phone survey, demonstrating a wide variation in responsiveness to environmental concerns. These results suggested a more complex interplay of influences on behaviour than came from the preliminary investigations. Responsiveness appeared to be heavily influenced by internal features of the businesses, as well as the interests of customers and suppliers. The phone survey helped to identify potential case studies which might provide evidence to explain the way in which these various influences interacted.

The case study companies are introduced in Chapter 7, including an analysis of their relative environmental performance. This effectively identified the good, middling and poor performers within the study group. The detailed analysis of case study evidence, based on the structure of the sourdough model, is presented in Chapter 8, highlighting how elements of the model interacted to influence the companies'

responsiveness to environmental or social impacts. Chapter 9 presents the results of the follow-up study conducted after a gap of two years, and the final summary and conclusions are presented in Chapter 10.

*When words are strange or disturbing to you, try to sense where they come from and what has nourished the lives of others. Listen patiently and seek the truth which other people's opinions may contain for you.*

Advices and Queries
Quaker Faith and Practice 1.02.17

# Chapter Two

## Literature Review

The purpose of this chapter is to set the research within a wider context of sustainable development and sustainable business literature and to introduce some possible theoretical perspectives on the research question. The theme of sustainability is examined as a discursive formation in 2.1, demonstrating how it has become ever more encompassing of the diversity of human knowledge systems. In section 2.2, the literature on business sustainability is examined, highlighting the means by which the business discourse selects certain aspects of the wider sustainability discourse, while overlooking other features. Following on from that, we examine the developing knowledge of small business behaviour with respect to sustainability in section 2.3. In section 2.4 the reader is introduced to a selection of theoretical contributions that influenced the development of the theoretical model, beginning with theories on education and learning, followed by an exploration of the work of Michel Foucault and finishing with organisational theory.

### 2.1 Sustainability

Foucault (1969) presents the idea of a 'discursive formation', a grouping together of statements that are acknowledged as having relevance each to the other, although potentially originating from very different disciplines. It is helpful to think of sustainability as a discursive formation, for it is not a single distinct concept, but a grouping of ideas from many different areas of experience. Within a discursive formation may be found common themes, though differently perceived. Time is such

a theme within the discourse on sustainability and this review begins by examining that theme. Foucault (1969) also describes the actions of authorities of limitation in allowing certain statements, or contributions from a range of possible 'surfaces of emergence' to be considered within a discursive formation. The discursive formation of sustainability integrates a broad range of contributions from many disparate disciplines, and the review introduces a selection of these to indicate the scope of the discursive formation. It concludes by noting the challenges to such authorities of limitation brought on by the problems of sustainability.

According to the Oxford English Dictionary, sustainability is the capacity to sustain, which in turn means to support, to continue to bear weight, to nourish, to endure, to keep sound. Many of the problems which exercise those who talk of global sustainability relate to the difficulties of nourishing, keeping sound, supporting and enduring into some distant future. A binding theme is a concern for human life in the future, clearly demonstrated in the definition provided by the World Commission on Environment and Development (1987):

'*Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future*' p. 40

The time dimension of the concept is central, although often overlooked. The Earth's planetary systems, (bio-chemical, geological, etc.) are in relative equilibrium, so long as the solar system remains stable. Clearly, when the sun starts to grow into a red giant, Earth's systems will go into catastrophic collapse or they may collapse as a result of unchecked disturbances in the sub-systems, such as the climatic collapse into permanent winter postulated by climatologists. The climate system in turn is influenced by many sub-systems including geological, ecological and industrial. Sustainability means different things to different people, depending on what level of system they are discussing. For some science fiction writers, from Asimov (1985) to Macleod (1998), human sustainability depends on developing technologies which will allow us to leave this planet before it is destroyed. For policy advisers, it means developing appropriate mechanisms to prevent catastrophic climate collapse (Grassl et al 2003). For others, it means making sufficient adjustments to maintain the

economic or political stability of industrial countries within the current generation (Schwartz & Randall 2003). Since stability is inevitably a temporary state, the idea of what is sustainable depends on the time-frame selected. The WCED (1987) report speaks of the needs and aspirations of future generations, while the business manager thinks of potential markets in future months. A theme of the sustainability discourse is the concern to lengthen time horizons for decision making, taking more account of decision effects further into the future.

However, the sustainability discourse is also marked by an urgency for better understanding of the effects of human activity on planetary systems. The reports of the Intergovernmental Panel on Climate Change (2001) suggest that environmental change will carry very significant consequences within the lifetime of this generation. It demands the inclusion of new sources of information and knowledge to evaluate the future effects of current decisions.

Sustainability therefore incorporates two contrasting themes of lengthening time horizons and acting with greater urgency to address long-term change. As David Kolb (1984) commented, one of the features that distinguishes humanity is the capacity to adapt to changed circumstances within a generation by the process of learning. We do not depend on genetic evolution to develop new capacities and skills, but through communication and innovation we can adapt rapidly to a highly diverse range of habitats. Hence, it is critical to gain a rich understanding of how learning and innovation takes place across the spectrum of human experience.

Another theme of the sustainability discourse concerns the growing awareness of diverse threats to future populations resulting from past and current human activity. The discourse there include contributions from many scientific and sociological disciplines. Within the discourse on sustainability, some key contributions are noted as critical (See Elkington 1997, Common 1995 and Hawken et al 1999). Elkington (1997) claims that Rachel Carson's 'Silent Spring', published in 1962, was responsible for altering perceptions of the chemicals industry and opening up to scrutiny the ecological and human health effects of chemical pollution. Similarly, the publication in 1972 of the report of the Club of Rome, 'Limits to Growth' (Meadows

et al 1972) alerted the world to the depletion rates of finite natural resources. The discovery in 1985 of the Antarctic ozone hole (Farman et al 1985) highlighted more clearly the potentially severe global effects of chemical pollution and the publication in 1990 of the first report of the Intergovernmental Panel on Climate Change (IPCC 1990) drew world attention to the impact of increasing atmospheric concentrations of greenhouse gases. There is also growing awareness of extreme poverty and social disintegration in developing countries and social exclusion in industrialised countries, which threatens political and economic stability.

Hajer (1995) describes such issues as emblems of environmental discourse. These statements gained critical authority because of when and where they were published, setting the knowledge of a particular specialism within a wider global context. The linking of the knowledge of analytical chemists and ecologists, demographers and economists formed a new discursive formation in which the boundaries of political discourse were extended and redrawn.

The epistemology of sustainability gives authority to certain 'surfaces of emergence', certain social and institutional contexts to make valid contributions to the discourse. Clearly some areas of scientific inquiry have gained elevated status within the discourse on sustainability. Ecologists have played a significant role in drawing to public attention the unintended effects of industrial pollution and climate change on biospheric systems. Dovers et al (1996) claim that *'without ecology, there would hardly be a sustainability debate.*'p.1151. They go on to examine the reasons why ecologists have had less influence in policy debate than they believe to be warranted. Similarly, the findings of climatologists have dominated the sustainability discourse, particularly since the establishment of the Intergovernmental Panel on Climate Change in 1988. However, there remain areas of scientific discourse that remain largely ignored within the discussion of sustainability. In the 1970s concern for the growth in human population attracted funding for programmes promoting birth control, but by the 1990 it was recognised that the success of such programmes was, at best, mixed. (Allen & Thomas, 1992). Population growth was increasingly recognised as a facet of gender inequality (UNFPA 1990) , but for wider political and cultural reasons, the sustainability policy debate did not engage with these problems.

The conventional discussion of sustainability does not normally place much attention on the effects of war, but merely acknowledges that violent disruption can both exacerbate and result from the hardships of resource scarcity. Since 2002, media attention has shifted away from the questions of environmental security to a more simplistic argument over international security. However, I believe that it is impossible to think sensibly about future resource use without accounting for the massive appropriation of natural and human resources for nationalistic and political objectives. For many people in the world, the effects of war-making reduce standards of living either by immediate destruction of productive resources or by their diversion into war-making efforts. The interdependence of industrial production and military force cannot be ignored. The publicity accorded to new wars should not detract from the debate on sustainability, but should enrich it with greater immediacy.

Hajer (1995) provides a detailed analysis of the development of environmental discourse, highlighting how the problematisation of the environmental crisis was shaped by institutional and political influences. In particular, he examines the development of ecological modernisation, noting that its concentration on technology and efficiency serves effectively to silence discussion of the social aspects of sustainability. Although the concept of sustainability concerns the sustenance of future human populations, the political discourse selects certain key threats to future security as worthy of action. As Hajer (1995) makes clear, the formulation of environmental problems depends on the institutional structures that can proffer specific solutions.

*'Policies are not only devised to solve problems, problems also have to be devised to be able to create policies.' p15.*

From this selection of contributions it is clear that the sustainability discourse incorporates a rich diversity of epistemologies which are perceived to interact in complex ways. Climate systems are affected by industrial activity which is influenced by economic systems which are in turn affected by ecological and social systems. As knowledge in one area develops and spreads, it affects practice in other areas which feed back into yet more related systems. This research is concerned with

the problem of understanding how far the broad discursive formation of sustainability can be integrated into the knowledge systems of business practices.

The concept of sustainability therefore challenges current practice in terms of immediacy and complexity. What emerges is a sense that current activities have impacts further into the future and over a wider spatial area than could previously have been imagined. The evidence of global environmental change makes clear the deeply interconnected and complex nature of human activity. A third dimension to the problem of sustainability is the challenge to political structures. Since global environmental change results from the decisions and activities of people and organisations on all parts of the planet, actions to constrain those changes will require an unprecedented degree of international cooperation. There is no political authority to protect the interests of the entire planet and of future generations, and even for the existing international authorities, there are highly challenging political obstacles. Although there can be some consensus on the idea that current patterns of consumption may be unsustainable, the means to identify more sustainable options remains a political battle-ground. However, the 'fear for the future' which underpins sustainability serves to redistribute responsibility in many directions. As well as demanding greater cooperation at intergovernmental level, it is also presented as a demand for greater civil responsibility from individuals and corporations. The Scottish Executive has promoted a public education campaign with the slogan 'do a little, change a lot', placing responsibility for energy consumption at the feet of private individuals. Sustainability challenges traditional political structures by stretching the boundaries of civil responsibility and demanding a wider conception of the locus of influence.

The sustainability discourse could be characterised as an expansion of perception over a broader range of knowledge, over longer time horizons and over a wider locus of responsibility. However, for practical purposes, decision makers remain constrained within existing social, economic and technical contexts. The following section on business sustainability therefore examines the extent to which it is reasonable to talk of business and sustainability in the same breath and how far it may be possible for sustainable livelihoods to grow from existing business practices.

## 2.2 Sustainable Business

This section explores the extent to which the epistemology of business can be expanded to incorporate the epistemologies of sustainability. A theme of the previous section was that concern for future generations demands an expansion of knowledge systems into previously overlooked areas. It is not new for businesses to acknowledge concern and responsibility for the social and economic effects of the business beyond simple profitability. The tradition of corporate responsibility has a long and illustrious heritage, including many Quaker founded firms such as Cadburys, Lloyds Bank and Rowntrees (See Windsor 1980). However, as our understanding of human induced environmental impacts grows, it is clear that the challenge of conducting truly sustainable business is significant. This review charts some of the developments in the understanding of the idea of sustainable business

In *Cannibals with Forks*, Elkington (1997) presents a vision of business that is highly responsive to the interests of a diversity of stakeholders, providing evidence of social, economic and environmental success. His catch-phrase, the Triple Bottom Line, has been widely adopted to provide a framework for corporate reporting on sustainability (Henriques & Richardson 2004). It is his contention that the successful businesses of the future will be built on epistemological frameworks which place equal significance on economic, ecological and social performance. He stresses the importance of consumer and investor pressure on corporations to demonstrate equal concern for economic, social and natural capital, but also highlights the influence of governments through systems of regulation and taxation. Similarly, Hawken et al. (1999) demonstrate how existing business epistemology excludes knowledge of natural resource efficiency as a result of organisational, institutional and regulatory failures. One area of sustainable business discourse concerns the role for governments in supporting the development of sustainable business among SMEs. (See Welford (1994), Holt et al (2000)). This discourse also emphasises the resource efficiency aspects of sustainability to the virtual exclusion of concerns for social and wider natural capital. There is growing evidence of businesses which adopt a more holistic approach to sustainability, going beyond simple resource efficiency to address some of the wider social and ecological impacts of business

activity. The current study enriches this literature by presenting a model to demonstrate how the epistemology of such firms differs from the more common forms of business knowledge systems.

Hawken's *Ecology of Commerce,* published in 1993 presents an early image of a restorative economy in which business serves to rebuild and recreate natural resources destroyed by recent generations. While forcefully narrating the ecological damage caused by industrial activities, he also proposes that businesses have the technical and creative capacity to reverse the process of degradation. His later work with Amory and Hunter Lovins, *Natural Capital*, published in 1999, provides a multitude of examples of resource efficiencies achieved by creative businesses. There is significant emphasis on the ways in which government actions and perverse incentives serve to undermine efficiency and the authors advocate the use of ecological tax reform to encourage greater resource productivity. Many of their examples demonstrate how existing structures of decision making exclude or undervalue experience necessary for more sustainable business practices. In Foucault's terms, the accepted grids of specification and authorities of limitation systematically silence knowledge of resource efficiency and equity[1]. Hawken at al (1999). are also very clear that existing practices of free trade can provide perverse incentives which favour inefficiency, although they do not suggest any specific mechanisms to counteract such forces. They appear to argue that a general awareness and valuation of resource efficiency, encouraged by ecological tax reforms, should provide the necessary incentives to stimulate the supply of sustainable technologies. They argue that epistemologies that systematically value knowledge of social and environmental effects should automatically produce more sustainable practices. Although Hawken's ideas are widely quoted among champions of sustainable business, such as Welford (1994), he has perhaps had less direct influence on business behaviour than Elkington (1997). Hawken (1993) provides inspiring visions of a restorative economy, and some very general principles of how that might be achieved. In contrast, Elkington (1997) speaks more directly to the business community in familiar terms of corporate accountability and 'the bottom line'.

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1 See section 2.4.2 for fuller explanation of these terms.

Elkington's concept of the triple bottom line (TBL) has become extremely popular as a theme for corporate social responsibility reporting. Norman & MacDonald (2004) note that the internet search engine, Google lists over 1,000,000 hits for the phrase and corporate giants such as Dow Chemical, BT and Shell use the term in many of their corporate reports. The TBL argument claims that long term corporate success depends on equal consideration of economic, social and environmental performance. The work has achieved a high degree of influence because it is firmly based within the existing corporate epistemology. The language is that of business reporting – shareholder value, return on investment, 'bottom line'. The surfaces of emergence are the experiences of global corporations, which have an authority based on longevity and profitability. However, Elkington also brings to the subject a degree of credibility from the non-corporate sector through his experience with NGOs. He takes a broad selection of issues of sustainability related to the experience of individual companies to demonstrate that failure to incorporate knowledge of social and environmental effects can ultimately damage a business. The tone of the work speaks clearly to corporate investors and directors, which may partly explain its pervasive influence. As powerful authorities of delimitation, corporate investors have significant control over corporate epistemology and by acknowledging the validity of the experience represented in Elkington's work, they can accommodate it within existing corporate structures.

The development of 'corporate social responsibility' reporting may not seem to be significant for the practice of smaller owner managed businesses, but it is worth a brief discussion for two reasons. Firstly, one might expect a 'trickle down' effect similar to the adoption of the EMS standard ISO14001, such that smaller companies serving corporate clients can expect in future to be required to provide evidence of their social and environmental impacts. A second, and perhaps more interesting reason is that CSR reporting demonstrates one approach to altering business epistemological frameworks to incorporate sustainability concerns.

The phrase, 'corporate social responsibility' has become highly fashionable in recent years, as businesses have begun to consider how the needs of investors can be

reconciled with concerns for the ecosystem, for social justice and for future generations. To a degree, this is helped by the growth in ethical investment, as some people require pension funds to provide some assurance that their savings are not supporting unethical activities (Paul Monaghan in Henriques & Richardson , 2004). Fund managers are increasingly expecting companies to provide information about their environmental, human rights and social effects, and indices such as FTSE4Good provide further incentives for CSR reporting. Many European governments are encouraging voluntary or mandatory disclosure of environmental reports and expect more extensive and intensive reporting in coming years. (EC 2001)

One argument in favour of CSR reporting is that it effectively expands the grid of specification for business information systems. By demanding the collection and dissemination of information relating to environmental and social impacts, the CSR report alerts decision makers to features of the business activity that might otherwise be overlooked. Norman and MacDonald (2004) have made the point that companies which have traditionally been concerned with those aspects of the business would already have such information systems in place and that the availability of information does not necessarily imply their consideration in decision making. While it is often argued that 'you can't manage what you don't measure' it may also be the case that measurement does not ensure management. The collation of information does not necessarily validate the data as a critical element of business knowledge.

Elkington's message appears to translate a range of sustainability concerns into economic terms via the market mechanism of ethical investment. If companies fail to address issues of equality, human rights or natural resource conservation, it could ultimately harm their share price by undermining investor confidence in their good reputation. However, the range of issues for inclusion into corporate reports on sustainability is potentially extensive, and the process by which a selection is made is itself an act of political authority. The CSR process maintains within the corporate control which elements of 'social responsibility' are worthy of discussion. One of the major criticisms of CSR reports produced so far has been the poor quality of such reports and the dearth of measurement of environmental and social performance (Norman and MacDonald 2004). A glossy report full of feel-good anecdotes does not

drive investment in sustainable technologies.

Partly in order to improve the quality of such reports and also to develop a common understanding of what is required, there have been a range of efforts made to develop standards, such as the Global Reporting Initiative, SA 8000 and AA1000[2]. As Oakley and Buckland point out in Henriques & Richardson (2004), there remains a concern that such standards may simply promote the lowest common denominator and discourage innovation among companies seeking to raise standards. However, they argue that standards of environmental and social reporting are necessary to provide some credibility and that such standards should be improved as understanding develops in their practical application.

It seems that the debate surrounding CSR demonstrates some of the challenges of incorporating sustainability within existing business epistemologies. Elkington has gained significant influence because his message retains the primacy of shareholders as the ultimate authorities of limitation. While noting the value of other stakeholder interests, these are placed within the context of long term business profitability. Another approach, pioneered by Traidcraft(2005) and the Co-operative Bank (2005) has investigated the practical application of stakeholder audits, allowing a voice to a wide spectrum of groups and individuals associated with the organisation. These audits help to define the types of information that the companies report to interested parties and, by implication, what aspects of the company's performance are recorded and evaluated. However it is worth recalling that neither of these organisations operates within a standard corporate ownership structure. It is debatable to what extent these models can be applied in the context of private or public limited companies.

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2The Global Reporting Initiative (GRI) is an independent institution and an official collaborating centre of the United Nations Environment Programme (UNEP), whose mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines.

SA8000 is promoted by Social Accountability International as a voluntary, universal standard for companies interested in auditing and certifying labour practices in their facilities and those of their suppliers and vendors. It is designed for independent third party certification

AA1000 Series, are principles based standards intended to provide the basis for improving the sustainability performance of organisations promoted by AccountAbility.

CSR has encouraged corporations to make statements of their commitment to principles that go beyond profit maximisation. It has encouraged the collation of information regarding environmental and social impacts. To some degree it could be said to extend business epistemology, if only a little. Whether or not it does anything to encourage more sustainable business practices depends on many other factors – What use is made of the information? Does it influence policy beyond the need for better figures? How fundamentally is the business affected by issues of energy use, climate change, population growth, ecological destruction? These questions are critical for the development of truly sustainable business within the corporate sector, but they are not the subject of this research.

While much of the discourse on sustainable business has concerned the information demands on corporations, there remains a quite different discussion of the implications of the sustainability challenges for SMEs. Since the early 1990's the emphasis has been predominantly on environmental management among SMEs, concentrating particularly on the barriers preventing better uptake of savings opportunities through improved environmental management. The following section reviews the common themes of this literature.

## 2.3 SME studies

When this research began, in 1996, the published literature on environmental behaviour of SMEs was extremely limited. This review begins by introducing the pre-existing literature, in order to explain the aims and objectives of the research, to develop a theoretical framework for understanding the responsiveness of SMEs to sustainability. The research approach was based on methods for deriving iterative grounded theory, discussed more fully in Chapter Three. A key element of this approach is the integration of a variety of theoretical perspectives with empirical research. As new research in this area was published, it was used to influence the process of theoretical development, both directly and in terms of guiding further empirical research. The SME literature review therefore covers two interwoven 'stories', that of the developing theory and that of the research method.

The theory was first influenced by Welford (1994) and Johnston and Stokes (1995) views on the role of environmental business support services, leading to empirical research in this area. Johnston and Stokes (1995) work also drew attention to the nature of the role played by business consultants, which was considered during the process of analysing the case study evidence. Jacobs (1998), Ammenberg et al (2001), Hoevenagel and Wolters (2000) and De Bruijn and Hofman (2001) all pointed to the role played by existing business networks, formal and informal, so the case study analysis examined the influence of such networks among the study companies.

Some research indicated promising avenues of inquiry which were explored by investigation of theoretical literature and comparison with case study evidence. For example, Petts et al's (1998) work indicated a potential role for organisational features and environmental champions, which lead to an investigation of the literature on learning organisations. Jacobs (1998) concept of 'technology scanning', by which businesses selectively adopt new technology for development, suggested another possible avenue of investigation. This lead to an investigation of literature on innovation. Tilley (1999) highlights the potential conflict between sustainability and the contemporary business paradigm, encouraging a further investigation of the

nature of learning versus 'epistemological breaks'.

The early SME literature, such as Welford (1994) focussed research attention on support services, and so the preliminary investigations concentrated on the experience of the providers of this business support. Similarly, the phone survey attempted to evaluate the influence of business support networks and consultancy services on SME behaviour. The choice of location for the empirical study was influenced by McKinney's (1998) findings of raised levels of awareness of waste minimisation in Lanarkshire. Petts et al's (1998) work stressed the significance of internal qualities within a business which made some responsive to environmental pressures. Qualitative research would be necessary to explore the significance of such influences, and this approach was supported by Johnston and Stokes (1995), Jacobs (1998) and Ammenberg et al (2001).

An early study of the extent to which SMEs are engaged with questions of environmental performance is provided by Richard Welford (1994). His survey of 102 SMEs in West Yorkshire was carried out in 1992 and 1993 and provides an interesting comparison with the phone survey conducted for this study. At that time, the largest proportion of companies (40%) were not giving any consideration to environmental performance, and only two had any intention of developing an EMS. Nonetheless, 40% believed that the environment would become increasingly important for customers in the future. The survey conducted within this research suggests that these predictions were accurate and practice among the engaged companies has improved significantly. However, the proportion of disengaged companies remains largely the same, even after almost a decade of awareness-raising. Welford (1994) classified companies as ostriches, laggards, thinkers and doers, indicating the degree to which they were actively engaged in improving environmental performance. There is a clear implication here that changes in practice follow from altered perceptions of environmental management, in its wider sense. Improved performance results from the application of new ways of thinking about the environment and business performance. In this work he also notes the constraints on knowledge development within SMEs, including the lack of management resources

and skills and the weak incentives for change. However, the work does not provide any explanation for the variation in responsiveness. Welford argued that improvements in environmental management would best be supported by the facilitation of environmental business networks and information services. This work guided the preliminary empirical study of business support services.

A number of such initiatives were developed during the 1990s, including the Aire and Calder Waste Minimisation Project and Project Catalyst, which were intended to demonstrate the potential savings from systematic waste minimisation. Neil Johnston and Anthony Stokes carried out an assessment of the motivations of the participants in these projects for the Centre for the Exploitation of Science and Technology in 1995 (Johnston and Stokes, 1995). They interviewed participants in three demonstration projects which operated from 1992 to 1994, including a number of SMEs. These projects made use of external consultants to help participants identify potential resource savings and sponsored club meetings to allow a sharing of ideas and practical difficulties. The intention of the projects was to alter business perceptions of environmental responsibility as a cost to that of a benefit, or saving opportunity, but the evaluation suggested that the environmental element was lost in the practical application. Waste minimisation was seen as a cost saving technique, but the connection with environmental responsibility was missed. The study identifies some features contributing to this failing. One was the common experience that environmental responsibility fell within the remit of production or engineering and tended to lack strategic influence. Another factor concerns the use of consultants to promote and stimulate participation. Many participants had existing connections with the consultants and benefited from a reduced fee for their time under the project. However, it must also be recognised that consultants commonly justify their fees with reference to the financial benefits they can bring to clients. However, the study does reveal some significant points about the process of knowledge development. Although consultants played an important part in the projects, the comments from the participants suggests that their role was not as external experts, as might be assumed. The purpose served by the consultants was to drive momentum for those changes which staff at participating companies wished to pursue.

*'The consultants were excellent: they didn't know anything, so they had very naïve ideas, 80% of which could be discounted. However, many of the other 20% were excellent'*

p16 Johnston & Stokes 1995

The consultants effectively granted a degree of legitimacy to engineers within the companies and raised their profile among managers. Although this point is not explored by Johnston and Stokes, it is made clearly in the quotes from project participants. Project participation effectively altered the rules of formation within the companies, even if only temporarily, to place a higher priority on resource efficiency. In evaluating the benefits of project participation,

*'the benefit of 'focus' was mentioned by 65% of the participants and 'drive' by 30%'*

p 22 Johnston & Stokes (1995)

Another finding concerning knowledge development, was the identification of the benefits of shared learning. Many of the participants commented that club meetings provided inspiration, support and a degree of peer pressure to implement changes. The consideration of common difficulties and the observation of alternative approaches built up a learning community, which many participants found helpful. The purpose of Johnston and Stokes' evaluation was not to explore the process of knowledge development explicitly, but their findings demonstrate its relevance within these initiatives.

Johnston and Stokes (1995) noted the relatively poor uptake of waste minimisation support among smaller businesses. Despite the impressive financial savings achieved by such projects, small companies, in particular appeared to face difficulties in engaging in the improvement process. The aim of this research project was to gain a deeper understanding of the nature of those barriers to improvement among SMEs.

A similar survey was undertaken by McKinney as research for a Masters dissertation at Herriot Watt University in 1998. The researcher subsequently worked for SEPA and her thesis informed their Waste Minimisation Strategy. This work was specifically focussed on waste minimisation, rather than wider environmental

management or sustainability, but it also demonstrates the barriers to engagement among SMEs. In spite of a number of successful demonstrator projects, awareness of waste minimisation practices among the sample was low, suggesting weaknesses in the dissemination of the results. Two areas of Scotland showed raised levels of awareness, corresponding to the catchment areas of the two most successful clubs run by East of Scotland Water[3] and by the Lanarkshire Environmental Business Club. The latter appeared to have better coverage of smaller businesses but the research indicated that this group identified a number of barriers to engagement. Although smaller companies would consider issues of waste if pressed by regulators, few perceived any resulting benefits to the business and were disinclined to invest time and energy in waste minimisation. When asked what kind of support they would like to help them to reduce waste, most favoured site visits by specialists providing clearly targeted advice, in preference to generic resources of printed or web-based materials.

McKinney's research had a very narrow focus on waste minimisation, and did not begin to consider wider issues of sustainability. However, the underlying premise was clearly that more efficient use of materials calls for a re-conceptualisation of waste and a re-evaluation of existing working practices to focus attention on material flows. It appears to the external observer that the narrow focus on waste and the concentration on cost savings placed severe limitations on the effectiveness of the initiatives. Although the organisers clearly intended to appeal to accepted business values, they did not distinguish themselves sufficiently from pre-existing good practice. Most business would claim to have a policy of minimising waste, because it would be absurd to claim otherwise. Although the professional advisers may have altered their own concepts of waste, this was not adequately conveyed to the wider business community, with the result that engagement among smaller firms was disappointing. It suggests that waste minimisation initiatives which concentrate on cost-cutting are not sufficiently challenging to the existing business epistemology to force the re-conceptualisation required for sustainability.

In recent years there has been a deluge of support for small businesses wishing to

3 East of Scotland Water was merged into Scottish Water in April 2002.

improve environmental performance, but it remains uncertain how effective these have been in switching business on to sustainability. Smith et al (2000) reported that in a survey conducted in 1998, two thirds of respondents claimed to address environmental issues in an environmental policy or business plan. These companies were also aware of growing environmental interest from stakeholders such as local authorities, customers and insurers.

Shearlock et al (2000) report on the poor co-ordination of support services in North-west England, in spite of a plethora of service providers. One particular problem they note is that small companies generally require quite specific advice or help, in contrast to the generic advice produced by government agencies. The knowledge base of individual companies was not significantly influenced by the availability of generic advice, because the authorities of limitation selected only specific information from the available sources. This point is also made by Holt et al (2000) in their report on support for SMEs in the UK. They note that in spite of the quantity of support that is available, *'little empirical research exists to prove whether these initiatives are assisting the vast majority of SMEs to move towards sustainability'. p35*

At this point it is useful to deviate slightly into the field of technology development among SMEs. Jacobs (1998) provides a very useful survey of studies on the adoption of new technologies among SMEs, highlighting the importance of a number of features. One theme of this work is the means of technology dissemination among small firms and the importance of established networks for the sharing of knowledge and experience. Although Jacobs was concentrating mainly on information technologies, it would seem that many of his observations are also relevant to the development of sustainable technologies. The array of environmental business networks that have bloomed in recent years have been promoted as a means of sharing information and experience of clean technologies. It appears from Jacobs' work that the existing business networks provide approved surfaces of emergence for the discourse of new technologies, requiring less investment in validation of knowledge than other sources. However, another theme of Jacob's work is the significance of the capabilities of owner-managers in technology scanning - that

process of identifying potential technology developments and adapting them to specific circumstances. With a few exceptions listed below, the majority of work on SME adoption of clean technologies has ignored this aspect, which appears to have a great bearing on the success of technology adoption.

Ammenberg et al in Hillary (2001) report on a Swedish project supporting 30 SMEs in an industrial district to develop a joint EMS and obtain group certification to ISO 14001. Although this group had also started out as a waste minimisation initiative, it had extended into other areas of environmental management and enabled participants to co-ordinate their internal resources. The shared experience of the waste initiative built up a degree of common understanding and values that made it easier to invest in a further stage of learning. Unlike the Scottish waste minimisation initiatives discussed by McKinney (1998), these companies relied mainly on internal knowledge resources which they shared co-operatively, rather than depending on an externally funded consultant. It is clear from the study that the group made significant investments in developing the internal knowledge bases of the companies and established trusted systems of knowledge sharing within the group.

De Bruijn and Hofman (2001) conducted an evaluation of 35 pollution prevention projects, involving more than 1600 companies, to assess to what extent participation in the projects had made a change to their thinking and investment decisions with respect to environmental performance. The Dutch model of waste minimisation clubs is based around provincial bodies. Each province has a 'prevention team' to co-ordinate pollution prevention projects and provide funding. VROM, the Dutch Ministry of Housing, Spatial Planning and Environment sets targets for reduction of waste and emissions. Consultants or universities carry out audits and material flow analyses and trade associations and municipalities work to network appropriate support services. De Bruijn and Hofman's evaluation indicated that many companies had increased their knowledge of material flows as a result of the project, but it was not clear that the methods had been used to generate new options for reducing material flows after the project ended. Most participating companies already operated EMS, so these projects did not appear to be reaching the laggards. Trade associations were named as the best partners in the projects because of credibility and long term

commitment and it was felt that consultants move on too soon. This study concentrated on the development of appropriate partnerships to ensure long-term security for such projects. There is much to be learned from this analysis for the improvement of British initiatives, not least in the effective co-ordination of local and national government agencies and the collaboration with existing business support networks.

Hoevenagel & Wolters(2000) continue this theme in their study of the role played by intermediary organisations, such as employers associations, and municipalities in providing specific support to SMEs. These findings demonstrate how institutional arrangements in the Netherlands have encouraged the development of effective environmental business support networks, while the UK experience has struggled to surmount institutional barriers.

These two Dutch studies demonstrate that the process of knowledge development depends on a complex interplay of institutional and cultural factors. The co-ordination among different agencies provided a high degree of legitimacy to the approach, particularly relying on existing trusted sources of information, such as trade associations. The advice offered was more appealing because it came from a reputable source.

A study by Frances Tilley (1999), evaluates the depth of sustainable thinking in the strategies of 60 small businesses in Leeds. All of these firms had made some form of improvement in environmental performance through changes in waste management, energy management or product marketing or design. However, Tilley found that most of these were motivated by efficiency rather than environmental concern. She classified their environmental responses as strategic (12%), piecemeal (28%), accidental (20%) and omitted (40%). However, even the most environmentally conscious firms were not taking a sustainability perspective. Although Tilley discussed the concept of ecological modernisation and questioned the sustainability of the accepted business paradigm, it was clear that none of the businesses in the study had begun to make such a radical reconceptualisation. Tilley argues that any form of sustainable business system requires a very significant change in perceptions

and understanding of the role of business, in common with the theme of this work. However, it does not go so far as to investigate the difficult question of how such an epistemological break might take place.

This question is investigated by Petts et al (1998) in their study of environmental responsiveness and organisational learning in SMEs. They surveyed nearly 1000 individuals working in SMEs to gain an impression of attitudes to environmental responsibility and how these related to corporate environmental performance. They identified widespread support for environmentally responsible behaviour and a desire among many workers and managers to be proactive in protecting environmental resources. However, there was also a widespread mistrust of the responsiveness of others, both within companies and between competing companies. Many seemed to see themselves as more responsible than those around them. To a degree, this finding is likely to arise from their methodology, but perhaps not to the extent that it was observed. The researchers also investigated 12 case study companies which were developing environmental management systems to assess the extent of organisational learning. They concentrated on three key areas, namely the role of the champion, the attitudes towards the business benefits of good environmental performance and the structure of the organisation for idea sharing. It was perhaps inevitable that in these proactive companies, there was an environmental champion in a relatively senior position. It is difficult to imagine that the companies could be proactive otherwise. However, an interesting finding is that in only one of the companies did they find evidence of a proactive environmental attitude to be dispersed through the organisation. In all of the others the champion was relatively isolated and faced some challenges in maintaining the momentum of change. With respect to the business benefits of environmental performance, the main drivers appeared to be cost savings and meeting rising expectations of corporate customers. It is notable that in none of the cases studied were environmentally benign technologies promoted, or even mentioned.

The researchers drew on the concepts of organisational learning to test the effect of company structures. In 11 out of the 12 companies the management structure was flat and open, allowing for an informal sharing of ideas. Six had formed environmental

teams or committees and most of the companies used regular team briefings, works fora and open-door policies by management to stimulate internal communication. Non-management staff stressed the importance of two-way discussion to initiate change, in contrast to the one-sided notion of suggestion schemes. This work appears to support the idea that organisational features can have some influence on the way in which business knowledge bases develop with respect to sustainability.

The research by Petts et al. (1998) makes a valuable contribution to understanding the internal mechanisms that can support improved environmental performance and moves far beyond the previous research which concentrated on external drivers for change. In this work Petts et al reveal the importance of internal organisation and shared learning in improving environmental performance. Nonetheless, it must be recalled that the selected companies were unusually proactive and more than half had invested in environmental training for staff, which is not common among SMEs. The preliminary study conducted for this thesis and confirmed by the case studies, suggested that environmental training is a very low priority for most SMEs. Although Petts' research identified the significance of good internal support mechanisms, it did not consider how such support could be generated in the first place. Even among the sample, the understanding of the business benefits of environmental performance was far from certain. Petts et al have provided a very helpful counterpoint to the incentive focussed work on waste clubs, but it remains a partial picture. One purpose of this thesis is to integrate these two perspectives to provide a richer understanding of the interaction of internal and external stimuli for environmental improvement.

The literature on SME environmental engagement indicated a range of possible influences on behaviour, but none provided a clear theoretical framework with which to analyse specific experience. The research intended to fill that void, by a process of iterative grounded theory generation. The following section explains the philosophical basis of such an approach.

## 2.4 Influences on Theoretical Development

The research method, explained in Chapter Three, utilises an iterative method to develop theory based on combining empirical investigation, reflection and the testing of a range of potential theoretical approaches. The previous section described the contribution of emerging work on SME behaviour, and this also pointed to other disciplines which could potentially illuminate the theoretical development. The theoretical development was initially inspired by an investigation of educational theory, highlighting the continuous process of knowledge development through practice and theory building. This suggested that businesses may become more sustainable simply by a process of continuous knowledge development, building on past learning. However, the evidence from the preliminary research suggested that there was a clear distinction between businesses that were engaged in such a learning process and ones that were not. Foucault's (1969) work noted the significance of points of discontinuity in the history of ideas, 'epistemological breaks' where the basis of knowledge is irrevocably changed. His ideas suggested a number of concepts that might help to explain this distinction between engaged and disinterested companies. Foucault's ideas found echoes in the literature on innovation. The literature of organisational theory considers some of the features of social organisations that can encourage or hinder the development of innovative thinking. The following sections summarise this literature, pointing out how it was used in the development of the theoretical framework for understanding SME behaviour.

### 2.4.1 Learning vs innovation

Before looking more closely at organisational features that can encourage or inhibit changes in knowledge, it is important to explore more fully the types of change that may be envisaged. Ordinarily, knowledge develops through processes of learning, building on past experience and incorporating new information and understanding. Kolb (1984)and Schon (1983) have independently explored the educational process in terms of the iterative interaction between practical experience and abstract theories. Schon (1983) developed the practice of 'action learning' which provided an opportunity for shared reflection on practical experience in order to develop deeper

understanding. Kolb (1984) describes a cycle of experiential learning in which experience is subjected to reflective observation to provide abstract concepts which form the basis for further experimentation. A key theme of each of these educational approaches is the continued cycle of learning which builds up from repeated reflection and experimentation.

Similarly, Bachelard is quoted in Gutting (1989) to observe:

*'Scientific culture is animated by a subtle dialectic that constantly goes from the theory to experience in order to come back from experience to the fundamental organisation of theoretical principles' p.32*

Sustainable business may be viewed either as a further development of existing business practice or as a fundamentally different way of working. It is the subject of some debate to what extent it is possible for existing corporate structures to fully accept the challenges of sustainability. Is it possible for business to learn to operate sustainably or is the concept of sustainability fundamentally disruptive of the existing corporate paradigm, as Tilley (1999) suggests? Given the diversity of business practice among SMEs it seems likely that some may be able to incorporate principles of sustainability with relatively little disruption, while for others the break may be far more profound. The empirical study provides some evidence for a range of responses.

The 1990s saw a number of writers (Tushman and Nadler 1996, Nonaka and Takeuchi 1995, Galbraith 1996) engaged with the problems of innovation, particularly within large organisations. In a time of rapid technological advance, the ability to harness a firm's creative abilities could be a critical competitive advantage. Tushman and Nadler (1996) drew a distinction between incremental, synthetic and discontinuous innovation, either in terms of product or process. This distinction reflects the degree of change on previous activity. Incremental change is effectively a further development of existing practice, resulting perhaps from refinement or adaptation of what has gone before. Synthetic innovation is a more radical departure, often resulting from some unusual external influence. However, despite this step

change from the past, there remains a clear connection with previous activity. Discontinuous innovation, on the other hand, is a completely novel concept that flies in the face of past practice. One might argue that the lower stages of incremental innovation should more realistically be classed simply as learning, for they involve similar processes of applying new information to a familiar situation to gain some improvement. Learning and innovation can be viewed as different points on a spectrum of creativity. The feature that distinguishes different points on that scale is the degree of change from what has gone before. To use the language of Bachelard, it is only discontinuous innovation that could be classed as an epistemological break, since it is here that previous assumptions are discarded and genuinely new thinking is given voice.

Senge (1990) drew a distinction between what he classed as adaptive learning, which was associated with problem solving, and generative learning, which results from creative tension between business visions and current reality. He suggests that truly innovative companies have developed structures and values which support generative learning. This implies a new role for business leaders as designers of organisations, as teachers and as stewards. Although Senge writes of innovation as the result of generative learning, thinking 'out of the box', it is clear that he seeks to harness such creativity within existing business structures and corporate visions. There is a clear tension between the need for freedom to play with new ideas and the need to channel such play into profitable activities.

In seeking to understand the response of SMEs to pressures for sustainability, it is important to consider how significant a change would be needed. As business practices vary, it is clear that some firms are likely to be far closer to sustainability than others and for some a clear break with past practice may be needed. The empirical study examines the experience of individual companies to gather some understanding of the depth of awareness of sustainability and the extent of change necessary.

The sour-dough model incorporates concepts both of learning and of epistemological breaks. Repeated practice (each new baking) provides a richer knowledge base with

which to move forward, akin to normal learning processes. However, there are circumstances in which the knowledge structures of a business can be fundamentally altered and a completely new range of knowledge ingredients is selected. Examples of this might include change of ownership of the business or significant changes in management. The analysis of the evidence provides an indication of how knowledge of sustainability develops by both means.

### 2.4.2 Foucault

Another key influence on the developing theoretical framework was provided in the work of Michel Foucault, particularly The Archaeology of Knowledge (1969). This section outlines some of the significant ideas of Michel Foucault, pointing out how these could be applied to the research context. The concept of the *archive* may be related to a business identity- those features that make it unique and must be communicated to new members of the community. The *discursive formation* represents the subjects of communication or discourse which occur within a particular context, such as a small business. The *rules of formation* define the limits of a discursive formation through a range of social and managerial structures. These rules take many forms, including social settings for communication, the interests of figures of authority and management systems for the identification of important information. Such rules define, if only temporarily, how knowledge develops within a social context, but they may also point to the causes of disruption of existing knowledge systems. This cuts to the core of the research question – what is it that distinguishes the engaged from the disinterested companies? Could this structure help towards understanding the break in thinking required for sustainable business?

Michel Foucault's interests ranged very widely and he published works on the development of clinical medicine, philosophy, social discipline and a history of sexuality (Foucault, 1961, 1969, 1976) Although during his lifetime his own thinking developed and changed significantly, at times appearing to contradict itself, this writer has drawn on only one period of his work, as presented in 'The Archaeology of Knowledge', in which he attempts to define his method of historical inquiry. In particular, I have made use of his concepts of the 'archive', 'rules of formation' and

'points of diffraction' in order to analyse the process of knowledge development in small businesses.

According to Gutting (1989) Foucault sought to distance himself from those historians whose concern was to identify the origin of ideas or attribute originality to certain thinkers. Instead, he saw the documents of historical analysis as the objects of study in their own right, not as signifiers of some anterior understanding. The importance of the document or statement was that it had been recorded. The act of communication required a selection to be made of experience deemed to be significant and the implied invalidation of other experience deemed less relevant. In the act of speaking on one thing, we also choose not to speak of others. He presented the notion of the archive - that body of knowledge that was considered worthy of faithful maintenance and communication to future generations. Although the term archive may suggest a fixed body of knowledge that is unchanged, such as a sacred text, this does not appear to be a quality that Foucault attached to the term. Indeed, for an archive to continue to be of value over a long time, there must be a degree of scope for extension, elaboration or interpretation of the body of knowledge. It is this process of adaptation that is particularly relevant. On the one hand there is a need to preserve that which has been deemed to be of long-standing value, and on the other there is a need for constant re-evaluation of ancient wisdom in the light of current experience. This idea has a very clear relevance for the consideration of sustainability. Many long-held assumptions concerning planetary resources are now subject to questioning and revision. The concept of sustainable business may be in conflict with current structures of ownership and control of resources. For an individual business, the archive may represent the core business identity, which may, or may not accord with the principles of sustainability. The structures which govern how such an archive may change over time might demonstrate the degree to which the business can be compatible with the idea of sustainability.

Foucault (1969) challenges the apparent unity of any archive, by making clear that each statement or document maintains an independent existence. The grouping together of certain statements into a 'discursive formation' is an arbitrary process, influenced by many 'rules of formation'. The 'discursive formation' is a grouping

together of statements that are acknowledged as having relevance to each other. For example, Foucault described psychiatry as a discursive formation, but within that formation he also included statements about the subject of madness preceding the 20th century development of the medical practice of psychiatry. Similarly, business management may be thought of as a discursive formation which includes statements about a range of characteristics of the business, such as financial accounts, human resources, customers, etc. The discursive formation of sustainable business may include statements concerning a range of social and environmental characteristics of business practice. Just as each scientific discipline contributes to the wider scientific discourse, so sustainable business discourse contributes to the wider discourses on sustainability. Within one company, the subjects of internal communications may be described as the discursive formation of the business.

Foucault (1969) argues that the range of possible statements which may be constructed within a particular discursive formation is limited, not only by the rules of grammar or logic, but also by what he refers to as the 'rules of formation'. These rules define, sometimes at a subconscious level, what experience may be considered in relation to others and how objects of thought may be placed in relation to one another. There is, in theory, an unlimited number of discursive fields, yet the subjects of discussion and the formulation of those fields are restricted by social, institutional, political and psychological constraints. A clear example of this is in the development of 'environmentalism' which has come to incorporate the experience of a highly diverse range of disciplines from engineering to climatology. Foucault's archaeological method sought to uncover those rules of formation and reveal how certain experience or information gained a privileged status over other knowledge that was disregarded. By drawing attention to the unspoken and to the structures which silenced certain experience, he sought to liberate the mind to investigate the alternatives to accepted norms. He makes clear that a discursive formation is a collection of statements that emerge from a 'non-discursive context' – the experience of daily life. What Foucault seeks to uncover are the unspoken rules which separate out certain forms of experience to be worthy of articulation and discussion.

The 'method' of archaeological investigation concentrates the attention on certain

aspects of a discursive formation which delimit its field of relevance. Foucault(1969) identifies four basic elements of a discursive formation – the objects of the statements, their 'enunciative modalities', the concepts used to formulate statements, and the themes or theoretical viewpoints developed within the formation. The term 'enunciative modalities' refers to the institutional context within which statements may be made. For each of these elements he describes forms of rules which influence the construction and use of statements within a discursive formation. Foucault developed this method based on his preceding work on the history of thought and not all of the elements or their rules can easily be applied to the far more limited field of small business management.

For this work, the most relevant element of Foucault's analysis concerns the rules for the formation of objects. He distinguishes three forms of such rules, which set apart certain forms of experience as being worthy of discussion. One form concerns the social context from which an object emerges, the 'surface of emergence'. Objects are worthy of discussion if they are in some way unexpected or pathological, so it follows that the social context defines what is considered to be normal and what is not. From that context, particular experiences emerge as being unusual and therefore the object of discussion. There are many potential objects for inclusion within the discursive field of sustainable business, but the selection of those objects depends on characteristics of the local social context, the specific business. For example, some workforces may be very conscious of recycling rates and therefore discuss each new waste stream that they encounter. Similarly, if workers are used to a mixed ability working environment, they may notice the absence of disabled workers in a particular factory, while those working in exclusively able-bodied workplaces might not register this absence.

A second form of 'rules for the formation of objects' concerns social authority to define objects for discussion and Foucault refers to these as 'authorities of delimitation'. In addition to objects which emerge naturally from a particular social context, some objects come to be discussed because individuals in positions of authority decree that it should be so. This is very clearly applicable to a small business context, particularly where the owner is closely involved in the operation. If

the owner is concerned about certain features of the business, such as materials efficiency or energy usage, then line managers and supervisors are required to discuss these matters. Within the wider sustainable business literature discussed in section 2.2, there is consideration of the role of shareholders as authorities of delimitation through the process of corporate social responsibility(CSR) reporting. If shareholders demonstrate a concern for social or environmental performance then companies are required to discuss and report on such issues.

The third type of 'rules for the formation of objects' are those concerning classificatory systems, which define certain forms of experience as relevant to the discursive formation. Thus, the object of discussion does not depend on observation within a social context or on the interest of an authority, but on prescribed systems of identification or, in Foucault's terminology, a grid of specification. An environmental management system could be construed as a grid of specification which directs management attention to certain classes of information about business performance. Similarly, if shareholders, as authorities of delimitation require information on social and environmental performance, then a company may establish CSR reporting procedures which themselves form a grid of specification. This would require managers to identify certain forms of information described by the reporting procedures.

This last example highlights an important feature of Foucault's rules of formation, namely that they are interconnected and do not act independently of each other. Within a discursive formation there may be a number of rules of formation in operation, some of which may work in contradiction to others. For example, it is conceivable that a company may have established an environmental management system in order to satisfy customer requirements. However if the owner and the workforce have no interest in environmental performance it is possible that the information gathered for the EMS is not used to influence the decisions and actions of the company.

Foucault also examines the importance of 'enunciative modalities' such as the right of certain people to use a given mode of speech and the institutional site of origination

of the statement. In more prosaic terms – what right do you have to say that and what business is it of yours? This questioning of authority seems to be particularly appropriate when examining the experience of small businesses, many of which strive for freedom of decision making, but are subject to strong external pressures. Concerning environmental performance, there may be many individuals, organisations and authorities which seek to influence the discussion of business sustainability, but the degree of their influence depends on many of the other rules of formation. For example, environmental authorities have a legal duty to force businesses to consider certain features of environmental performance. While consumers may also wish their suppliers to demonstrate good practice, their influence is constrained by features such as their individual power relative to other consumers.

Foucault's rules for the formation of concepts and for the formation of strategies are not so directly applicable to the business setting. However, they do provide some insight into how accepted patterns of knowledge can change. Foucault is not only concerned with the structures which constrain and direct the development of knowledge. He also acknowledges the significance of discontinuities of thought which allow for the emergence of distinctly different ways of thinking. These bear some resemblance to the ideas of his teacher, Gaston Bachelard who was interested in the role of 'epistemological breaks' - points of rupture with previous ideas, where thinking is irrevocably changed from what went before. Gutting (1989) relates the debate between Bachelard and Canguilhem regarding the degree of continuity that may endure such breaks in systems of thought. Canguilhem provides a richer understanding of epistemological breaks by recognising that such breaks are not necessarily completely disjunctive. Concepts from a past theory may be maintained, but their relations to others can be redefined in superseding theories. So even although a theory can become outdated the concepts behind them can remain valid. While Bachelard was concerned with the epistemological obstacles that constrained scientific thought, Canguilhem is less sweeping. He does not cast out the old ideas as necessarily bad or wrong, but views them more as providing the building blocks, perhaps modified, for later theories. Within Foucault's structure of rules of formation there occur 'points of diffraction' at which two equally permitted, but incompatible theories may exist. He examines the circumstances in which such

discontinuities can emerge within a discursive formation.

It seems that the idea of the epistemological break is highly significant for any discussion of sustainability. Existing practices and modes of thought concerning the role of humans on the planet apparently have to change quite dramatically over the next few generations. The objects of value or significance will alter as we gain a deeper understanding of the part we play in planetary life systems. Section 2.1, discussing the literature of sustainability, argued the case that sustainability is fundamentally about reconceptualising the role of humanity within planetary systems. Within that context, business sustainability also demands a profound reconceptualisation of the physical, social and economic environment within which companies exist. It is not yet clear how much of a change is necessary for small businesses to adapt to the demands of sustainability, but it does appear that there are some who are open to such change and some who are not. This research examines the process of knowledge development in eight SMEs to understand whether their experience represents an 'epistemological break' or a gradual learning process.

It was Foucault's contention that a careful examination of these and other characteristics of a discursive formation could provide some understanding of how certain types of knowledge have developed. By examining what is and, more importantly, what is not said, we can more fully appreciate the limits of a discursive formation. Foucault's analysis of discursive formations provides inspiration for the analytical approach of this study. By examining how certain experience and knowledge is valued and used in business decisions, we can begin to understand how some companies become attuned to sustainability, while others remain inattentive to its demands. By questioning the authorities of limitation, we begin to see how certain practices can become open to question while others remain immutable.

This work seeks to understand the rules of formation which guide the development of knowledge in small businesses and which, in some cases, can lead to the development of new perspectives and new practices. By examining the social structures and practical processes by which new information is tested and evaluated, we come to understand what features contribute to the epistemological breaks or

reconceptualisations that set businesses on the path towards sustainability. Many of these themes are common to the literature on organisation for innovation, which is discussed below.

### 2.4.3 Organisational theory

Organisational theory concerns, among other things, the flow of knowledge and information within organisations. This requires a balance to be struck between formalising certain classes of information while also encouraging the consideration of new information. This discussion begins by examining the role of procedural standards as a means of sharing good practice, and then reviews some of the literature on organisational learning and innovation. This demonstrates a number of features of business organisations which can encourage or inhibit the development of new knowledge within a business.

Early writers in management theory, most notably F.W.Taylor (1947), were most concerned that mass production required a fast and efficient means of reproducing craft skills among an unskilled workforce. To this end scientific management encouraged the breaking down of skilled tasks to many, much simpler operations which could be carried out repetitively by unskilled workers. Thus the traditional knowledge of the crafts-man or -woman was simplified into the manufacturing operating procedures. As mechanised production has become increasingly sophisticated, detailed knowledge of manufacturing operations has become embedded in capital equipment, vastly improving the reliability and standardisation of product. These systems are now so highly advanced that most manufacturing firms do not have sufficient personal knowledge to learn how their processes can be improved. Those people who can analyse manufacturing systems' performance work as highly paid consultants. However, it is not only mechanisation that has lead to standardisation. The rapidly expanding service sectors rely on human behaviour to add value, but in order to produce a predictable standard of service, the idiosyncrasies of personal characteristics have been subsumed in detailed work instructions. The three-ring binder has become a symbol of global standardisation, defining in precise terms how each task is to be performed to prevent any unexpected deviations from

the norm. Standardised procedures provide a degree of predictability, which is critical for many types of operation.

Standard operating procedures are a critical element of the corporate knowledge base of any business. To a degree they could be said to define the business identity, by describing how they perform daily activities. Particularly for manufacturing firms, repetition and conformity are central to the quality of the final product and changes must be carefully evaluated to avoid any compromise of that quality. Standard procedures effectively provide a grid of specification to classify certain knowledge, experience or practical activities as critical to the business knowledge base. They provide the rules to identify classes of information deemed essential to the business discourse.

Galbraith (1974) looked at organisations in terms of information processing. He noted that predictable work could be organised according to rules and procedures, even when the degree of organisation was relatively complex. For predictable tasks, even those calling for a lot of co-ordination among different task performers, procedures, targets and rules can be developed to ensure that the work is appropriately co-ordinated. However, the less predictable the work, the greater would be the need for 'on-the-job learning', in-situ information processing. Galbraith suggests that the success of an organisation depends on a combination of the amount of non-routine work that it performs and its ability to process information to resolve new problems. This suggests that organisational structures suited to standardised predictable work are not necessarily well-suited to work demanding creative responses to novel problems, such as waste minimisation or sustainable production.

In the 1950's a body of literature developed which focused on the need for organisational learning and, ironically, some writers proposed developing procedures for that purpose. Demming's work on quality circles encouraged workplace learning by encouraging the setting up of procedures to review experience and devise new solutions and improvements (Demming 1982). This work has been highly influential and has formed the foundation of quality management standards, which in turn influenced the shape of the international standard for environmental

management. At one level procedures can be improved and developed by a conscious application of a learning procedure. Environmental management systems can establish procedures for the continual review and improvement of environmental practice. They can, if well specified, provide a grid of specification, directing the attention of managers toward important features of environmental performance.

The literature of knowledge management has been predominantly concerned with the means of sharing information in large organisations, particularly in respect of information technologies.(Scarbrough et al 1999). Hansen et al (1999) distinguish between strategies of 'codification' and 'personalisation' in the work of management consultancies. Codification depends on extracting 'knowledge objects' from cases, and making them widely available within the organisation for others to use, e.g. via a database. It depends on a reasonable degree of standardisation in the service provided to different clients. Personalisation strategies depend on getting people together to tackle novel problems, calling on a range of relevant experience. Although technology can allow a sharing of basic information, it does not substitute for personal contact. These ideas clearly echo Galbraith's information processing work of 1974.

Donald Schon (1971) described 'dynamic conservatism', an active resistance to change, which he observed in many large organisations. This can be seen when structures and systems which are developed to deal with one situation are threatened by changes to the operational environment. Galbraith (1996) wrote of innovation as being destructive of established practices and proposed organisational structures specifically to protect the development of innovative ideas. Similarly, Tushman and Nadler (1996) note that organisational structures appropriate to ‘today's work’ may retard the capability to realise ‘tomorrows work’. Systems get embedded and the people who are effective in making the system work at one time have an investment in a 'no change' policy. Foucault was at pains to make clear that the rules of formation, as well as delimiting an area of discourse, also served to exclude certain statements as irrelevant. By establishing certain patterns and organisational structures, we preclude the possibility of alternatives.

Nonaka and Takeuchi (1995) have studied the experience of Japanese companies in developing cultures that encourage learning and innovation. They point out the significance of tacit knowledge, which is embedded in working practices and specific contexts and, as such, may be difficult to recognise or articulate in different circumstances. The focus of attention for Nonaka and Takeuchi is the interaction between personal, tacit knowledge and systematic, explicit knowledge, in the context of organisational learning for innovation. They describe a 'spiral of knowledge', in which tacit knowledge is articulated and codified to enable it to be communicated to those in a dissimilar context. The process of internalising the explicit information and adapting it to a new context is perceived as the basis of innovation.

For Nonaka and Takeuchi, the key step is finding ways of revealing and making explicit the practical knowledge and concepts used by working people in their daily lives. In some ways this could be compared with Kolb's (1984) stage of reflective observation, but Nonaka and Takeuchi make clear that in order to become aware of ones own tacit assumptions and working models it is often necessary to have those challenged in some way. They refer to the use of *koan*, or seemingly contradictory phrases, in stimulating learning in business organisations. The effort of making sense of the contradiction may lead to a deeper understanding of personal assumptions and concepts. A more superficial, but similar effect may be achieved by a professional consultant studying the workings of an organisation, questioning traditional practices. This process of making explicit the tacit knowledge held by people is referred to as the articulation of the knowledge.

The next stage in Nonaka and Takeuchi's cycle depends on the codification of that articulated knowledge in forms that can be communicated to others in the organisation. As the knowledge is separated from it's original context it may be referred to as information, rather than knowledge. The final stage of receiving the information and adapting it to a new context is classed as 'internalisation' and creates new personal knowledge . This cross-fertilisation of ideas is viewed as the basis of innovation.

This process of adapting knowledge from one practical context and applying it to

another is highly relevant to the practice of improving environmental performance. The preliminary study identified a range of knowledge sources available to SMEs, including environmental business clubs which provide opportunities for sharing of experience. The case studies indicated that many of the better performing companies utilised knowledge from a wide range of internal and external sources. The way in which such knowledge is incorporated into the developing knowledge base is influenced by features of internal organisation.

Tushman and Nadler (1996) have suggested a number of features of an organisation that can help to develop a willingness and ability to innovate, under the broad headings of individuals, formal organisational arrangements and informal organisation. They have argued that :

*'organisational learning and innovation is a group and inter-group phenomenon and individual contributors rarely produce the creative ideas or solutions required for complex or discontinuous innovation.' p143*

For this reason, the individual characteristics they stress are connected with group working and the sharing of knowledge. The skills required to help people to work effectively in cross-functional groups identified by Tushman and Nadler include problem solving, communication, conflict resolution and team building. Clearly these are also skills necessary for running a small business.

There are also aspects of the informal organisation that can serve to encourage learning. Tushman and Nadler argue that innovation is supported by working norms that favour high standards of work, informality and flexibility. If workers are aware of the need for high standards and are rewarded for it, they are more likely to engage in actively learning how to improve. Similarly, a degree of informality and flexibility allows people scope to try out new ways of working. Tushman and Nadler suggest that an atmosphere of trusting conflict resolution is essential if new ideas are to gain widespread acceptance. This relates back to the inherent threat posed by innovation to established practices. For new practices to build on past knowledge, there needs to be a clear process of acknowledging and working through potential problems,

integrating received wisdom with new ideas.

However, there are also features of informal organisation that can effectively discourage innovation by making it risky for people to suggest new ideas. If an organisation is overly concerned with operating according to the rules, it can fail to perceive opportunities for improvement. More critical though is the attitude taken to unsuccessful innovation. New ideas that do not produce the anticipated benefits can either be viewed as a source of better information – why the idea did not work – or they can be treated as failures to be covered over and forgotten as quickly as possible. If failed ideas are brushed under the carpet or if unsuccessful innovators are punished, the long-term effect is to discourage future innovation.

Tushman and Nadler have also identified formal organisational arrangements that can support innovation, some of which are commonly found in the informal workings of small firms. The key purpose of formal arrangements for innovation is to encourage people from different disciplines and working areas to work together to share ideas. Within a small business, there are few organisational barriers to prevent contact among separate parts of the organisation, but some firms are more clearly integrated than others. Coffee rooms provide a clear illustration. In some firms managers are supplied with coffee in their offices by secretaries and they tend to eat lunch at the desk or with external business contacts. In others, facilities are shared among management, office staff and production staff and these provide the social hub to the factory. This apparently minor difference demonstrates the ease with which workers in different parts of the firm communicate with each other. Another formal arrangement relevant to the smaller firm is the availability of training opportunities. As well as developing the skills of the workforce, training also provides a forum for workers in different areas to share experience. At one level this may serve to support personal learning from both formal and informal sources, and at another it can provide a stimulus to ideas for improved performance.

Tushman and Nadler's model identifies a number of characteristics of individuals and formal and informal organisation which can help to encourage innovation. They build up a picture of a learning organisation as one with a high degree of internal

cohesion and loyalty, dedicated to high standards of performance, open to new influences and willing to test new ideas and take calculated risks to improve performance. Individual members are committed to advancement within the firm through training and varied work activities which challenge their capacity.

Their work was helpful during the analysis of the case study evidence, drawing attention to internal features that supported the development of the environmental knowledge base. One iteration of the analysis tested the direct relationship between learning organisation characteristics and environmental performance. Those companies which performed well demonstrated many learning organisation characteristics, but so did companies with a weaker environmental performance. On reflection, it was clear that a company's capacity to learn and innovate was only one of the influences on environmental performance. Some companies could be highly innovative, but they directed their creative abilities to non-environmental aspects of the business. Nonetheless, learning organisation characteristics contributed to the development of the environmental knowledge base of businesses. Organisation was therefore included as one element within the sour-dough model, which is described fully in the following chapter.

### 2.4.3 Summary

The sustainability literature highlighted the significance of integrating knowledge from many disciplines in order to develop understanding of the impacts of current human activities on future generations. It is a discursive formation that is rapidly expanding to incorporate contributions from many different surfaces of emergence, many enunciative modalities and many authorities of limitation. Business discourse is not untouched by this expansion and the corporate world faces increasing demands for evaluation and analysis of their environmental and social impacts. The corporate world has long recognised shareholders as the ultimate authorities of limitation on the rules of formation for business discourse, and it is through the influence of those authorities that the growth of corporate social reporting has come about. However, small and medium sized businesses, which account for 99% of businesses in Scotland, are not so clearly affected by the interests of institutional investors. Early

literature in this area (Welford, 1994) suggested that SMEs lagged far behind larger corporations with respect to environmental management and there has been very little literature concerning their engagement in the wider social aspects of sustainability. There appeared to be a contradiction within the literature between the case evidence of companies profiting from resource efficiency and the perception of widespread disinterest. Most of the literature on SME engagement has concerned the roles played by support services, such as environmental business clubs. This research therefore sought to explain the distinction between the engaged and the disinterested companies and began by investigating the effect of support services in Scotland.

In building a theoretical framework with which to understand the differing reactions of businesses to sustainability, the research drew on a number of theoretical disciplines. Educational literature highlighted the cyclical nature of the learning process in building up an increasingly rich understanding through the integration of theory and practice. Foucault identified a range of 'rules of formation' which effectively defined the scope of a discursive formation, highlighting the social and institutional features which allowed for the emergence of certain objects or discourse. He also noted the effect of the 'epistemological break' where knowledge systems are significantly altered to incorporate new areas of knowledge which had been previously overlooked. This literature provided a structure for interpreting the literature on organisational theory, particularly in relation to innovation. Much of that literature concerned the social context, or the surfaces of emergence, for the possibility of new ways of thinking. It strove to define the conditions or rules of formation which could allow for an epistemological break, or discontinuous innovation. Early writers on organisations were concerned with standardising procedures as a means of disseminating and repeating good practice, but later work has highlighted the limitations of standardisation when it comes to improving and developing new knowledge. As the pace of technological change increases there is a growing recognition that successful firms need not only repeat past success, they must also remain open to new opportunities and be willing to cast aside past truths. Many writers have identified features of organisations which can encourage learning and innovation, including the personal and institutional capacity to question accepted practice.

Sustainability demands changes in business practice, and while in some cases this may be a natural development of existing knowledge through learning processes, in others it could demand a fundamental reconceptualisation of the purpose and identity of the company. In order to understand why some firms appear more open to the challenge of sustainability than others, it is necessary to examine the structures of knowledge development within the organisation. These structures include the grids of specification that define critical areas of knowledge, the rules of formation that select from internal and external knowledge sources and the organisational features that mix together different knowledge sources. These ideas are all reflected in the sour-dough model presented in Chapter Four.

*Be aware of the spirit of God at work in the ordinary activities and experience of your daily life. Are you open to new light, from whatever source it may come?*

Advices and Queries
Quaker Faith and Practice, 1.02.7

# Chapter Three

# Research Methodology

The principle aim of this research was to develop a theoretical framework to explain the variation in responsiveness of SMEs to sustainability. This chapter begins by presenting the philosophical basis of the research, justifying the basis for its contribution to knowledge. It then explains the use of iterative grounded methodology, which integrates empirical and literary research in order to build up an explanatory structure. This includes an outline of the overall research process, followed by more detailed descriptions and justifications for the separate empirical research stages .

## 3.1 Research Philosophy

Epistemology is defined, in the Concise Oxford Dictionary, as the theory of the method or grounds of knowledge . This work begins with an explanation of the epistemological framework for three reasons. Firstly, knowledge is itself the subject of the research, so it is vital to establish clearly from the outset the concept of knowledge that is developed in this work. Secondly, the purpose of the thesis is to demonstrate that this research has made a valid contribution to knowledge, hence we must be clear about the nature of knowledge that this work provides. This leads to the third reason, which relates to the research methodology. The justification for the methodological approach is based on a post-structuralist conception of the social world, with its attendant post-modern epistemology.

This research presents a theoretical framework, or model for understanding the behaviour of SMEs. It is intended to draw attention to a range of features that influence behaviour, although the outcome of their interaction is complex. It is not claimed that this model is the only possible interpretation of the evidence, but rather, the model provides a useful guide to significant influences. The value of this contribution should be judged in the context of the discursive formation to which it belongs. It does not present a theory in the positivist or the structuralist sense, but a theoretical framework which identifies forms of experience which have influenced the consideration of sustainability.

Foucault(1969) drew attention to the social and institutional structures which served to guide the construction of social knowledge. By contrasting the concepts of previous eras with contemporary understanding he undermines any sense that an existing system of knowledge is permanent and unchanging. He enriched understanding of current concepts by reference to change from those of preceding generations.

Baert (1998) describes how rational choice theory, developed from economics, aims to explain social behaviour with reference to the personal preferences of individuals, as demonstrated by their effective utility functions. Utility functions provide a theoretical mechanism for the ordering of preferences, and rational choice allows individuals to maximise their expected utility from the range of possible alternatives. James Coleman's *Foundations of Social Theory*, cited in Baert (1998) developed this theory to account, not only for economic behaviour, where the theory arose, but also for the diversity of social behaviour. Baert (1998) notes that rational choice theory is not used to explain the behaviour of individuals, but of large groups of actors or consumers. The intention is to explain social structures by reference to the generalised preferences of the mass of actors, not to investigate the differences between individual preferences. He states that one of the underlying assumptions of rational choice theory is that preferences are stable over time and throughout society. It is therefore conceivable that the theory may be used to explain why SMEs either do or do not engage in environmental improvement, but not why some SMEs behave differently from others. In contrast, this work does not assume that SMEs have

broadly consistent utility functions. The economic approach generally assumes a profit maximisation objective for business decision makers, although acknowledging that some businesses may have different objectives and therefore different utility functions. However, these are taken to be pre-existing 'givens' and the approach does not allow for examination of the differences between utility functions for different companies. Baert (1998) criticises the approach of rational choice theorists on the basis that preferences are attributed by researchers to justify the rationality of behaviour, but they are rarely tested empirically. Since this work is concerned with the differences in behaviour among businesses, such generalising assumptions are inappropriate. Although other writers, such as Reinhardt (1999), have based their analysis of corporate environmental behaviour on this model, this work takes a different approach in order to take account of social influences which cannot easily be contained within the rational choice model.

One theme of the development of social theory in the twentieth century has been the debate over the contribution of scientific method to understanding the social world. On one hand there is an intuitive appeal about the apparent certainty that may be attributed to scientific knowledge, while on the other there are clear limitations as to the extent to which scientific method may be applied to the social world. Consideration of the positivist and the structuralist schools of thought illuminate this debate.

Positivism may be stylised as a strictly scientific approach to knowledge. It gives precedence to sensory observation for the development of scientific knowledge, assuming that such observations may be made independently of preconceived theoretical foundations. However, Gaston Bachelard argues that our perception of objects is guided by a theoretical perception of their nature (Gutting 1989). How we use senses to apprehend an object is determined by scientific understanding and instrumentation. The qualities that we perceive are described in terms of the theoretical models we use to investigate them. Theories guide our perceptions towards specific qualities of experience which are considered important for the development of more general understanding. Where, though, do we find these theories which guide our learning? Karl Popper, quoted in Warburton (1999) writes,

*'There is a reality behind the world as it appears to us, possibly a many-layered reality, of which the appearances are the outermost layers. What the great scientist does is boldly to guess, daringly to conjecture, what these inner realities are like.' p278*

However, Popper is concerned with the demarcation between science and non-science. He presents scientific theories as bold ideas that may be in apparent contradiction with existing observation as currently understood. Such theories provide predictions about possible observations. The theories are not, in themselves, true, but good approximations to the underlying reality. Popper distinguishes 'empirical' science from non-science, based on whether a theory provides falsifiable hypotheses. The testing of such hypotheses contributes to scientific understanding. According to Baert (1998), Popper tends towards a positivist epistemology, giving precedence to sensory observation as the foundation for scientific knowledge. This necessarily precludes certain forms of evidence that cannot be objectively evaluated. By those standards, the theory developed in this work is avowedly not 'scientific' in the Popperian sense, because it relies on evidence that is not open to direct sensory observation, and it does not provide strictly testable hypotheses. Any hypotheses deriving from the theory are indicative rather than strictly falsifiable. Positivists believe that there are unseen structures at work which can explain observed phenomena. Their work concerns the testing of theories by reference to physical observation. Part of the problem of this approach is that there is a great deal about the social world that is not open to observation, even although it may have a significant influence on social behaviour. Values and informal social organisation, for example, have to be inferred from a range of evidence and are therefore not open to direct objective measurement. Baert argues that positivism is therefore a weak method for understanding the social world.

Structuralism is an approach to understanding the social world that underpins the linguistic work of Saussure (1916), the psychology of Piaget (1974) and the sociology of Durkheim (1895). (Baert 1998). The structuralist school of thinking also holds that there are long-standing, invariant principles, or laws which guide social behaviour, but in contrast with positivist perspectives, structuralists hold that these

laws cannot be tested simply by reference to observation. Although these underlying social structures have a causal effect on individual and social behaviour, one cannot use simple observation to test the validity of hypothesised structures. Structuralism takes a holistic approach to understanding social behaviour, such that meaning is embedded within a broader context. Directly observable effects may have a variety of meanings dependent on their wider social context and are therefore not the constituents of simple causal relationships proposed by a positivist view. Structuralism concentrates on understanding the underlying, relatively fixed structures which guide social behaviour, rather than the transient variations between events. Durkheim (1895) sought to understand 'social facts' which he deduced from empirical research, implying the existence of universal structures controlling the actions of the individual. Baert (1998) argues that a further principle of structuralism is the concept that social structures act as a constraint on individual agency. This implies that it would be difficult for an individual to have any effect on structures. It is this principle in particular that is in clear conflict with the approach taken to this study. Although, at any moment, the actions of an individual may be constrained by the social context, it is not assumed that such social structures are inevitable and invariant. It is a fundamental premise of this work that the present, unsustainable social structures are open to deliberate change. The concept of society built upon invariant principles is in clear contradiction to the position taken in this work.

The post-structuralist perspective developed from a rejection of the constraint of agency implied by the structuralist view. Foucault (1969) contributed to this through a painstaking deconstruction of the concept of unities of thought, challenging the notion that such unities can have any existence except as artificial mental constructs. As was discussed in the previous chapter, he goes on to identify a range of interacting social and institutional structures which legitimate certain forms of knowledge within particular settings. A statement or document has its own existence, but any value that may be placed on it depends on its relation to other statements and the meaning accorded to it within a discursive context. There is no intrinsic value in one statement except in its relation to others, such that it contributes to a wider discursive formation. This carries very significant implications for the objectives listed at the start of this section.

Firstly the validity of this work as a contribution to knowledge depends on its integration with other statements and the ease with which it can be related to a wider discursive formation. The work is cross-disciplinary, drawing inspiration from a rich variety of intellectual sources, such as educational theory, organisational theory and the wider discourse on sustainability. By integrating these perspectives with the practical experience of business managers, this work draws together knowledge that was previously distinct. The analysis of business epistemology draws out relations that had been overlooked. In addition to explaining the real-world observations, it also contributes to a wider understanding of knowledge development. The generalisability of the theory will depend on further research but this in itself is a contribution to knowledge, because it inspires further investigation, further learning, and the development of further knowledge.

A second implication of this post-structuralist perspective concerns the model of knowledge development that emerges from this research. The sour-dough metaphor describes knowledge as if it were a living, developing entity, constantly absorbing and selecting new forms of constituent knowledge, yet grounded in specific temporal and spatial contexts. The value of a particular contribution depends on its integration with other knowledge, its influence on the changing knowledge base. There is no fixed, unchanging knowledge base, because knowledge only has life in application and further development. Thus, in order to study how knowledge develops in a particular context, it is necessary to take account of the social organisation which authorises and validates the process of knowledge development. This idea draws heavily on Foucault's archaeological method.

Finally, Foucault stresses the significance of social contexts for the formation of concepts and their construction into theories. This suggests that a theory to explain the behaviour of small businesses should be predominantly based on the categories that are relevant within that context. The post-structuralist view supports the grounding of theory within a specific empirical setting. The following section describes in more detail the approach of iterative grounded theory that underpins this research.

## 3.2 Iterative Grounded Theory

Grounded theory is a term coined by Glaser and Strauss (1967) to describe a process of inductive theory generation based on empirical evidence. A key theme of this approach is that theories can, and should, be based on real life experience. They describe a research process that begins, not with a preconceived theoretical basis, but with an exploration of a substantive area. Their approach emphasises the need for generating new theory directly from data, basing categories and properties on real life experience, rather than on preconceived concepts adapted from other contexts or disciplines. A cornerstone of this method is the comparative analysis of study groups, intended to draw out similarities and differences which form the basis of categories – the building blocks of theory. The conceptual categories that emerge from comparative study are further extended and refined as they are tested in more cases, providing greater richness to the idea. The validity of the method is based on the comparative analysis of evidence, not in the independent or objective validation of each piece of evidence. In keeping with post-structuralist thinking, they adopt a relativist epistemology, utilising a range of data sources for the development of categories.

The method of discovering grounded theory was developed for sociological research, but has been widely adopted in a range of disciplines. Strauss and Corbin (1997) state that

*'Grounded theory methodology and methods are now among the most influential and widely used modes of carrying out qualitative research when generating theory is the researcher's principal aim' p.11*

While Glaser and Strauss' methods have been highly influential in the development of qualitative inductive research, there have been criticisms of their wholesale rejection of pre-existing theory. Orton (1997) questions the simple dichotomy between inductive and deductive research implied by their approach. He refers to the development of organisational process research as an example of a research methodology that falls somewhere between these two camps. Iterative grounded

theory is an approach that utilises the empirical priority of grounded theory, but modifies it in order to draw on potentially enlightening theories. By this method, a theory is gradually built up by a process of investigation and reflection, using the findings of each stage of reflection to guide the next stage of investigation.

*'In a study where neither the theory nor the data is fixed, research improvisation works better than research design'. Orton p432*

Iterative grounded theory is used where research is focused on complex organisational phenomena which occur over time, such as organisational learning and cultural change.

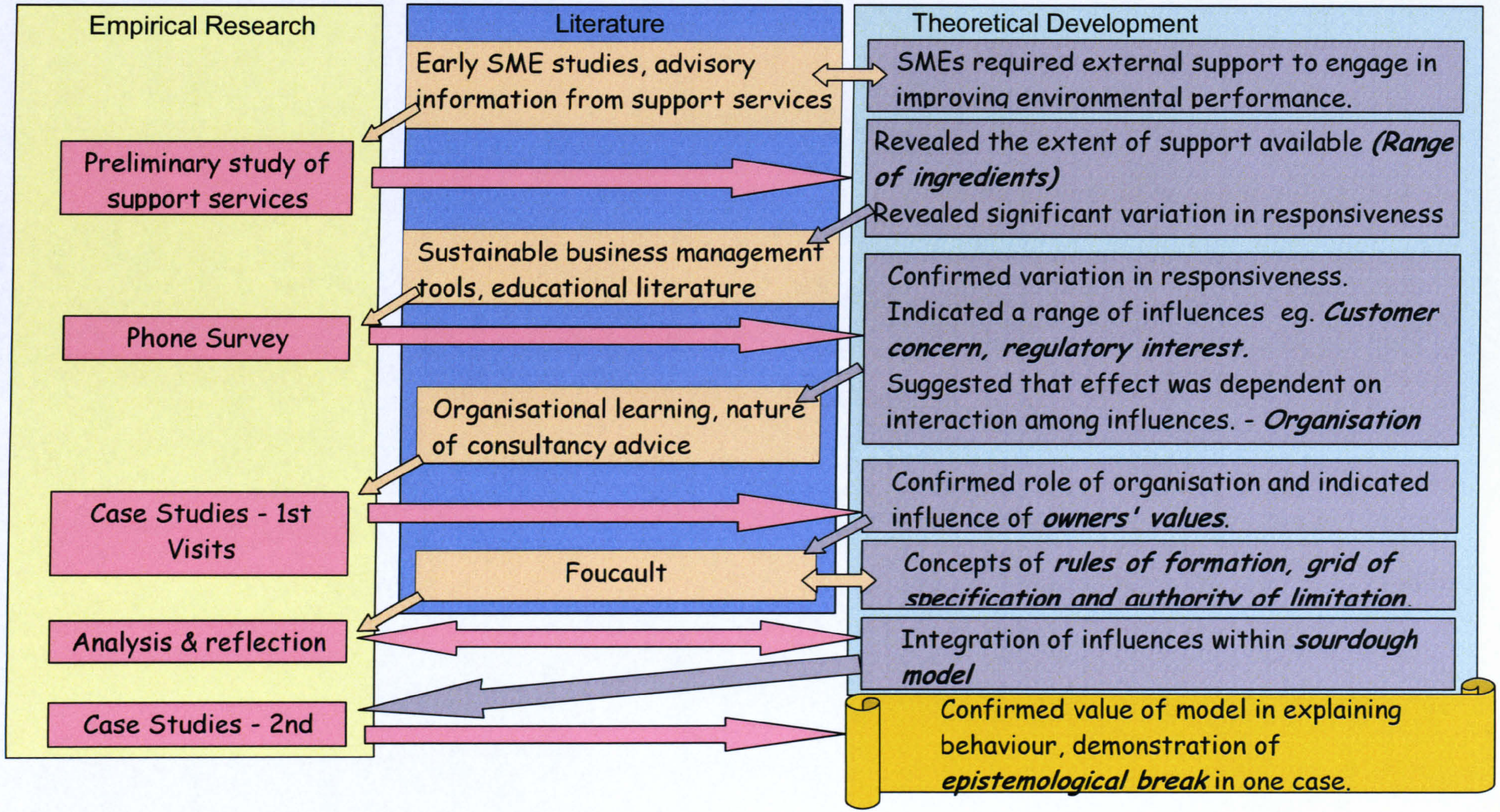
The research question concerned the differential responsiveness of SMEs to sustainability, but in the early stages of this study the subject was poorly understood. Much of the literature reviewed in the preceding chapter was published some way into the project. There was clearly no existing body of theory that was directly relevant to the specified subject area. While tentative theories existed of business environmental strategy (e.g. Roome 1992, Meima 1994), these were not concerned specifically with SME experience. The literature on the SME 'sector' such as Storey (1994) concerned specific characteristics of the small business sector, indicating that there was much to distinguish their behaviour from that of larger corporations. It was therefore apparent from the outset that in an area so devoid of theory, a key research objective should be the generation of theory, or at least some guiding theoretical framework.

The preliminary research suggested that any response to the research question was likely to be complex and multidimensional. Within each of the potential explanatory areas, there could be many further interacting influences. It also seemed likely that the situation was one which would change over time, as general public awareness of environmental issues and of sustainability changed. It therefore seemed appropriate to approach the research question with an open flexible attitude, in common with the use of the methods for generating iterative grounded theory.

*'A researcher committed to iterations between theory and data is less likely to have a research design, or even a research methodology, but is more likely to cobble together a bundle of research techniques which help respond to emerging questions throughout the study. An iterative process researcher suspects that researchers who can predict the appropriate research design in advance might not be asking difficult enough questions'. Orton p 432.*

It is hoped that the overall research process presented here represents more than a mere 'cobbling together' of research techniques, but any criticisms of the process should be made within the context of this rather fluid approach. Figure 3.1 is intended to provide a graphical representation of the way in which empirical investigations and literature research were integrated in the process of theoretical development.

Figure 3.1 Process of Theoretical Development



One of the aims of the research was to enrich our understanding of how government could support the development of sustainable businesses. Clearly, there are many possible mechanisms for the encouragement of sustainable business, including taxation measures, public procurement policies and direct regulation. The literature on SME environmental management had placed a high emphasis on the role of advisory support services to encourage engagement in environmental improvement Welford (1994) had identified lack of awareness and lack of specialist skills as barriers to such improvement and proposed that business advice and support networks could help to address those problems. A preliminary objective of the research was therefore to identify and evaluate the effect of support services for SMEs with respect to environmental improvement within a limited geographical area. This could serve to highlight the strengths and limitations of this form of government action in support of sustainable business. The focus of support services was predominantly environmental, with a bias towards waste minimisation. Clearly, this is a much narrower discipline than the broad field of sustainable business, but it reflected the existing domain of activity at the time of the research. The first task was to identify the extent of such support services in central Scotland, which was achieved by means of a survey of potential suppliers of environmental business support, conducted in 2000. The methodology used is described and justified in more detail in section 3.3 below.

The evaluation of the impact of the support services was based on the experience of two main groups. Firstly reflective interviews were conducted with service providers, commenting both on their own service and those of others. Secondly a sample of small and medium sized manufacturing businesses were surveyed in 2001 to gain an indication of their awareness both of the support services and of environmental issues in general. The purpose of this part of the research was specifically not to evaluate the impact of any individual service for their clients, but rather to test whether the availability of support services affected the general business population in an area. Other researchers have provided evaluations of specific projects , such as Johnston and Stokes (1995), but this research was intended to provide a more general evaluation. The preliminary study of service providers and the literature review had indicated that North Lanarkshire was an area which was particularly well-supported

in terms of environmental advice, so this area was selected for the survey. This confirmed the perception that there was a very wide range of engagement with environmental concerns and that there was a low uptake of support for improvement in this area. Support services did not appear to be a significant influence on the general level of engagement in environmental improvement. However, the qualitative responses to the survey suggested that there may be important internal features of businesses that influenced their engagement.

Another research aim with both practical and conceptual elements was the identification of good practice among SMEs to enrich understanding of the concept of sustainable business. In order to gather sufficiently detailed information, a case study approach was used, selecting a small number of businesses for investigation during 2002. These firms were selected from among the phone survey respondents on the basis of their claimed engagement with improving environmental performance. They were chosen specifically because they seemed to be more engaged than others in the move towards sustainable business. The investigation of these businesses concerned not only the level of practical engagement in improvement, but also the process by which sustainable business thinking was integrated into general business decision making. This allowed for a richer conceptualisation of sustainable business and for the development of a theoretical understanding of the progress towards that ideal. By examining the experience of these relatively advanced companies, it should be possible to identify how far sustainable business differed from traditional good business practice. This experience would also provide the basis for a theoretical framework to explain the drivers and barriers to sustainable business in general.

The theoretical development was based on a method of iterative theory building, derived from Glaser and Strauss' (1967) method for deriving grounded theory. By this method, a theory is gradually built up by a process of investigation and reflection, using the findings of each stage of reflection to guide the next stage of investigation. The case study evidence was analysed using a range of theoretical perspectives that had presented themselves in the course of the preliminary studies and the literature review. The relevance and limitations of each of these approaches were used to influence further stages of theoretical development. The aim was to

integrate a range of theoretical and practical perspectives into a coherent model with which to explain the behaviour of small businesses in respect of sustainability. The emergent model was used to structure the presentation of the case study evidence.

In order to provide some preliminary testing of the theory, follow-up studies were conducted of the case studies after a lapse of two years. This allowed the researcher to test whether the model could successfully explain the degree of change in practice over the intervening period. Although not all of the original companies had remained in business, the surviving ones did suggest that the model was a useful tool for explaining their progress, or lack of progress towards sustainability.

This iterative process served to build up a theory that was firmly based on empirical findings, but allowed the influence of a broad range of theoretical and practical perspectives. The discursive formation was deliberately inclusive and extensive. The comparative analysis of the case studies drew out the 'unspoken experiences' – those features that influenced one company but are remarkably absent in others. This accords with Foucault's approach of looking for what is absent in order to understand what is present. The research design may, indeed, be described in terms of the sour-dough metaphor that resulted from it. The early studies drew on a few ingredients, or knowledge sources, to construct a simple theory, but it was through repeated learning and investigation, the addition of further knowledge sources that a rich and satisfactory result emerged. The presentation of this thesis represents a sharing out of the dough, to allow other bakers to work with it and make their own contributions.

The following sections provide more detailed justification of the research methods used at each stage of the process.

## 3.3 Preliminary study

The early stages of the literature review demonstrated that most academic attention to SME engagement in sustainability concerned the effects of support and advisory services. Little had been published at that time on the situation in Scotland, but there were indications that a number of environmental business clubs had shown some success.

The purpose of the preliminary study was two-fold. Firstly it sought to identify what advisory support was available to small businesses which were interested in improving their environmental performance and secondly to gather an 'insiders view' of the effect of such support. This study was intended to provide background information in support of the broader research aims, not to form the main focus of the research. The opinions of service providers could give some clues to explain why some businesses were more engaged than others and what factors supported such engagement. This stage of research therefore provided evidence of available support services and also some evidence which could contribute to the later stages of theoretical development.

Snowball sampling was used from late 1999 to 2000 to identify individuals engaged in environmental business support activities. The network of such individuals within central Scotland was small, and the researcher soon encountered repetition of contacts. Internet searches of relevant organisations provided some further contacts, but at that time there was a limited amount of information available via the Internet. The research was based within the Graduate School of Environmental Studies, which was already established as an educational centre for environmental professionals and many of the contacts were made through alumni of GSES. The preliminary study began by making general telephone inquiries to local enterprise companies in the Scottish Enterprise Network (SEN), asking what support was available for a small business reviewing its environmental performance. SEN is the agency for government support of business and could be assumed to be a first contact point for businesses seeking such help. Out of eight such calls, only one resulted in a direct contact with someone with relevant knowledge. The other seven respondents did not

know of any such support and could provide no further contact details. At the very least, this suggested some failings in the internal communications of these organisations. Fortunately, contacts with known individuals at a later stage revealed that the available support was not quite as inadequate as the early survey indicated. Conversations were held with twelve people employed within the Scottish Enterprise Network,[1] either in Local Enterprise Companies or Enterprise Trusts. These led to further discussions with eight environmental consultants, most of whom worked in collaboration with the enterprise network in providing support services. Four academic staff at higher and further education establishments were also interviewed to investigate their experience of environmental business clubs, and four staff from SEPA provided further information. One member of staff from each of East of Scotland Water and West of Scotland Water (since merged) and Scottish Power added to the picture[2]. In addition, the researcher attended a number of environmental business club meetings and one publicity event for the East of Scotland Waste Minimisation Club. All of these institutions had made some contribution to the discourse on sustainable business as a result of their organisational responsibilities. In Foucault's terms they were recognised as legitimate surfaces of emergence for statements contributing to the discursive formation. A full list of interviewees is provided in the appendices.

The aim was not to provide a fully comprehensive listing of every organisation working in this area, but to gather an impression of the availability of advisory support. While this technique could not provide a completely exhaustive listing, it does identify significant players in the field. The method is also representative of the way in which a business manager might seek out publicly funded support for environmental improvement and therefore provides a reasonable indication of the accessibility of these services.

Face to face interviews and phone discussions were conducted to assess the extent of

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1 Scottish Enterprise Network is a public body with responsibility for the support and promotion of Scottish businesses. It consists of Local Enterprise Companies and smaller Enterprise Trusts, which operate in areas of particular need.

2 The two Scottish water companies are in public ownership and merged in 2002 to form Scottish Water. Scottish Power is a privatised energy company with a significant share of the Scottish electricity market.

interviewees' engagement in support activities, how these fitted with their other organisational responsibilities and to gather their perceptions of their own experience. Participants frequently commented on the difficulties they faced in providing or co-ordinating business support. The analysis of these interviews provided an insight into the institutional features supporting the development of environmental business clubs. This analysis employed less methodological rigour than the main study, primarily because it was intended to provide a contextual setting. The detailed results of this preliminary study are provided in Chapter 5.

The preliminary study revealed that there were many organisations with responsibility for providing support to SMEs and that the co-ordination of services was perceived by them to be very important. A challenge they recognise that they faced was in engaging SMEs with environmental improvement and a common approach was to concentrate on the potential for efficiency savings. There was a common perception that SME managers were broadly disinterested in questions of sustainability, except when pressed by regulators or by customers.

In respect of the overall research question, the preliminary study gave support to the perception that there are some SMEs that have engaged in improving their environmental performance, if not their thinking on the wider theme of sustainable business. The support providers were reluctant to use the word sustainable in relation to business, because it did not communicate well to their target audience. Among SMEs the term 'sustainable' referred to individual business survival rather than to any wider social concepts. This suggested that the research focus should narrow down to environmental management, rather than the broad theme of sustainable business.

The study also supported the initial perception that despite a few good examples, most SMEs were not actively engaged in improving environmental performance. The respondents suggested a number of possible explanations for this which should be explored in more detail in the later research. Firstly, efficiency and cost savings were viewed by service providers as the most significant motivations for engagement. This reflects the promotional strategies of many service providers who stress 'waste- minimisation' as the core purpose of their support. Further research

should test the validity of this assumption. Secondly, regulators and customers were identified as potential motivators for companies to engage in environmental management, but service providers recognised that these motivations were highly variable. A key influence on the effect of regulatory or customer interest was the general level of awareness and concern within a company. This suggested that further research should test awareness of regulations and of customers' environmental concern. Many of the service providers perceived their role principally in terms of awareness raising and viewed environmental business clubs or waste minimisation clubs as a useful tool to serve that purpose. North Lanarkshire was an area identified as having a particularly strong support network and an active EBC. Testing awareness of regulation in this area would give some indication of the effect of the club in raising awareness among the wider business population.

The next stage of the research was intended to balance the views of the service providers with the perceptions of a sample of the business community. Based on the evidence from the preliminary study, North Lanarkshire was selected as the geographical base for the next stage of study and the aim was to evaluate awareness of regulations, customer environmental interest, available support services and engagement in efficiency improvement.

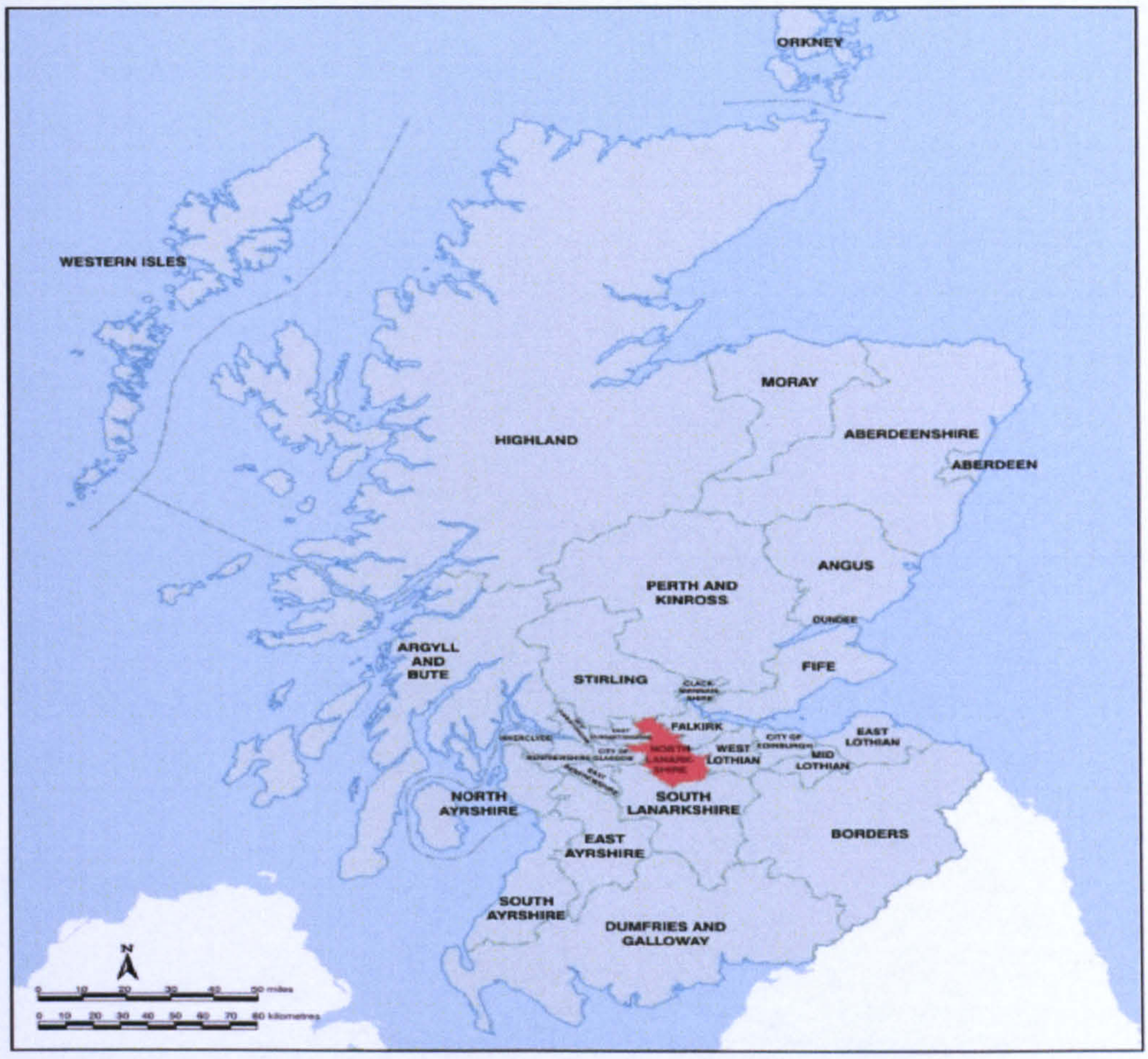
## 3.4 Phone survey

This stage of the research served to evaluate the experience of businesses in the target area and also to identify potential companies for closer investigation through the case study research stage. It therefore sought a superficial level of information about what companies were doing, and also a more detailed investigation of practice. Survey techniques could provide simple evidence which could be analysed quantitatively, but the research also required more in-depth response. A telephone survey could provide the opportunity for more detailed investigation among more responsive companies, while also gathering data for the general evaluation.

North Lanarkshire is part of the catchment area of the Lanarkshire Environmental Business Club, one of the more widely recognised of such clubs in Scotland and might therefore be assumed to have a higher level of awareness than other areas. An earlier study of waste minimisation clubs (McKinney 1998) had indicated that general awareness of waste minimisation in Lanarkshire was higher than average for the rest of the country. Since the aim was to identify firms engaged in environmental improvement, it seemed sensible to increase the chance of finding such firms by concentrating on a well supported area.

North Lanarkshire is an area of west central Scotland which historically relied on heavy industries such as coal mining and steel-making. The decline of those industries left a legacy of industrial pollution and widespread unemployment. It has received substantial assistance from the European Union for regeneration and is rebuilding its economy on the basis of its good transport links. It is claimed that North Lanarkshire businesses can reach 3 million people, or 60% of the Scottish population, within one hour's drive (North Lanarkshire Business Directory) It therefore represents a  highly industrialised population, well integrated into the global economy.

Figure 3.2 Map of Scotland showing location of North Lanarkshire (from North Lanarkshire Business Directory 2000)




Manufacturing firms were selected for study because this sector has been the primary focus for advisory services, such as Envirowise. Manufacturing activities are commonly intensive users of physical resources and energy and therefore provide a population with significant scope for transformation to more sustainable business practices.

Businesses were selected from a comprehensive business directory produced by the local authority (North Lanarkshire Business Directory, 2000). The directory is prepared on the basis of updating existing information, liaison with new start programmes, postal surveys and advertisements in the local press. Inclusion in the directory is voluntary, but free of charge. It is possible that the directory is biased

towards those businesses which are willing to advertise, which might exclude businesses which do not seek publicity. The directory lists 452 manufacturing businesses, of which 204 are micro-enterprises (employing fewer than 10 people) and 15 are classed as large (with more than 250 employees), leaving 233 in the small and medium sized categories. Over a two month period in 2001, calls were made to 117 small and medium sized manufacturing companies in North Lanarkshire, eliciting responses from 61, a response rate of 52%, representing 26% of the sample population. These responses were gathered from a range of manufacturing sectors including electronics, engineering and food and drink. The sampling was not random, but concentrated on sectors that were not dominated either by micro or large enterprises and were likely to have an awareness of environmental concerns. Thus, for example, sign-makers and clothing producers are excluded from the sample, because those businesses were predominantly micro or large scale enterprises. The purpose of this was to increase the likelihood that case study companies might be engaged in similar activities, to enable better comparison of performance.

Box 3.1 Phone Survey Questions

Phone Survey Questions

1. Is your business affected by any of the following environmental regulations?
a.) Do you operate any processes requiring permits or authorisation under IPC or LAPC?
b.) Do you produce special or hazardous wastes?
c.) Are you obligated under the Packaging waste regulations ?
d.) Do you have a trade effluent consent ?
e.) Any other environmental regulations?

2. Have you undertaken an environmental audit, energy audit or waste audit of your business or any part of it? What kind of audit and who carried it out?

3. Do you promote any environmental benefits to be gained from your product or service or do you provide environmental services?

4. Do you have an Environmental Management System or are you developing one?

5. Are they aware of Scottish Energy Efficiency office, Envirowise, waste minimisation initiatives, Lanarkshire Environmental Business Club? Have they used any of these or any environmental consultancy? Was it useful?

6. Are you independent or wholly owned?

7. Would you be willing to participate in a more in-depth study?

The questions, shown in Box 3.1, allowed the researcher to quickly gather information about the level of regulatory awareness, environmental auditing, green marketing and environmental management systems.

The first question concentrated on regulations, as the preliminary study had suggested that most SMEs were not aware of environmental regulations affecting their businesses. This question provided an indicator of regulatory awareness. Clearly, it was impossible to assess the accuracy of the responses without a fuller investigation of their activities, so it could not evaluate how many companies were affected by regulation, only how many were aware of regulations affecting their business. The responses to this question could be related to question five, to assess the effect of support services in raising awareness of regulations.

Although the preliminary study had suggested that efficiency was perceived to be a key motivator for environmental engagement, this was a difficult quality to evaluate. Business will always claim be interested in increasing efficiency, but the extent to which efficiency gains affect behaviour may be highly variable. The second question was intended to give some indication of how many companies had engaged in systematic activity to reduce waste or energy use, by conducting audits. Although this may not be an ideal indicator of commitment to efficiency, it also served to indicate the overall level of engagement in one form of improvement to environmental performance.

The interest of customers was evaluated through the third question, concerning the promotion of environmental features of business activities. At this stage of the research, the nature of customer influence was under-developed and this simple question appeared to be adequate to evaluate the effect of customer interest. Although the later investigations revealed the far more complex nature of customer engagement, this question did provide some indication of how businesses perceived customer interest in environmental features.

The fourth question provided a second indication of engagement in improving environmental performance and the fifth tested the awareness of the available support

services. The sixth question, concerning the ownership of the company was included because many of the companies listed in the directory were part of much larger organisations. For example, it seemed that classifying the manufacturing operation of a multi-national corporation as an SME would be somewhat misleading. Although the survey was not deliberately piloted, this sixth question was added after the fourth call, when it became clear that the companies listed in the directory were not all independently owned.

Many of the respondents were enthusiastic to discuss their experience and notes of these comments were kept to enrich the understanding of the motivations for environmental improvement. Some of these are included for illustration in later sections of the thesis.

The full results of the phone survey are presented in Chapter 6. They confirmed that environmental engagement among SMEs is varied, with more than 40% of the sample showing no awareness of, or engagement in environmental issues, but 36% had achieved, or were working towards, recognised environmental management systems. Support services appeared to have little impact on the majority of businesses - 60% of respondents knew of at least one source of support, but only 15% had ever made use of them. The qualitative responses indicated that there were clear differences in attitudes between engaged companies and disinterested ones, but in order to understand that distinction, more detailed research would be needed. The phone survey identified 15 companies who had given some consideration to their environmental performance and would be willing to participate in a more detailed study. Those respondents also provided detailed responses to the survey questions and discussed their experience in order to provide the background information necessary to allow careful selection for the later study.

The preliminary study and the phone survey guided the case study investigations, by pointing to potential influences on environmental behaviour. Thus, the interviews sought detailed information concerning the influence of customers, regulators and support services, as well as evaluating the internal qualities that might affect behaviour. However the studies were also intended to draw out the perceptions and

*opinions of the business managers.*

## 3.5 Case Study Selection

The research objectives included the collection of evidence of good practice in sustainable business, in order to investigate the practical meaning of sustainable business for SMEs. It also sought to examine the learning processes involved in the development of sustainable business practices. These objectives required detailed information about individual companies, which could not be obtained by survey methods. Case studies were selected as a method which could allow both detailed investigation of practical experience and the development of theory by means of comparison between cases.

Cases were selected from among the respondents to the phone survey. The companies selected were those who had made some changes to improve their environmental performance and who were interested in taking the time to participate in the study. These cases were chosen because they appeared to be sensitive to environmental concerns and could therefore provide some insight into those processes which produced such sensitivity. Based on the responses to the phone survey, eight firms were selected which appeared to encompass quite varied levels of environmental commitment and were subject of varying degrees of external pressure. For ease of recognition, these companies are referred to by the pseudonyms Plywood, Components, Bread Bags, Pulp, Compressors, Furniture, Toner and Pressed Steel, indicating their main product. An introductory description of each firm is provided in Chapter 7.

Glaser and Strauss (1967) argue for theoretical sampling, as opposed to statistical sampling. The cases for comparison should be selected in order to provide sufficient contrast to generate useful concepts for exploration in order to develop a rich theoretical framework. In this research, no effort was made to select cases that could be in any way construed as 'typical' of a wider population. Indeed, some effort was

taken to identify businesses that were unusually responsive to environmental pressures. Yin's case study research methods (See Yin(1994) and Yin (2003)) place great emphasis on the prior selection of theory to guide case study selection and analysis, but this is not the approach adopted in this work. The theory emerging from this study is the result of data analysis, not the structure that guided the analysis from the outset. However, the initial theory emerging from the preliminary studies and the telephone survey did influence the selection of cases. These early studies had indicated potentially significant roles for regulators, customer concern, support services and resource efficiency as factors influencing environmental engagement. Since the influence of regulators was unclear the sample included some cases which were highly conscious of regulation (Bread Bags and Pulp) and some which were not (Components and Plywood). Similarly customer concern was a significant feature for Pressed Steel and Pulp, but not for Furniture or Plywood. The role of support services was tested by comparing the experience of Bread Bags, which relied heavily on support services, and Pressed Steel which was not aware of them at all. Resource efficiency was central to Toner's business model, but seemed to be a relatively low priority for Plywood. These contrasts provided a fuller understanding of the ways in which such influences affected business behaviour.

## 3.6 Case Study Research Method

The case studies served to provide a more detailed understanding on the influences on environmental behaviour. Interviews and site visits were conducted to

1. gather information about the company and its environmental performance
2. gather evidence of the role played by specific influences indicated by the earlier research, such as clients, regulators, support services, etc.
3. evaluate the perceptions of the manager or interviewee regarding influences on environmental performance.

Glaser and Strauss (1967) note:

*'In theoretical sampling, no one kind of data on a category nor technique for data collection is necessarily appropriate. Different kinds of data give the analyst different views or vantage points from which to understand a category and to develop its properties' . p65*

This clearly resonates with Foucault's thinking on the range of surfaces of emergence of statements. The site visits were intended to utilise a range of information sources to gather relevant evidence. Prior to site visits company websites were evaluated, where possible, and general background information relating to the core business of the company was obtained. However, at the time of the initial studies few companies had developed websites at all and even fewer provided much meaningful information. The researcher aimed to arrive early for the interview and took time to chat to reception staff, read publicity material and check the range of certificates on display in public areas. This provided an early indication of the extent to which environmental performance was an important part of the public image presented by the company. Reception staff also provided some indication of the accessibility and approachability of managers and the nature of the informal organisation in operation. Where possible, the interview included a tour of the facility , which served a number of purposes. Firstly, it provided opportunities to discuss specific aspects of the operation and allowed for a more detailed observation of working practices. It also allowed the researcher to observe the social interactions in the workplace, forming an

impression of the common modes of interaction. The informality of the tour also encouraged interviewees to make some relatively unguarded observations and provided a more personal insight into the perceptions of the subjects.

Hakim(1989) states that

'*Qualitative research can be extremely valuable for identifying patterns of associations between factors on the ground,*' p28

and notes its value in the development of theory concerned with causal processes. Qualitative research is concerned with individuals' own accounts of their attitudes, motivations and behaviour and can provide a richer body of evidence than other methods such as large scale surveys. In contrast to survey methods, in-depth interviews provide the opportunity for respondents to guide discussion to potentially significant areas which might have been overlooked by preconceived theories.

'*Although the interviewer guides the discussion enough to focus on the topic of interest, the depth interview provides enough freedom for respondents also to steer the conversation, for example to bring in all sorts of tangential matters which for them have bearing on the main subject*'.
Hakim (1989) p26

The study companies identified relevant people for interview, commonly based on knowledge of the firm's environmental performance. In many cases these people were in the position of manufacturing director or production manager. These were the people with most direct responsibility for environmental performance. The position held by these individuals varied from one company to another, and the effect of this variation is considered in the analysis.

In advance of the visit, interviewees were only advised that the researcher was interested in their experience of improving environmental performance, and they were given no warning of the type of information required prior to the visit. The aim of this was to allow the interview to be strongly guided by the respondents, as a

means of identifying information that the respondents considered to be important, in keeping with the approach of grounded theory. One implication of this approach was that some detailed information was not immediately available at the time of interview. This in itself provided further information about the level of personal knowledge and awareness of environmental matters on the part of managers. Follow-up phone conversations allowed the researcher to check the accuracy of the information gathered from the visit and to fill in any gaps that appeared when analysing the data.

The interviews began by asking the subjects to describe the business and its main environmental impacts. This allowed the interviewees to start from an area of comfort, where they were confident of the information they could provide and allowed a free-flowing conversation to develop naturally. During these practical descriptions opportunities arose for the researcher to prompt for specific detail on matters such as recycling, energy audits and customer base, as they emerged from the conversation. The researcher's interest usually encouraged interviewees to share their personal attitudes, values and opinions on environmental and social issues and in those cases the researcher made an effort not to guide the interviewee in any way. It was only towards the end of interviews that the researcher checked that key areas had been covered, using the check-list below, to prevent omissions.

A critical attribute of qualitative methodology is that it allows insight into the perceptions and motivations of individuals, and to this end, the interviews were semi-structured, but provided significant scope for extemporisation by the interviewees. The interviews included a number of specific, but open questions intended to encourage the interviewees to recount their experience. Every attempt was made to keep the interviews as informal as possible and to encourage the subjects to share their personal perceptions and opinions about their working experience. Although all of the interviews covered the areas described below, some extended much further, based on the enthusiasm of the subjects to share specific information. This allowed the researcher a deeper understanding of features that were significant in individual cases. Grounded theory methods specifically encourage data collection to be guided by the emergent theory, such that later stages of sampling concentrate on concepts

that have emerged from the earlier stages. Thus, the later interviews sought out evidence on certain features, such as the concentration of the customer base, which were signaled as important in the early interviews.

Key areas investigated in the interview included:

- Environmental concerns of customers
- Use of support services – LEBC, consultants, SEPA, etc.
- Opinions of ISO14001 from customers and managers
- Concentration of customer base
- Training provision
- Sources of idea generation
- Nature of supplier network
- Staff turnover and induction procedures
- Professional and educational experience of senior staff
- Formal and informal organisational features

The interviews were not based on a preconceived idea of what would be the critical characteristics, but rather sought to identify commonalities and discrepancies among the case study evidence – building categories of influences. This selection of categories was predominantly based on the preliminary contextual studies and the qualitative responses from the phone survey and therefore conforms to the grounded approach encouraged by Glaser & Strauss (1967). However, a portion of the categories, such as staff training and organisational features, were suggested by reference to literature on organisational learning and innovation. Based on the literature of learning organisations, specific evidence was sought for learning processes at work and those features associated with learning companies - open communication among different parts of the organisation, informality, willingness to test new ideas. Glaser and Strauss discourage the investigation of preconceived categories on the basis that they may be inappropriate to a given context and blind the researcher to more locally relevant categories. However, in this case, the concepts of organisational learning seemed to be highly relevant and generated a great deal of evidence in many cases. If organisational features seemed irrelevant to the practical

situation they would have been dropped from the investigation. The main emphasis of the interviews remained the categories emerging from preliminary studies and the developing body of evidence.

The interviews were not taped, because this could discourage respondents from giving frank and open responses, particularly as they related to the internal organisation or the role of regulators, but detailed interview notes were written up immediately after the close of the visits. These notes form the basis of the case study evidence presented in Chapter 8.

Following the first round of case study interviews, the information was analysed, according to the procedures described in section 3.7.1 below. After ranking the cases in terms of environmental performance, a range of influences were evaluated to test the extent to which they could explain the companies' environmental behaviour. It became clear that no single influence could adequately explain the companies' relative performance. Concurrently, the literature research examined the contributions of organisational theory and epistemology. The period of reflection and analysis was extensive, considering a range of potential explanatory models. The sour-dough metaphor emerged as the most useful means to describe the complex interactions among the range of influences at work.

## 3.7 Method of Analysis

The overall research aim was to explain the variation in business responsiveness to sustainability and the case studies were intended to provide the basis for a theoretical explanation of that variation. Although one approach might have been to compare responsive and unresponsive companies, in practice this was not feasible because unresponsive firms were unwilling to participate in the research. The research was therefore based on a number of firms that were all at least somewhat responsive. Nonetheless, there was a noticeable variation in the degree of responsiveness among the study companies. This variation provided the base-line against which to compare potential explanatory factors. By making a heuristic evaluation of the companies relative performance they could be roughly ranked, or grouped into good, middling and poor performers. This ranking could then be compared with a range of potential influencing factors to evaluate how well these explanatory variables could account for the companies relative performance. For example, the effect of regulatory interest could be tested by comparing the performance of highly regulated and lightly regulated companies. In practice, this simple approach could not adequately explain the companies' performance ranking and a more complex theoretical development was required which is described in more detail below. Nevertheless, the ranking of performance did provide a useful guideline against which to compare the combination of influences described by the term 'business epistemology'.

### 3.7.1 Performance Evaluation Method

Since the case study companies were engaged in very different activities, it was difficult to compare their environmental performance with any precision. Quantitative measures such as levels of effluent or volumes of waste would give information about specific types of environmental impact, but it would reveal little about the behaviour of the firm. Such measures would indicate more about the type of industrial processes used than it would about the firm's approach to environmental matters. A check-list approach was considered, suggesting particular measures that the companies might take and producing a ranking based on how many of those measures were in place. However, in looking at other studies which used this

method, such as Clayton et al (1997), it was clear that a great many measures would be inappropriate for particular firms. To 'down-grade' the firms performance on this criteria would be misleading. It became clear that some reflection was required on the meaning of 'environmental performance' for the purposes of this study.

Clearly, different products and processes have very different impacts on the natural and social environment. In this study it is assumed that the 'what and how' aspects of a business are relatively fixed. Although firms may choose more environmentally friendly production methods, the core aspect of 'what their business is about' does not change radically. Thus, any evaluation of the specific environmental impacts of the business would reflect more about the core business than it would about how responsive the firm was to pressures for cleaner production. Environmental performance is therefore a relative term, indicating something of how the firm behaves within the context of its core activities. A different study might seek to evaluate the performance of companies within a similar industry, but that was not the purpose of this work. This study faced the problem of comparing performance of very different companies.

Any such study has to consider how to evaluate the relative merits of established good practice compared with improvements in practice. Put simply, is it better to reward a company that is improving from a poor base or a company that is relatively good already? This is highly relevant to the case of small businesses, where the scope for improvement may be fairly limited beyond a certain point. Given the fact that understanding of environmental impacts is developing rapidly and that new 'environmentally friendly' products are coming to market at a good rate, it seems likely that even those firms who have established good practice might continue to find further improvements if they are minded to do so. This suggests that 'good practice' should also demonstrate some recent changes in practice, or at least some evidence of investigation of potential improvements. An evaluation of environmental performance should therefore provide a comparison of the number of measures taken to improve environmental performance, which is the approach taken in this study.

In addition to the question of quantity - number of improvement measures - there are clearly questions of quality and range. How significant are the measures in reducing environmental impacts? Are measures concentrated in a single aspect of operations or do they cover many aspects of the business? In evaluating the relative performance of the businesses, credit was given for quality and range of measures.

During the interviews and factory visits, I asked specifically for examples of recent improvements that had been made to the business and how these had come about. I also asked about what types of materials were segregated and recycled and what difficulties had been encountered in establishing recycling procedures. The factory visits also allowed more specific questioning of practices to determine why operations were carried out as they were and whether further scope for improvement had been identified. Following the visits the evidence was listed to identify what forms of 'good practice' were present. This procedure gave a clear impression of which firms were 'good' and which were 'poor'. Further analysis was required to compare the 'in-betweens'. Paired comparisons were made among all of the firms to identify which could be classed as the better performer. Although this is fundamentally a subjective evaluation of the relative merits of the two cases, it allowed the evidence to be considered in a systematic and transparent way. In most of the cases it was quite clear which of the firms was the better performer. In those cases where the evaluation was close, the paired comparisons demonstrated the areas of similarity and of difference.

The result was a broad classification of the companies from poor to good based on number, quality and range of measures taken to improve environmental performance.

### 3.7.2 Analysis of Explanatory Features

The aim of this stage of analysis was to derive a theory to explain the responsiveness of the case study companies to sustainability, although in most cases this centred on environmental improvement. The initial evaluation had distinguished between relatively good and relatively poor performers and the next stage was to structure an explanation for that variation. The analysis of the data used the constant comparative

method advocated by Glaser and Strauss (1967), gradually developing categories of influence by comparing the experience of each of the case studies.

The preliminary study and the phone survey had suggested some potential influences on environmental responsiveness – regulations, support services, customer interest and efficiency motives. This stage of analysis compared the effect of these influences across the group of case studies. One technique used in this process was to map the relative strength of each of these influences among the study companies and compare this ranking with the ranking of environmental performance. However, it was clear that such a simple approach would be inadequate to account for the variation in behaviour. The comparative process revealed the degree to which behavioural influences were inter-related.

Interview notes were analysed to identify evidence of such categories of influence, which in turn provided further properties of the categories to enrich the theory. For example, the effect of customer pressure is moderated by a range of factors, including the concentration of the customer base, the form of customer concern and the personal experience and values of managers within the study company. When a property was revealed in one case, the other cases were then analysed for evidence of that property, either as a positive or negative influence on behaviour. Such analysis allowed for the development of a richer understanding of the nature of the influences at work.

Much of the literary research was conducted at this stage, concurrently with the analysis of the case study evidence, highlighting the potential influence of learning styles, consultants' roles and organisational features. The concepts derived from the theoretical literature were tested against the case studies. The process of melding together these diverse categories and properties was a lengthy one, allowing a rich conversation to develop between the emerging theory, the case study evidence and a range of literary influences, described in the literature review. The analysis produced a very rich amalgam of conceptual categories and properties which combined to affect business responsiveness to environmental concerns.

This gradual process of analysis, testing and refinement guided the theory towards the process of knowledge development. The sour-dough model emerged from the practical context of the researchers personal experience. In struggling to bring together these diverse, yet inter-related influences, a simple home-baking analogy encapsulated the nature of the learning process. The sour-dough model provides a conceptual framework to combine the categories of influence and identify relevant features of individual experience.

The framework which emerged from this process was used to structure the case study evidence, highlighting the interconnections among the categories of influence. These case studies are presented in Chapter 8, based around the framework developed in this research.

The following table summarises key categories of influence and lists relevant properties.

Figure 3.3 – Categories of influence on environmental performance

| ***Categories of Influence*** | ***Category Properties*** |
|---|---|
| Existing Knowledge | Previous working experience of environmental champion |
| | Core environmental or social values |
| Customer Expectations | Inclusion of 'big name' customers |
| | Customers' proximity to retail sector |
| | Environmental interest of customers |
| | Degree of customer engagement |
| | Level of price competition |
| | Practical influence of customers |
| Regulatory Interest | Policing or advisory roles |
| Supplier Network | Availability of environmentally conscious suppliers |
| | Quality of supplier information |
| Business Networks | Environmental standards of major competitors |
| | Environmental business clubs |
| | Informal social networks |
| | Trade associations |
| Business Advisers | Knowledge source or subcontract |
| Rules of formation | Value of environmental information |
| | Inclusion of social effects |
| | Evaluation of environmental claims |
| | Influence on strategy |
| Organisation | Authority of environmental champion |
| | Dispersion of environmental responsibility |
| | Social integration |
| | Environmental discussion opportunities |
| | Personal engagement of champion |
| Grid of Specification | Collection and use of environmental data |
| | EMS |
| Authority of limitation (owners) | Sustainable business objective |
| | Focus on continuous learning |

## 3.8 Follow-up study

After a gap of two years, the researcher contacted the study companies to evaluate their progress. Two of the original companies, Bread Bags and Pressed Steel, had ceased trading and Components no longer performed any manufacturing. Pulp had been bought over by a competitor, but retained some of the original staff. It is indicative of the fragility of small manufacturing businesses that three of the original eight had stopped producing and another three had undergone significant changes in their markets over the two year period.

Phone interviews were conducted with managers at Furniture and Plywood and site visits were conducted at Pulp, Toner and Compressors. These visits provided an opportunity to test the effectiveness of the sour-dough model in explaining their performance over the two year period. The case of Pulp, which had changed ownership provided a striking demonstration of the effect of an 'epistemological break' in changing the progress of business sustainability.

The follow-up study first sought evidence of further improvements in performance in the intervening years, and then investigated any possible changes in the balance of influences in the business epistemology. Using the sourdough model as a framework, the researcher examined any changes in the company knowledge base, customer expectations, external knowledge influences, such as business and supplier networks, internal rules of formation, organisation, grid of specification and authority of limitation. The method of investigation was similar to the first visit, based on interviews and site visits, where possible.

## 3.9 Scope and limitations of the method

The research method described in this chapter is based on a post-structuralist perspective of knowledge and should be assessed within that framework. Specifically, it is not claimed that this work provides *the unique* explanation for the environmental behaviour of SMEs. Rather, the theory is one approach to understanding that behaviour which is firmly based on practical experience and which provides a useful structure for analysing similar situations. The research was intended to discover grounded theory, not to provide a systematic test of the theory.

The analysis described in the preceding section follows the methods of grounded theory and the case studies presented in the following chapters demonstrate the validity of the concepts to the evidence gathered. However, it must also be recognised that the theory derived from this evidence may not be the only possible analysis of the data. Returning to the work of Foucault, one might argue that the discursive elements selected are only one form of many potential such selections. The method used is intended to ensure that the resulting theory is dominated by the same concepts as dominate the reality of business experience. The process of analysis evaluated the relevance of many categories of influence that did not turn out to be useful. Undoubtedly a study based on preconceived theories of power relations, for example, might highlight different categories and different evidence. Such an analysis may also have a degree of validity, but it would reflect more of the thinking of the researcher than the thinking of the objects of study – namely workers in small businesses. Clearly, the researcher is convinced that the emergent theory provides an accurate and useful description of the substantive experience and this work is intended to demonstrate that. It is not argued here that business epistemology is the only possible approach to explain variation in environmental performance, but rather that it can be shown to be one useful explanation and appears to be more comprehensive than previous piece-meal explanations and is firmly based in the concepts relevant to the substantive area of study.

Glaser and Strauss (1967) have argued that grounded theory should aim for theoretical saturation in the substantive area of study, that is, the analysis should

continue until no further concepts or properties may be identified from the evidence. Such detailed analysis was indeed conducted for the sample evidence. It might reasonably be argued that further case studies might reveal yet more properties to enrich the theory. However, this argument does nothing to undermine the research already conducted. It is to be hoped that work on this theory will continue which may well cast new light on the analysis to date, but that does not in itself make this work in any way 'incomplete'. Glaser and Strauss make clear that a theory is ready for publication when it can be clearly and credibly presented in order to allow others to accept the theory and work with it more. The nature of grounded theory is that it should continue to develop through further research.

*'Our strategy of comparative analysis for generating theory puts a high emphasis on theory as process: that is, theory as an ever-developing entity, not as a perfected product.' p 32*

The method of iterative grounded theory is based on a systematic comparative analysis of data to identify categories and properties. Clearly the nature of the original data is qualitative – it includes factual information about the companies and very many subjective perceptions of the respondents. Elements of the factual information could be readily validated by observation during the factory visits and in many cases systematic quantitative data was provided in support of specific claims. However, a proportion of evidence was the opinions and evaluative comments of interviewees. Nonetheless, the 'independent truth' of personal perceptions and opinions is relatively unimportant to the theory. Glaser and Strauss (1967) make this clear in the following:

*'In generating theory it is not the fact upon which we stand, but the conceptual category that was generated from it. A concept may be generated from one fact, which then becomes one of many possible diverse indicators for the concept. These indicators are then sought for the comparative analysis.' p 23*

Thus, for example, the property of social integration could be indicated by a selection of examples, including shared catering facilities, open office space, regular training

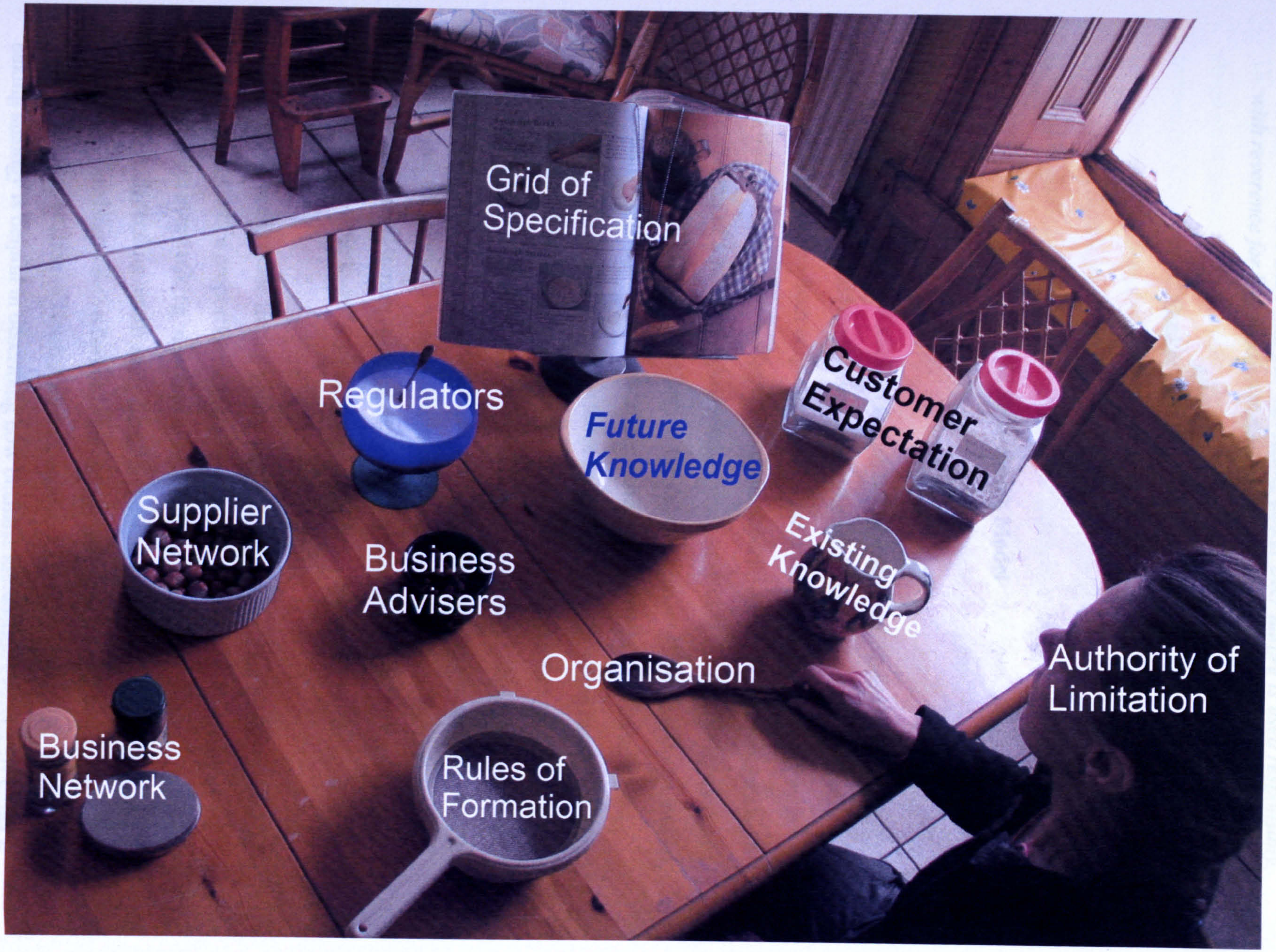
activities, active social organisations, etc. The reality of any one example in any one case study does not materially affect the value of the concept for the purpose of the theory. The method of comparative analysis tests for examples of a concept in a range of situations so the validity of one individual example does not affect the validity of the concept.

While the study was not intended to test a theory, the follow-up studies provided support to the emergent theory. Following the analysis of the data and the development of the theory, further interviews were conducted with the original study companies after a gap of two years. This provided further support to the theory by demonstrating that those firms with a 'sustainable business' epistemology had continued to improve, while those whose epistemological framework included only a few of the relevant 'ingredients' had made less progress. While this cannot offer conclusive proof of the usefulness of the theory, it does support the argument for further development of the theory. The results of the follow-up study are reported after the main case studies in Chapter 9 below. The follow-up site visits allowed for some preliminary validation of the findings, but further work is necessary to establish the extent of validity of the theory. Nonetheless, from a post-structuralist perspective, the fact that this theory requires further elaboration and investigation does not undermine the claim that, *as it stands* it makes a contribution to knowledge. The value of the work will be established over time, based on the use that is made of the theory for further research.

This study was conducted in the context of small and medium sized manufacturing firms working to improve their environmental performance, but the model has been presented in more general terms to facilitate possible application in different contexts. The theoretical framework that emerged from the research was based on the experience of SMEs, within a wider business context of support agencies, regulators and informal business networks. Clearly, its application to larger organisations or to businesses in a significantly different institutional setting may stretch the model beyond usefulness. It has an internal validity to the extent that it accurately explains the experience of the study companies, but its wider validity will depend on more research. Other cases in similar circumstances should reveal whether it is relevant to

non-manufacturing firms, larger firms, or firms not yet engaged in environmental improvement.

The question of the extent of possible application requires more research effort to establish. For example, it would be reasonable to test whether this model is only applicable to the development of environmental knowledge, or if instead it could be applied more generally to other knowledge areas, such as technology development, marketing, human resources, etc. The model was intentionally constructed using general terms, such as 'business advisers' which could cover a broad range of organisations and individuals. The term emerged from the contextual study, but it is clear that different geographical areas would provide a different combination of advisory services and institutional arrangements for business support. For example, De Bruijn and Hofman (2001) describe the very different institutional support structures available to businesses in the Netherlands .Similarly, other knowledge areas such technology development, are likely to offer a different structure of support networks.


Grid of Specification
Regulators
Future Knowledge
Customer Expectation
Supplier Network
Business Advisers
Existing Knowledge
Organisation
Authority of Limitation
Business Network
Rules of Formation

*We do not own the world, and its riches are not ours to dispose of at will. Show a loving consideration for all creatures, and seek to maintain the beauty and variety of the world. Work to ensure that our increasing power over nature is used responsibly, with reverence for life. Rejoice in the splendour of God's continuing creation.*

Advices and Queries
Quaker Faith and Practice, 1.02.42

# Chapter Four

## The Sour-dough Model

This work presents a theoretical framework to make sense of the environmental behaviour of SMEs. The iterative research method, described in Chapter Three, combined the evidence from empirical studies and a variety of literary sources to develop this grounded theory. The environmental performance of SMEs depends on the development of a sustainable knowledge base. Analysing the case study evidence using grounded theory techniques lead to the the emergence of the sour-dough model, which identifies significant features of the business epistemology influencing the development of the sustainable knowledge base. The elements of the model are based on concepts developed primarily from the case study evidence, supported by contributions from a range of academic disciplines and from existing research in this area. This chapter describes the model in detail, drawing out the connections with the literature just described. The sour-dough model developed here serves to describe the knowledge development process of small businesses, highlighting features that encourage sustainable knowledge development.

Sour-dough bread is made from a yeasty starter dough. Every time the dough is used to make a new loaf, a proportion of the dough is held back to form the basis of the next loaf. With every baking, new ingredients are added and each loaf is different from the last, depending on the ingredients and the mixing. In the appendices is a recipe for 'Friendship cake', a form of sour-dough cake reputedly shared among Quaker families settling in North America, encouraging social cohesion. This home-baking analogy is helpful in describing how business knowledge evolves, by either a

gradual learning process or by discontinuous breaks in the knowledge base.

The review of literature on sustainability in section 2.1 illustrated how sustainability could be conceptualised in terms of developing knowledge, forming new discursive formations amalgamating disparate intellectual disciplines. Similarly, the developments in sustainable business, discussed in section 2.2, highlighted the role of reporting and information selection in directing attention to certain forms of sustainable business practice. Knowledge development is central to the model. Fundamental to this work is a conception of knowledge as a dynamic, evolving quality that both informs, and is influenced by, practical experience. As discussed in section 3.1, the work adopts a post-structuralist perspective, viewing knowledge as explicitly contextual. A business knowledge base is not fixed, fully formed, but develops by a process of learning and practical experimentation.

When a company starts out, each person brings to the company personal knowledge and experience that is used to define what the company does and how it does it. This may be thought of as the starter dough, the yeast, sugar, water and flour that sets the whole process in motion. At this stage everything is quite raw and new, lacking in character. However, during the life of the company the dough takes on a unique combination of characteristics that changes with each baking. In the picture the jug represents the starter dough, the existing pot of knowledge, and the bowl is where the future knowledge of the company is mixed together.

This model of continuous knowledge development is influenced by the educational work of David Kolb (1984) and by the concept of innovation developed by Nonaka and Takeuchi (1995). Kolb wrote of learning as a continuous cycle running between active experimentation and reflective observation. It is this sense of continuity that the model is intended to convey. Knowledge cannot come from nothing, but is necessarily based on what went before. The distinction to be drawn between the work of Kolb (1984) and of Nonaka and Takeuchi (1995), is based on the role of new knowledge. Nonaka and Takeuchi (1995) investigate the cycle of learning based on the translation of tacit to explicit knowledge between different groups of people. Thus, the developing knowledge base is not simply a continuous refinement of a

fixed body of knowledge, but an on-going generation of new knowledge based on pre-existing knowledge and new influences.

The case study evidence presented in Chapter Eight demonstrates that the companies with relatively poor environmental performance had made episodic efforts to improve, but the better performers showed a continuous learning process, building on each experience. Each new experiment or initiative may be thought of as baking a new loaf, incorporating new information and knowledge into the existing knowledge base, allowing new 'ingredients' to interact with the corporate knowledge, and selecting some of that new amalgam for retention to form the basis of the next loaf. The learning process includes a number of important stages – the selection of new ingredients, according to a recipe or personal taste, the sifting of good information from useless contaminants, the mixing of existing and new knowledge, the sharing out of the dough between the cake to be consumed and the retained knowledge for the next baking.

Foucault's (1969) concepts are used in certain aspects of the sour-dough model – particularly the ideas of grids of specification, authorities of limitation and rules of formation. Foucault(1969) describes grids of specification as classificatory rules which include or exclude certain objects from the discursive formation. (Objects here refers to the objects of discourse – statements) Clearly there are many such grids of specification within a business context – information requirements of regulatory authorities, management system reports, financial accounts, etc. The grid of specification identifies certain items of information as relevant and necessary. In the sour-dough model, grids of specification are represented by the recipe book – the theoretical structure that defines what knowledge has to be included within the corporate knowledge base. A grid of specification is a set of rules that define what knowledge and information must be incorporated into the developing knowledge base of an organisation. A distinction may also be drawn between information that is collated for internal use or for external reporting. The perceived purpose of the information may influence the value that is placed on it for the purpose of internal decision making. There may be some ingredients that would cause the loaf to fail if they were omitted and similarly, certain knowledge would be critical for survival. If

the company ignored regulatory requirements or industry standards, they could expect the business to suffer, possibly catastrophically. Such knowledge would be identified in the grid of specification of required information.

The preliminary study and the phone survey indicated that many SMEs made very selective use of the range of potential information sources. Companies effectively 'sift out' the useful advice from the bulk of what is on offer. Foucault (1969) uses the term 'rules of formation' to describe a framework for selecting certain statements for inclusion within a discursive formation. The sieve that a company uses selects knowledge affecting environmental performance or social impacts. I have used this term in the sour-dough model to describe the sieve. Each of the knowledge ingredients must pass through the sieve to ensure that only the desirable knowledge and experience is included in the dough. Managers may accept advice from some sources unquestioningly, or they may take time to evaluate the usefulness of certain information. These values are intrinsic to a company, influencing the way in which their knowledge grows. Each provider of business information services should be aware that only a proportion of the advice offered is likely to be taken up to enrich the developing business knowledge base.

Organisational theory highlights the significance of those formal and informal features of an organisation that affect its capacity for learning and innovation. The enrichment of a business knowledge base depends on the appropriate mixing of established knowledge with new ideas. Organisation may be thought of as the wooden spoon. The success of a sour-dough loaf depends on the mixing of new ingredients with an existing base. It is there to ensure that different ingredients, or knowledge and experience comes together to produce a reaction. If the water and yeast don't mix there will be no fermentation. Similarly if appropriate knowledge and skills are not brought together in the right way, new knowledge cannot grow. It is important to recall that the process of learning is not simply the addition of new knowledge to an existing knowledge base, but it involves the active combination of knowledge to create something new. The knowledge bases interact to generate new solutions appropriate to particular situations. The knowledge base of a company includes the experience of different individuals and the successful incorporation of

new ideas can hinge on finding the right combination of internal experience and novel ideas from external sources. The features of learning organisations such as cross-functional working and reflective opportunities can enhance the process of knowledge development within a business.

Within Foucault's framework, authorities of limitation are those institutional authorities that grant to certain groups or individuals the right to include statements within a discursive formation. The owner of a small business has a significant influence on what knowledge and experience, both internal and external can be incorporated into the developing knowledge base. In the sour-dough model this can be thought of as the baker who selects certain ingredients, guided by the recipe, but also using personal experience and taste. One would expect that this role would be critical in shaping the corporate knowledge base in a small company. The business founder determines the starting knowledge base, through the recruitment of staff. The organisation, the rules of formation and, to a degree, the grid of specification are defined by the priorities and objectives of the owner. The identity of the company is defined by the owner – she chooses what kind of cake to bake. The selection of information sources is influenced, not only by the grid of specification, but by the personal interests and preferences of the owner. When a new batch of dough has been mixed, some of it is baked into a cake to be shared out and enjoyed immediately, while some is retained as a starter for the next loaf. In terms of knowledge development, each learning experience provides some features considered to be of value for the future, while other aspects may be forgotten or ignored. Kolb's learning cycle (Kolb 1984) emphasises the importance of abstract conceptualisation, drawing out significant elements for future experimentation. From each experiment or new idea that is tested, certain elements of the experience are retained to contribute to the archive of the business. The knowledge that is retained may be quite specific or more general, leading to new opportunities for further testing. This stage, too, can influence the development of sustainable business thinking within a company by recording success or difficulties of particular experiences.

The preliminary study identified a range of knowledge sources available to managers of SMEs wishing to improve environmental performance. However, the phone

survey indicated that many businesses were ignorant of the range of advice on offer. The case studies revealed a far wider range of external information sources than suggested by the preliminary study. In particular, the influence of customers and suppliers was far more significant than that of government sponsored advice services.

Customers expectations form an important element in the business knowledge base of SMEs. Welford (1994) made some investigation of the perception of customer expectation in his early survey work, but it has not been a dominant theme of the literature since then. The importance of customer expectations, both positively and negatively, was expressed repeatedly in the case study interviews and in the responses to the phone surveys. Some companies may have a few very large customers who determine a large part of the knowledge base of the business, while others have many smaller clients whose effect is more diluted. Customer expectations can influence the degree to which the business epistemology favours knowledge of sustainability impacts by, for example, demanding information about environmental policies or practices or social responsibility reports. Conversely, if customers demand information that is contrary to the demands of sustainability, managers attention may be distracted from the development of a sustainable business knowledge base. Particularly in smaller companies, the interests of the customers direct the attention of management. The case study analysis demonstrates the complexity of the influence held by customers. The picture represents customer expectations as flour, the bulk ingredient of the cake. This is to signify the importance of customers' influence over the developing knowledge base of the business.

In addition to customer expectations, there is a range of other potential influences on the business knowledge base. The picture shows a selection of ingredients which can be used in different quantities to influence the future knowledge of the company. The business manager has a range of support services that can be used as appropriate to develop the knowledge base of the company. The SME literature directed attention to the role played by support services such as environmental business clubs, consultants and the advisory services of utility suppliers. These services were further investigated in the preliminary study and the phone survey. That research indicated

that such services could enhance the business knowledge base in some instances, but their effect was heavily dependent on the existing business epistemology. The influence of regulation was unclear from the phone survey – a high proportion of companies were not aware of any regulations affecting their business. Jacobs (1998) and others indicated the potential significance of existing business networks for the dissemination of technical knowledge, and the case study evidence supported this view. Jacobs (1998) also suggested that informal networks and suppliers could be another important source of information for small businesses. Again, this was supported by the case study evidence. The effect of each information source may be moderated by the influence of other sources. For example, the effect of regulation seems to be connected to the influence of business advisers, based on the evidence of the phone survey. Just as a bad mix of spices can spoil a cake, a poor selection of knowledge sources can undermine sustainable knowledge development. Any of these organisations may provide opportunities to enhance the business understanding of sustainability, but the selection of such advice depends on the 'baker' or business manager. Although the ingredients are available on the kitchen shelves, it is up to the baker to decide whether they are necessary at the time.

So far the discussion has demonstrated how business knowledge can develop by a continual process of experimentation and reflection, a learning cycle which incorporates new information and mixes it with the existing knowledge base. However, the previous discussion of organisational learning also highlighted the role of discontinuous innovation, epistemological breaks, where knowledge systems changed fundamentally from what went before. There are certainly times in the life of a small business where the knowledge base is radically altered – a new baker comes along, the recipe is changed or the mixing method is updated. If the ownership of a company changes or new management is introduced the values and priorities of the organisation can shift dramatically. The follow up study, in chapter nine, provides a remarkable demonstration of the effect of such an epistemological break on the knowledge base of one SME.

*Business in its essence is no mere selfish struggle for the necessities and luxuries of life, but a vast and complex movement of social service'.*

London Yearly Meeting 1911, Quaker Faith and Practice 23.61

# Chapter Five

## Results of Preliminary Study

The preliminary literature review showed that the question of SME engagement in sustainability was dominated by a concern for effective support and advice to small business managers, particularly through the medium of environmental business clubs, although none of this was based on Scottish evidence. Welford (1994) and Johnston and Stokes (1995) indicated that advice and support services could help to raise awareness and engagement in improving environmental performance. The preliminary study, conducted during 1999 and 2000, sought to identify what advisory support was available in Scotland to small businesses which were interested in becoming more sustainable and to gain an 'insiders view' of these support services. The experience of these service providers could build a richer understanding of the features that influenced SME engagement. This stage of research therefore provided evidence of available support services and also some evidence which could contribute to the later stages of theoretical development.

Conversations were held with twelve people employed within the Scottish Enterprise Network (SEN)[1], either in Local Enterprise Companies or Enterprise Trusts. These led to further discussions with eight environmental consultants, most of whom worked in collaboration with SEN in providing support services. Four academic staff at higher and further education establishments were also interviewed to investigate their experience of environmental business clubs, and four staff from SEPA provided further information. One member of staff from each of East of Scotland Water and

1 Scottish Enterprise Network is a public body with responsibility for the support and promotion of Scottish businesses. It consists of Local Enterprise Companies and smaller Enterprise Trusts, which operate in areas of particular need.

West of Scotland Water (since merged) and Scottish Power added to the picture[2]. A full list of interviewees is provided in the appendices. Face to face interviews and phone discussions were conducted to assess the extent of interviewees' engagement in support activities, how these fitted with their other organisational responsibilities and to gather their perceptions of their own experience. In addition, the researcher attended a number of environmental business club meetings and one publicity event for the East of Scotland Waste Minimisation Club, during which the researcher gathered information informally from around 20 club members.

It was clear from the study that there was no shortage of available advice for managers of small businesses seeking to improve environmental performance. Environmental consultants, utility company staff and SEPA staff all have relevant expertise that the business manager can utilise and further information and advice is available from Envirowise, SEPA and SEEO publications. In some parts of the country, environmental business clubs provide businesses with supportive networks to develop internal capability. Some businesses have made significant gains from the use of these services, which have been widely publicised (Envirowise). Nonetheless, most of the people who work in these support services admitted in interview that they were discouraged by the poor use that is made of the services. Club organisers reported that recruitment and retention to business clubs and waste minimisation initiatives has been disappointing and most of the pilot projects which the LECs have supported have not led to longer term business support structures. It appears that many business managers remain highly sceptical of the claims that are made and are unwilling to invest time and effort in the pursuit of good environmental management. It appears from the study that the availability of good advice is not the only factor for success.

Another significant finding of the preliminary study was the concentration of advice on environmental, particularly waste minimising elements of sustainability. The researcher found no evidence of support for the integration of social elements within the business advice framework. The support providers were reluctant to use the

2 The two Scottish water companies are in public ownership and merged in 2002 to form Scottish Water. Scottish Power is a privatised energy company with a significant share of the Scottish electricity market.

word sustainable in relation to business, because it did not communicate well to their target audience. Advisers believed that among SMEs, the term 'sustainable' referred to individual business survival rather than to any wider social concepts. This suggested that the research focus should narrow down to environmental management, rather than the broad theme of sustainable business.

The preliminary study supported the initial perception that despite a few good examples, most SMEs were not actively engaged in improving environmental performance. Efficiency and cost savings were viewed by service providers as the most significant motivations for engagement, but regulators and customers were also identified as potential motivators. Advisers suggested that a key influence on the effect of regulatory or customer interest was the general level of awareness and concern within a company. Many of the service providers perceived their role principally in terms of awareness raising and viewed environmental business clubs or waste minimisation clubs as a useful tool to serve that purpose. Environmental business clubs (EBCs) are a mechanism for combining the knowledge resources of a number of support services to provide co-ordinated advice for businesses.

The following sections describe the key organisations who are engaged in providing this service and note some of the constraints that they have identified in supporting SMEs. EBCs are examined in section 5.4 and the final section summarises the key implications of the preliminary study, both for the development of an explanatory theory and for the further development of the empirical study.

## 5.1 SEPA

The most obvious government agency with environmental responsibility is, of course, the Scottish Environmental Protection Agency, SEPA. They have wide-ranging environmental responsibilities including monitoring of general standards of air and water quality, ensuring adequate standards of waste management and enforcing government regulation on pollution control. In terms of supporting good environmental business practice, SEPA provides environmental advice in the form of information leaflets and by supporting environmental business clubs, which are

discussed later. They also have direct contact with those businesses which require licences for potentially polluting activities or which have been reported for environmental offences. Clearly, the latter policing role forms a very different type of relationship than the business support role. Within SEPA's organisation, these two roles have been traditionally kept rather separate. Environmental Protection Officers (EPOs) are responsible for licensing polluting activities and investigating breaches of consent conditions, so their role is primarily a policing one. One EPO stated in an interview that a co-operative relationship may develop in some cases, which could lead to more general advice on environmental performance, but this is far from inevitable. To some extent it depends on the response of the business manager to SEPA's policing role, but it can also depend on the capacities of the individual EPOs. These staff tend to be specialists in certain types of pollution and their effective control, and have had to extend their areas of expertise to meet the demands of a new organisation and a broader area of legislation. In the opinion of staff interviewed, SEPA has struggled to match the demands of more extensive legislation with the existing highly specialised skill base of its workforce. In these circumstances, staff capacity to provide advice to businesses has been somewhat limited and one EPO commented in interview that he felt that business support did not always sit well with his regulatory duties.

Nonetheless, SEPA management appear to be aware of the need to support all businesses in their efforts to improve environmental performance. As well as producing advisory leaflets on a range of topics, SEPA have set up a waste minimisation unit, which has co-ordinated support for business clubs and publicity events. This unit also initiated training support for 200 staff in waste minimisation methods, to equip them with the skills to support businesses. This training had not taken place at the time of the preliminary study and it remains to be seen how it may affect businesses environmental performance in future.

Advice from SEPA carries some influence with business by virtue of their status as a regulatory authority, but only so far as it relates to conformity with legal requirements. The extent of their influence beyond that required by law may be far more subject to the personal relationships between advisers and business managers.

In the terminology of the sour-dough model, the recipe demands a certain quantity of consideration be given to SEPA, but the generosity of the measure depends on the inclination of the cook. The rules of formation of the business knowledge base will determine what consideration is given to environmental regulation and to advice on good practice which EPOs may offer.

## 5.2 Other Governmental Advice

There are many other arms of government which provide generic advice to business on improving environmental performance. Envirowise, a government programme, provides many publications advising on clean technologies and waste minimisation methods. Some of these are targeted at specific industries, providing reasonably detailed advice for very specific applications. The Scottish Energy Efficiency Office (SEEO), which is closely allied with Envirowise provides energy and waste minimisation advice and administers grant schemes for energy saving investment. Both of these organisations also support environmental business clubs by providing information, speakers and sometimes specialist consultants. An Envirowise consultant explained that in the early stages of Envirowise, participating companies received a highly specialised consultancy service, in the hope that 'best practice' advice could then be drawn up for other similar businesses. This was seen to be a rather costly exercise and the programme later concentrated on supporting locally run clubs with generic advice, rather than providing individual consultancy services. For some small businesses the SEEO offers one day site visits to provide company specific advice.

Envirowise and SEEO advice are promoted through Local Enterprise Companies (LECs) and SEPA, mainly through EBCs. SEEO publicity material is aimed at a very broad audience, including the general public, and is therefore perceived by business managers to be rather generic. Envirowise advice is more specific than that produced by SEEO, although the phone survey evidence suggested that it suffers from poor marketing. Few business managers who were interviewed in the later phone survey had any awareness of Envirowise. There are clearly limitations on the

extent to which this government sponsored advice serves to influence business knowledge bases. It would appear that where the advice is brokered through a business network such as an environmental business club, it acquires a degree of credibility, but generic advice devoid of context has little influence on business behaviour. This accords with Jacobs (1998) findings on the dissemination of new technologies among SMEs. The effect of government advice is best understood within the broader context of the business epistemology – the means by which certain knowledge is validated and utilised.

LECs, which are at the front line of government support for business, appeared to have a role to play in improving businesses environmental performance. Their purpose is to stimulate economic growth, and environmental efficiency may be viewed as an important part of that objective. The preliminary study began by making general telephone inquiries to eight out of the twelve local enterprise companies in the Scottish Enterprise Network, asking what support was available for a small business reviewing its environmental performance. Only one resulted in a direct contact with someone with relevant knowledge. The other seven respondents did not know of any such support and could provide no further contact details. At the very least, this suggested some failings in the internal communications of these organisations, that receptionists could not identify providers of environmental support within their own organisations. Fortunately, contacts with known individuals at a later stage revealed that the available support was not quite as inadequate as the early survey indicated. The snowball sampling technique allowed the researcher gradually to identify people within these LECs with relevant experience.

In spite of the early indications to the contrary, it emerged that LECs had been active in the establishment of EBCs in many parts of Scotland, such as Ayrshire, Dundee, Lanarkshire and West Lothian. They also provided subsidised consultancy support in West Lothian to specifically support SMEs. However, it would appear that support for small business environmental improvement is often temporary, demonstrating some success for participants in the short term, but having little influence on wider business practice. The Ayrshire Textiles Waste Minimisation Club was considered successful in terms of participation and identification of savings, but it was a

demonstration project with a lifespan of less than one year. LEC staff commented that in each area there may be one or two individuals who have been involved in such support at some time, but there is no on-going environmental service for small businesses, such as exists for financial and marketing support. The Small Business Gateway, which supports new business start-up did not normally provide any advice on environmental management. Each of the interviewees from SEN appeared to have some brief experience of waste minimisation or business sustainability, but none seemed confident in discussing the issues or showed any familiarity with wider experience or literature on the subject.

While some of the LECs have supported Environmental Business Clubs, discussed in section 5.4, environmental matters do not appear to be an important consideration for the majority of their work. One interviewee commented that performance targets focus on new-business start-ups, inward investment, training support and infrastructure projects. At the time of the study, the LECs did not have any environmental goals and the capacity of staff appeared to be limited in this area. The dominant discursive formation did not place a high value on knowledge of business environmental aspects. It would therefore be difficult for a business, with an interest in improving environmental performance, to find significant support from the LECs.

## 5.3 Service Providers

The utility companies and waste service providers also have a role to play in influencing business environmental behaviour. As providers of natural resources, such as energy, water and waste services, these firms form a clear commercial link between resource use and profitability. Charges for utility services can focus the attention of business managers on wasteful practices in a way that government advice cannot. Although it may seem that such firms have a commercial interest in increasing business use of their services, this is partly countered by supply constraints. In the case of energy and water providers, the investment costs of increasing supply are substantial and many companies have chosen, or have been encouraged, to pursue a policy of demand management.(SeeWeisacker et al ,1998)

For the business manager this means free advice on reducing energy and water usage. To some extent this is also the case for waste services, particularly for sewage, where costs are directly related to the level of treatment required. Water companies, which in Scotland remain in public ownership, have been actively engaged in supporting businesses to reduce the volume and toxicity of their water borne waste.

Solid waste management services are provided by both public and private firms which are in active competition with each other. The landfill tax was intended to encourage better waste management practices, by taxing disposal costs, thus making clear the social costs of waste disposal. The Landfill Tax Credit Scheme allows landfill operators to claim tax credits for contributions made to environmental bodies for a range of environmental projects, potentially including 'demand management' measures such as waste minimisation initiatives (Bell & McGillvray 2000). Some waste service providers, such as Shanks have supported waste minimisation initiatives through advice and service improvements, but it was claimed by consultants that others have simply used the excuse of tighter regulation to increase their charges.

There are also many commercial environmental consultancies which are keen to give environmental advice to businesses. Some of these have developed from engineering firms with experience in relevant technologies, such as pollution control or land remediation, but there are also many smaller firms with specialist skills which are offered on a consultancy basis. The term 'consultancy' may be used to describe many different roles, ranging from the provider of expert specialist advice to the independent subcontractor (Kubr 1996). For a small business with limited management resources, there are strong arguments for using consultants from time to time to fill gaps in the internal skill base. However, Johnston and Stokes (1995) noted that the cost of using external experts can be prohibitive for the smaller firm, particularly where the benefits of using the service are unpredictable. One way in which this antipathy to advisory consultants has been overcome has been through the support of LECs and environmental business clubs. These provide a mechanism for subsidising the consultancy costs and demonstrating the effectiveness of the service to other businesses.

Discussions with educationalists revealed that many higher educational establishments provide courses in environmental management either at undergraduate or postgraduate level and some have also offered short courses aimed at managers in employment. For example, Bell College offer a postgraduate diploma in Environmental Management, leading to an assessment for associate membership of the Institute of Environmental Management and Assessment (IEMA). A lecturer in a further education college noted that they concentrate more on providing courses leading to vocational qualifications and, in the absence of such standards for environmental practice, their contribution has been limited so far. Storey (1994) notes that small businesses face barriers to investing in educational courses, similar to those applying to the use of consultants. The costs to the firm, both in terms of cash outlay and, more significantly, of managers' time, can be prohibitively high and the predicted business advantages are uncertain. Small firms traditionally depend on employing staff with appropriate skills rather than investing heavily in training, partly as a result of high job mobility among trained staff. One area of interest for the later study was the extent to which managers' educational experience influenced the firms' environmental performance.

These early investigations revealed how a range of public and private organisations offered support to small businesses to improve environmental performance. While such advice was made available from many sources, there was some variation in the authority and acceptability of the services offered. SEPA staff were conscious of possible conflict between their regulatory and advisory roles, but utility service providers, having a clear business relationship with clients, could offer advice that was perceived to be supportive. Consultants, government agencies such as Envirowise, and educational institutions lacked the personal business linkages to allow widespread dissemination of their knowledge resources. Effectively these groups were not recognised contributors to the knowledge base of SMEs. The following section describes the model of environmental business clubs which serves to combine the knowledge resources listed above into a packaged service more readily acceptable to small businesses.

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## 5.4 Environmental Business Clubs

The term 'environmental business clubs '(EBCs) is used here in a broad sense to include waste minimisation initiatives, which have a finite lifespan and limited membership, and also the longer lived clubs which cover a wider range of environmental issues. The researcher interviewed organisers of seven Scottish clubs and consultants who had experience of many more clubs in England. The researcher also attended the meetings of two clubs in Glasgow and Edinburgh and spoke informally to a number of club members. Johnston and Stokes (1995) have provided a useful analysis of such early initiatives as 'Aire and Calder' and 'Project Catalyst' in the early 1990s. The common feature of such clubs is the co-ordination of a range of support services for the benefit of many firms, based either on geographical location or industrial activity. Recruitment and co-ordination of the clubs may be undertaken by one of the sponsoring organisations or by paid consultants and financial support comes from a combination of membership fees, public subsidy via LECs and in-kind support of sponsors. Club activities can include subsidised audits by consultants or by utility company advisers, regular club meetings for mutual support or expert advice, newsletters, events or student work placements.

'*Workshops are intended to allow us to exchange practical experience in improving the efficiency of our businesses both for environmental and economic reasons*'
Lanarkshire Environmental Business Club Programme, 2001

In order to appeal to businesses, the stated objective of many clubs is to realise cost savings for participants and many clubs publicise their success in financial terms:

'*Envirowise has helped UK companies save over £180 million a year*'
Envirowise Update November 2002

For sponsoring organisations the purpose of the clubs is to raise awareness of potential savings and provide generic advice to encourage more firms to increase their efficiency. Some clubs focus very specifically on waste minimisation, while others also seek to raise awareness of impending environmental regulation and

encourage business debate and participation in legislative processes.

Consultants noted that the EBC model clearly has a number of potential advantages, both for sponsors and participants. Sponsors have the opportunity to meet corporate objectives in relation to a large number of businesses for a relatively low marketing cost. Publicity of good practice is a key objective of some sponsors and participants, so all sponsors gain some public relations advantage from association with the club. If the club is appropriately structured, the advice provided may be far more effective than it would have been had it been provided individually - there can be a peer pressure effect that can encourage fuller participation in the improvement process. Club members acknowledged that some sponsors, particularly consultants or other private sponsors, may gain greater acceptance or credibility from association with the club.

The potential advantages to the participants are also clear. The most immediate advantage is the potential savings identified by expert advisers, although this has to be weighed against the costs of implementation. Another is the public subsidy for expert advice that may come with club membership. In recent years this element has reduced as the public agencies seek to spread their impact over a wider area. In some clubs there may also be a mutual support or networking advantage to be gained from membership. Liz McCarthy, who co-ordinated the Ayrshire Textiles Waste Minimisation Initiative, commented to the researcher that meetings with complementary, but non-competing businesses were especially productive, since participants shared enough experience to offer detailed supportive advice. This reflects the observations of Nonaka and Takeuchi (1995) on the benefits of shared tacit knowledge in articulating detailed information, discussed in section 2.4. The peer pressure effect can encourage managers to devote resources to achieving results which might otherwise have slipped. Some clubs have reported the benefits of a shared learning experience as managers have discussed successes and disappointments of experiments. The structure of the club has a great influence on the real advantages to be gained. The more specific the advice, the greater is the advantage to the participating business. The experience of EBC based learning described by respondents corresponds closely with the description of Action Learning

pioneered by Donald Schon (1971), in which groups of workers defined their own learning objectives and used meetings to reflect and theorise on practical experience, leading to the development of new theories and areas for experimentation. This work influenced the theoretical development which was examined in section 2.4.

Clearly there can be much to recommend participation in an EBC for some businesses, but active club members noted that the costs of membership should not be underestimated. These costs include financial costs, in the form of membership fees and investment in improvement, and the cost of management time, to attend meetings and to analyse operations. Among small firms the latter cost can be the most significant one, since the manager's time is likely to be the most scarce commodity in the firm.

The widespread appeal of the EBC model can be seen from the number of such schemes that have been formed over the past decade. In Scotland there have been at least 10 initiatives working with more than 140 companies between 1994 and 1999. Some concentrate on industrial sectors, such as the Tayside Food Producers and the Ayrshire Textile Producers, while others have formed in geographical locations, such as the Selkirk Riverside Project and the Grangestone Project. One club organiser admitted that while the model is most suited to reaching small and medium-sized firms, the clubs which demonstrate the largest savings generally include some larger 'showcase' companies, which have the turnover to support the investment of management time and capital. In most cases, consultants are employed to audit member companies and provide recommendations of actions to reduce waste of energy, water or materials. There is a strong desire among the sponsoring agencies to identify the potential savings to be gained, although some club members noted that the savings realised often fall far short of the potential envisaged by the consultants. Lack of capital investment can be a constraint on the improvement process. When the consultants reports have been produced there follows a period of implementation, when the lower cost options are pursued and glowing reports of success are drawn up for publication. For many of the sponsors, this publicity stage is one of the most important, because the intention is to demonstrate to other firms what can be achieved. Many waste minimisation initiatives have a finite lifespan from the outset,

being intended primarily as demonstration projects.

There are some clubs which seek to go beyond waste minimisation by providing members with information and advice on impending regulation or broader environmental issues. These differ from the waste minimisation initiatives in their intention, which is generally to provide businesses with a forum for investigating the practical implications of new and forthcoming legislation. The introduction of landfill tax, the climate change levy and packaging waste regulations have all served to stimulate interest in waste minimisation as a secondary area of interest. [3]

From discussions with the organisers of two such clubs – The Glasgow Environmental Business Forum (now ceased) and Lanarkshire Environmental Business Club, a number of issues came to light which have undermined the long-term success of such ventures. In the early stages of formation there was widespread enthusiasm among businesses for such a service, particularly when significant new regulations were under discussion. Such fora allowed firms with common interests to share experience and learn from experts and provided a networking opportunity. However, as general business awareness developed, the needs of each participant became more specific. Increasingly members acknowledged that while some meetings were very useful, many others were irrelevant to their business. The club structure forced the learning process in directions that served the interests of sponsors, but was unresponsive to the practical needs of members. The knowledge services offered by club membership served the needs of some businesses, but for others, new sources of support would meet their needs better. The findings of DeBruijn and Hofman (2001)on the influence of trade associations suggest one possible area for future development. In Scotland trade associations have not been significant players in EBCs, but DeBruijn and Hofman's work demonstrates their effectiveness in the Dutch context.

There have also been some difficulties in maintaining an acceptable financial structure for such clubs. There are always going to be severe constraints on the

3 LEBC Programme of Events 2001- meetings included ' Energy Efficiency in Business and the Climate Change Levy', 'The SEPA Waste Strategy' and 'Effluent and Water Charging : a presentation from West of Scotland Water'

monetary cost of membership, particularly if participants only benefit from a small proportion of the club services. However the cost of administering the clubs is not insignificant. The clubs are generally not profitable as stand-alone ventures and require continuing external sponsorship. The loss of such support has been the catalyst for the demise of some clubs. One club organiser noted that since the clubs are not inherently profitable, they have to meet some other objectives of the administering organisation. Usually these would be marketing interests of consultancy businesses or educational establishments, but it appears that where such objectives are not sufficiently realised, the club goes into decline.

Although this study was based on interviews with people based in central Scotland, the work of Holt et al.(2000) and Shearlock et al (2000) confirms that a similar range of advisory services is available in other parts of the UK and DeBruijn and Hofman (2001) identifies a wider range of support services available in the Netherlands. The work of these writers suggests that institutional arrangements can affect the accessibility and quality of such services.

## 5.5 Conclusions

The preliminary study provided a number of useful insights into the research question, in terms of context, influences on theoretical development and guidance for further empirical research.

The study identified an extensive range of providers of support for environmental improvement, but it was clear that the availability of information and advice is no guarantee of its use. A challenge recognised by advisers is the problem of engaging SMEs with environmental improvement and a common approach is to concentrate on the potential for efficiency savings. There was a common perception that SME managers were broadly disinterested in questions of sustainability, except when pressed by regulators or by customers. The support providers were reluctant to use the word sustainable in relation to business, as the term 'sustainable' would normally refer to individual business survival rather than to any wider social concepts. This suggested that the research focus should narrow down to environmental management,

rather than the broad theme of sustainable business.

The study also supported the view that despite a few good examples, most SMEs were not actively engaged in improving environmental performance. The respondents suggested a number of possible explanations for this which should be explored in more detail in the later research. Firstly, efficiency and cost savings were viewed by service providers as the most significant motivations for engagement. This reflects the promotional strategies of many service providers who stress 'waste-minimisation' as the core purpose of their support. Further research should test the validity of this assumption. Secondly, regulators and customers were identified as potential motivators for companies to engage in environmental management, but service providers recognised that these motivations were highly variable. A key influence on the effect of regulatory or customer interest was the general level of awareness and concern within a company. This suggested that further research should test awareness of regulations and of customers' environmental concern. Many of the service providers perceived their role principally in terms of awareness raising and viewed environmental business clubs or waste minimisation clubs as a useful tool to serve that purpose. North Lanarkshire was an area identified as having a particularly strong support network and an active EBC. Testing awareness of regulation in this area would give some indication of the effect of the club in raising awareness among the wider business population.

The next stage of the research was intended to balance the views of the service providers with the perceptions of a sample of the business community. The preliminary study identified North Lanarkshire as an area where support for environmental improvement was high, both in terms of government funding priorities and due to the activities of a highly successful EBC. McKinney (1998) had identified this area as showing heightened levels of awareness of waste minimisation among businesses. On this basis North Lanarkshire was selected as the geographical base for the next stage of study and the aim was to evaluate awareness of regulations, customer environmental interest, available support services and engagement in efficiency improvement.

*As new knowledge, new methods, new technologies arise, so is the condition for the operation of conscience altered and advanced.*

Edward W Fox, 1969,
Quaker Faith and Practice 23.62

# Chapter Six

## Phone Survey Results

The preliminary study had identified a range of services available to support companies interested in improving their environmental performance, but advisers perceived a lack of interest among most of their target audience. They had suggested a number of potential influences on environmental engagement, including efficiency motives, regulators, customers and general environmental awareness among businesses. One independent consultant had commented ruefully that '*unless regulators were breathing down their necks, they wouldn't take a blind bit of notice*'.

The phone survey was conducted to gain some indication of the importance of these motives and to identify potential case studies for closer investigation. The intention was to evaluate the perceptions of people working in small firms, rather than the impressions offered by the advisory community. The survey concentrated on businesses that were likely to be aware and engaged in environmental matters, by selecting manufacturing companies based in North Lanarkshire, a relatively well-supported area.

The results confirmed that environmental engagement among SMEs is varied, with more than 40% of the sample showing no awareness of, or engagement in environmental issues, while 36% had achieved, or were working towards, recognised environmental management systems. Support services appeared to have little impact on the majority of businesses - 60% of respondents knew of at least one source of support, but only 15% had ever made use of them. The qualitative responses indicated that there were clear differences in attitudes between engaged companies and disinterested ones.

## 6.1 Environmental Awareness

The results were analysed to determine the extent to which responding companies were considering their environmental performance. Table 6.1 shows the numbers of companies which were conscious of the environment in each of the categories shown. Since the categories are not mutually exclusive, it was also helpful to examine in how many ways the company was engaged with environmental considerations. Table 6.2 shows how many companies which were engaged at more than one level

Table 6.1 – Awareness of Environmental Issues

| ***Form of engagement*** | ***Number of companies (out of 61 responses)*** |
|---|---|
| Aware of regulation | 22 (36%) |
| Promote environmental product | 10 (16%) |
| Audited | 28 (46%) |
| Developing or established EMS | 20 (33%) |
| Used support services | 9 (15%) |

Given the widespread perception that small companies remain largely unconcerned about environmental performance, it was interesting to note from Table 6.2 that 59% of the respondents were aware of environmental matters to some extent. Only 25 of the responding companies (41%) were not at all engaged - not affected by regulation, never done audits, never used support services, no environmental aspect to product, no EMS. Although the figure is hardly encouraging, it does suggest that ignorance may be less widespread than had been suggested by the preliminary study. The figure of 41% not engaged in any environmental activities corresponds closely to Tilley's (1999) findings.

Table 6.2 – Engagement in Environmental Activities

| *Number of forms of engagement* | *Number of companies (out of 61 responses)* |
|---|---|
| 0 | 25 (41%) |
| 1 | 10 (16%) |
| 2 | 7 (11%) |
| 3 | 11 (18%) |
| 4 | 8 (14%) |
| 5 | 0 |

## 6.2 Regulatory Pressure

The preliminary study had shown that many people assumed that small companies pay no heed to environmental performance unless pressed to do so by regulatory authorities. 22 out of 61 firms said that they were affected by regulations. The phone survey was not directly testing whether or not companies were regulated, but whether they believed themselves to be so. It could be assumed that all companies are affected by some environmental regulations, even if only by the Duty of Care to dispose of waste appropriately. Although the question prompted with some examples of environmental regulations, it also allowed respondents to mention any other regulations affecting the business.

Table 6. 3 – Proportion of companies aware of regulation and also engaged in other ways

| *Form of engagement* | *Number of companies (out of 22 regulated)* |
|---|---|
| Audited | 15 (68%) |
| Developing EMS | 11 (50%) |
| EMS approved | 2 (9%) |
| Used support services | 9 (41%) |

All of the firms which used the support services were aware of regulations affecting their businesses, although the direction of causation is unclear here. On the one hand it is possible that the firms using support services do so because they are under pressure from regulators. Alternatively, firms may be aware of their regulatory responsibilities because of their involvement in the environmental business clubs.

68% of the regulated firms had undertaken some form of audit, 50% were at various stages of developing an EMS and 9% had achieved ISO14001. However, in the survey sample as a whole 46% of companies had been audited, 23% were developing EMS and 10% had achieved ISO14001. Clearly, regulation was not the only effective incentive for environmental management and regulated firms did not always go on to develop EMS. Half of the regulated firms had no plans to develop an EMS.

Since 64% of the sample did not believe that they were affected by environmental regulation, it may be inferred that environmental regulation does not have a significant influence on the behaviour of the majority of small companies.

## 6.3 Efficiency motivation

A clear premise of waste minimisation initiatives is that small companies are assumed to be concerned to reduce waste in order to save money and that this incentive can be used to raise awareness of wider environmental issues. 28 out of the 61 respondents (46%) had undertaken some form of audit - environmental, energy or waste. 21 had done environmental audits, 16 energy audits and 12 waste audits. It was not clear whether the environmental audits had always included energy and waste audits. If small businesses are really so anxious to increase efficiency one would expect more of them to have made some analysis of waste. 64% had not performed any environmental or waste audit.

Some of these audits had been performed for a corporate buyer or a major client, and some had been done by waste contractors or energy suppliers. Most were seen as

useful to a greater or lesser extent, although those done for buyers or waste contractors were less useful.

This question obviously ties in with the EMS question. 6 firms (10%) have achieved ISO14001 and 14 (23%) are at various stages of developing an EMS. Clearly those EMS engaged firms had undertaken audits, which left 7 (11%) who had done audits, but did not envisage developing an EMS. That group included 2 waste audits performed by waste contractors, 1 energy audit by the electricity company, 1 client audit, 1 free consultant's audit and 2 internally performed. Those two companies who initiated internal waste audits both found the process to be useful and generated savings. In one small firm employing 21 people, the internal waste audit successfully reduced waste to landfill by 50%. However, this did not lead to a wider interest in environmental management of the business. Another company made a more typical response -

'*There is so much junk mail comes in here it would take a full time member of staff to read it all. We're not doing anything toxic and if there were easy ways to squeeze another penny out of this place I'd have found them years ago.*' .

It is clear that small businesses take a more complex view of waste minimisation. All would claim to avoid waste, because it would be ridiculous not to, but few are willing to take time to investigate the issue, assuming instead that there was little scope for improvement. A number of the respondents were clearly distrustful of consultants and other outsiders investigating their business. The connection between waste and environmental management is also far from simple. Since environmental audits are a necessary preliminary for EMS development, we cannot say that the audits have led the company to work on an EMS. The EMS decision may be quite independent of the audit experience. Seven companies performed audits with no intention of developing an EMS, and not all of these believed the audit to have been useful. It seems that waste audits do not necessarily open the eyes of small business managers to the benefits of improving environmental performance.

## 6.4 Customer Expectations

If regulation and cost-cutting do not lead businesses towards eco-efficiency, what role is played by customer expectation? 10 out of 61 (16%) stated that environmental aspects of their product or process were important for clients. Of that group 20% had ISO 14001 and 30% were developing an EMS. However, 40% had never undertaken environmental, energy or waste audits and 80% were not aware of the support services available.

Table 6.4 – Environmental engagement of companies promoting environmental products

| ***Form of Engagement*** | ***Number of companies (out of 10)*** |
|---|---|
| Aware of Regulations | 6 (60%) |
| Audited | 6 (60%) |
| Developing EMS | 3 (30%) |
| EMS approved | 2 (20%) |
| Used support services | 2 (20%) |

Two points are interesting here. Firstly only 16% of those surveyed saw environmental performance as important for customers, which is a surprisingly low figure. Secondly, even where it is perceived to be important, action in terms of EMS development only occurs in half of the cases. The group of companies which promote environmental benefits of their product are more aware of regulation than the survey group as a whole, but it is clear that not all of these companies are fully engaged in improving environmental performance. It is depressing to note that despite a decade of awareness raising and the development of international standards for environmental management, these results bear a striking resemblance to those of Richard Welford (1994). It appears that market pressures are not yet significantly affecting the environmental performance of small manufacturing businesses.

## 6.5 Awareness of support services

The preliminary study identified a number of efforts made by government agencies to raise environmental awareness within business. The survey tested awareness of the SEEO, Envirowise, LEBC and other waste minimisation initiatives. 61% had heard of at least one of these support services, with the SEEO scoring highest with 41% of companies recognising the name. However, only 9 companies (15%) had ever used any of these services, with seven turning to the local service of LEBC. Of the 7 LEBC members, 1 had achieved ISO 14001 and 5 were working on EMS development. This suggests that although LEBC is failing to engage the majority of firms, those it does 'capture' are committed to EMS development.

## 6. 6 Influence of ownership

The picture of corporate structure that emerged from the survey was an interesting one. In the sample, the majority of companies were independently owned (77%) and most employed fewer than 50 people (65%). However, out of the 14 companies which were subsidiaries, 10 (71%) were developing an EMS or had already achieved ISO14001. 5 out of the 6 small subsidiaries had an EMS approved or in progress. That is, 71% of subsidiaries were investing in EMS compared with 21% of the independent companies. It is clear that companies who were subsidiaries of larger organisations were more likely than independently owned companies to have invested in EMS development.

## 6.7 Conclusions

The preliminary study identified many sources of support for SMEs wishing to improve their environmental performance, but indicated that most SMEs were not making use of these services. The phone survey confirmed that many businesses were not aware of the support available and only 15% made use of those services. The initial study also suggested a number of factors which might be expected to motivate companies towards improvement, such as regulation, customer pressure or resource

efficiency. However, the phone survey demonstrated that none of these factors exerted significant pressure on the majority of companies. Customer interest is not a significant driver, as 84% feel no strong pressure from customers to report on their environmental management or performance. In spite of awareness raising by SEPA, 64% of companies do not believe that they are affected by environmental regulation. Even although SMEs might be assumed to be concerned with resource efficiency, 65% had not undertaken any form of environmental, waste or energy audit.

The phone survey results suggested a number of implications for the theoretical development. Firstly, it was clear that no single driver demonstrated an overwhelming influence on environmental performance. There were connections between influences, such as that between membership of an environmental business club and awareness of regulatory responsibility. This suggested that any explanatory theory should allow for the interaction of separate influences. Environmental discourse within businesses appeared to integrate knowledge from a variety of sources, so the explanatory theory should accommodate such interplay.

The qualitative responses to the phone survey also demonstrated the rich variety of attitudes to environmental performance among SMEs. While it would be easy to take a simple and pessimistic interpretation of the quantitative evidence, the personal comments provided by respondents indicated that SME responsiveness was not the 'ostrich' strategy identified by Welford (1994). Many internal features also influenced the response to environmental pressures, including personal motivations and shared experience. It was clear that understanding the environmental behaviour of SMEs would demand a more complex and detailed analysis than could be gathered from survey evidence. In order to understand this it would be necessary to undertake a detailed qualitative study to examine the effect of personal attitudes and other internal features.

*Every object we use has to be designed, manufactured and sold by someone. It is an honourable occupation to apply one's talents to the marketplace. One person's need becomes another's opportunity, his livelihood, his dignity ... Perhaps a function of industry is to reflect that of God that is creation and glory. We can be creative in our small way in God's image; we can work in partnership with God, combining natural and human resources; we can extract order from chaos.'*

Rachel Jackson, 1990
Quaker Faith and Practice, 23.55

# Chapter 7

## Case Study Introduction

The research objectives included the collection of evidence of good practice in sustainable business, and to examine the learning processes involved in the development of sustainable business practices. These objectives required detailed information about individual companies, which could not be obtained by survey methods. Case studies could allow both detailed investigation of practical experience and the development of theory by means of comparison between cases.

Cases were selected from among the respondents to the phone survey. The companies selected were those who had made some changes to improve their environmental performance and who were interested in taking the time to participate in the study. These cases were chosen because they appeared to be sensitive to environmental concerns and could therefore provide some insight into those processes which produced such sensitivity. Based on the responses to the phone survey, eight firms were selected which demonstrated quite varied levels of environmental commitment and were subject of varying degrees of external pressure. For ease of recognition, these companies are referred to by the pseudonyms Plywood, Components, Bread Bags, Pulp, Compressors, Furniture, Toner and Pressed Steel, indicating their main product.

The preliminary study had indicated potentially significant roles for regulators, customer concern, support services and resource efficiency as factors influencing environmental engagement. Since the influence of regulators was unclear the sample included some cases which were highly conscious of regulation (Bread Bags and Pulp) and some which were not (Components and Plywood). Similarly customer concern was a significant feature for Pressed Steel and Pulp, but not for Furniture or Plywood. The role of support services was tested by comparing the experience of Bread Bags, which relied heavily on support services, and Pressed Steel which was not aware of them at all. Resource efficiency was central to Toner's business model, but seemed to be a relatively low priority for Plywood. These contrasts provided a fuller understanding of the ways in which such influences affected business behaviour.

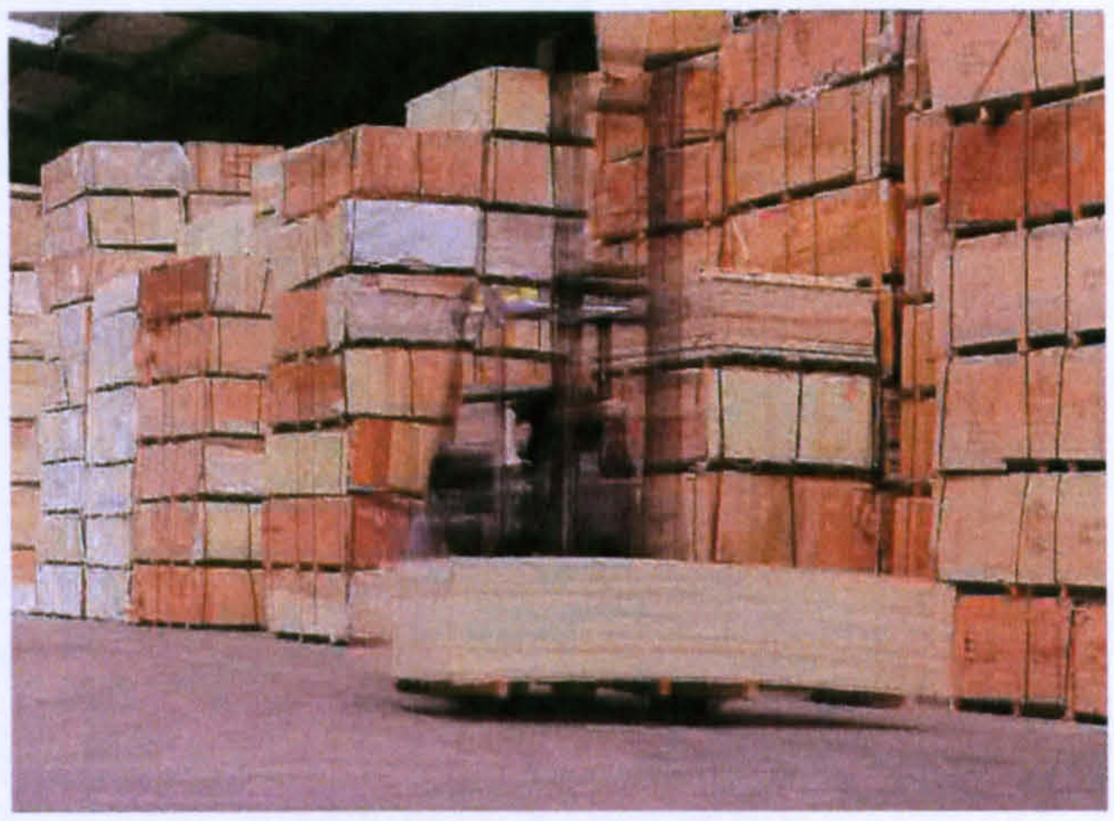
This chapter introduces the study companies, picking out identifying features. Each description provides some information about the company history, its main business activities and identifies the principle interviewee in the company. For each case, this is followed by a description of the measures that the company has taken to improve environmental performance. As discussed in chapter 3.7.1, this evaluation of environmental performance provides a heuristic ranking of the companies from minimally engaged to committed. The cases are presented in order of their performance ranking, beginning with the weakest performer.

## 7.1 Plywood

This company, formed in 1990, predominantly imports and distributes plywood and sheet materials (such as Medium Density Fibreboard, MDF), to a range of building supply firms and local authorities, but it also manufactures fire doors at their North Lanarkshire site. They employ around 50 people, with over half based at the purpose-built plant in North Lanarkshire. The company was founded by four partners who had previously worked together as employees of a family firm which had been taken over by a large holding company. They had developed expertise, particularly in the administration of the import business as it related to timber products, and they

also brought to the business an established network of international timber contacts. The main business activity of the firm has been the importing of tropical timber products from a number of countries, including Brazil, Malaysia and Myanmar. A proportion of the imported plywood does come from Forest Stewardship Council (FSC) approved sources, but not all.

Fig 7.1. Plywood



Their interest in improving environmental performance stemed from their concern over the poor reputation of the timber trade among environmentalists. The company supports a trade association group 'Forests Forever' promoting the benefits of sustainable timber use. Prior to the first visit, the firm had begun to develop stronger links with North European producers and began investing in manufacturing facilities, partly in response to growing consumer concerns about the use of tropical hardwoods. They share ownership of a Lithuanian firm manufacturing door frames which are imported to the UK where they are formed into fire doors. The manufacturing side of the business was a very small proportion of turnover, but it made a disproportionately high contribution to profitability. Nonetheless, the majority of the company's turnover still came from their tropical import and distribution business. It was clear in discussion with Derek , one of the directors, that environmental challenges were viewed as a threat to the business rather than an opportunity. Derek managed internal operations and had responsibility for implementing a proposed EMS.

Plywood was a company that would have to make major changes to the business to be classed as a sustainable business. Their original purpose, to import plywood made from tropical hard woods, was at odds with current thinking on the sustainable use of forest resources. It would be simple to write them off as the most obvious 'worst case'. How could such a company possibly claim to have any environmental credentials? However, they have been included in this study because they were keen to discuss environmental issues and had taken some time to become more environmentally aware. International concern over the trade in tropical timber products had forced them to take some consideration of their environmental impacts.

The Forest Stewardship Council (FSC) scheme for certifying wood from sustainably managed sources has been the primary means for the timber trade to assure customers of the minimal environmental impacts of their products. At the time of the first visit Plywood could provide some wood from FSC sources, but at a significant price premium. Few of their suppliers could provide such guarantees and Plywood's buyers had severe reservations concerning the reliability of such claims. The plywood market in tropical countries was suffering from over-supply which resulted in tough price competition. In these circumstances many suppliers were offering poor quality products and making unfounded claims as to their quality or source standards. The management of these supplier relationships was a major concern for the company. On the first visit the company did not believe that UK buyers were sufficiently interested in FSC approval to warrant much investment in such sourcing. Quality standards were viewed as being of greater concern to UK commercial buyers than sustainable sourcing. However, two years later the quantity of FSC imports had increased significantly and the company had many more suppliers who are registered in the FSC scheme.

It would be misleading to suggest that the company is moving out of the tropical timber trade, but they are reducing their reliance on that business by investing in slightly less controversial ventures, such as the manufacture of fire doors and investment in Lithuanian softwoods. While temperate forestry is not without problems from an environmental perspective, it was viewed by the company as being less obviously harmful than the tropical business.

Plywood has a joint venture with a Lithuanian company to produce frames for fire doors which are imported to the UK for completion at the North Lanarkshire site. The manufacturing unit was a relatively recent addition to the business and used water-based glues in the production process, avoiding the need for solvent management. The workshop also included an air filtration system necessary for the safety of the workers and the avoidance of fire hazard. Nonetheless, the workers were not all wearing masks and there were few safety or environmental notices in evidence in the workshop. Timber treatment takes place earlier in the process, so there were no significant issues of chemical control at the UK plant. The company did not investigate the environmental practices of those suppliers with responsibility for treatment. Waste was not segregated on site, but was removed by a waste contractor who claimed to segregate it elsewhere. An attempt had been made to segregate waste in the warehouse, but this had been unsuccessful because it did not take sufficient account of established working practices. During the visit, the practice of waste control within the premises appeared to be poor.

At the time of the first visit the company was considering the development of an environmental management system, using the support of consultants from the trade association. They had already developed a quality management system which was approved to ISO 9001, and were investigating the potential for ISO14001. An environmental policy had been drafted, which appeared to make the very general assertions without having any significant effect on practice. Following discussions with the consultants, further work was required of the partners. At that time it appeared unlikely that progress would be made quickly and indeed, two years later the EMS project had been abandoned.

The partners were keen to make clear their involvement with 'Forests Forever', which provides information about sustainable forestry practices. This group is supported by the timber trades and produces educational material highlighting the environmental benefits of good forestry practices. On closer investigation of this organisation, it appears that there is no requirement for supporters to demonstrate any practical commitment such good practice.

Given that transport and distribution was a significant part of their business, one might imagine that fuel costs could be a consideration to encourage careful transport management. However, transport services were contracted out and the firm effectively surrendered responsibility for transport planning. Similarly, the firm had not yet carried out energy or waste audits on the basis that they did not believe any potential savings would justify the management time required for the task.

Although Plywood was clearly some way from becoming a sustainable business, it would be unfair to say that they took no account of environmental considerations. Their investment in FSC sourcing was probably the most significant change to the business in recent years, although this had some way to go before it would cover the majority of their sales. They were clearly concerned by environmental protesters and wished to make use of any opportunity to assert their sense of environmental responsibility. Nonetheless, there remain very many opportunities for further improvement in practice.

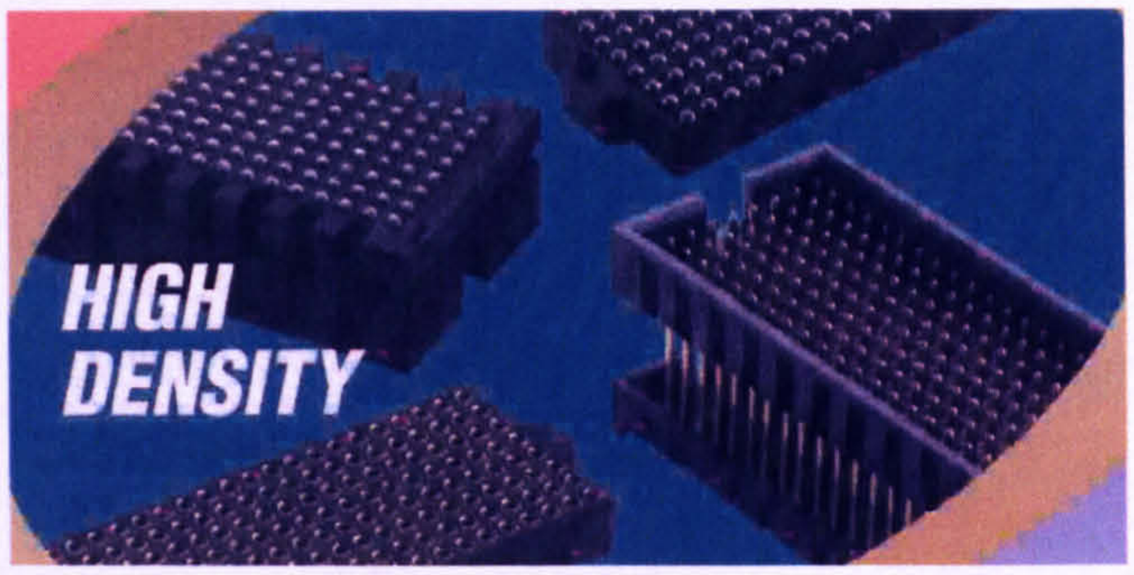
The next three cases – Components, Bread Bags, Pulp and - were fairly similar overall in environmental performance, each demonstrating strengths and failings compared with the others.

## 7.2 Components

Components was the only case study company that was a subsidiary of a larger group. It was owned by an American company which suppliee electronics components to a diverse customer base in Europe, North America and Asia. The company specialised in flexible manufacturing and traded on the speed of their supply response. The case study was the European manufacturing operation in Cumbernauld, North Lanarkshire, in existence for about 16 years. This operation was a relatively simple customising and distribution centre, where components, which had been manufactured in USA, were assembled according to customer specifications and shipped out. The workforce varied in size from a core team of

about 15 people to about twice that number at busy periods, with the difference made up of temporary unskilled workers.

Fig 7.2 – Component products - high density connectors




The firms most significant environmental impacts were related to materials usage and transportation impacts, but neither of these was within the scope of influence of the Scottish operation. Component design was determined in the USA in accordance with industry standards and the business was based on rapid supply to a global manufacturing base, necessitating the use of air freight. Nonetheless, within the limited scope available, staff at Cumbernauld had done what they could to limit the impact of their part of the operation. This mainly involved improving recycling rates and reducing the quantity and impact of packaging used on site.

The dominant driver for these changes was the personal interest of the foreman, Peter, who 'gets things done'. He claimed that cost savings justified this use of his time, but the firm had not made any record of the savings he had achieved. For him, waste minimisation was a core personal value that implicitly influenced everything he did. The managers and the parent company provided him with very little support, simply accepting and benefiting from his suggestions.

There are some similarities between Plywood and Components, in that both are involved in a global distribution network and serve customers who are not highly concerned about their environmental performance. However, Components had made far greater progress towards good environmental practice than Plywood, largely as a result of the personal determination of one member of staff.

This operation was a relatively simple customising and distribution centre, where components manufactured in USA were assembled according to customer specifications and shipped out. The off-cuts included waste plastics and small amounts of various metals, including gold. These off-cuts were segregated at the workstations and sent for recycling to appropriate reclamation facilities in England. Just prior to the first visit the company had begun to send cardboard packaging waste to a local recycler. The foreman noticed that the boxes from the US parent company stated 'made from 40% recycled material, 100% recyclable' and that their boxes were thinner, made from single skinned, rather than double skinned cardboard. This lead him to discuss their own packaging standards with the supplier and a cost saving was made. Further packaging savings were made following complaints from German customers over the use of expanded polystyrene pellets. The foreman sourced rolls of air filled polythene pockets, which could be compacted on disposal. This generated cost savings of £1500 per annum on their existing process. Although it may not be the most eco-efficient means of packaging, it was a significant improvement on past practice.

None of the improvements has been technically challenging, but they have resulted from personal attention to detail. For example, some of the components were packaged in disposable plastic tubes, in order to meet the clients manufacturing requirements. Even although the tubes were very cheap, the foreman investigated the feasibility of reusing returned tubes, but the labour cost of sorting the returns made it uneconomic. The production process was not energy intensive, relying more on manual labour than specialist machinery and the main use of energy was in space heating and lighting. Heaters were regularly serviced and a 25% saving was made on energy bills simply by shopping around for a more competitive supplier. When a nearby school was fund-raising for a mini-bus, the workforce collected aluminium cans for recycling to support the effort.

It could sensibly be argued that most of these improvements are relatively insignificant compared to the environmental effects of global air freight, on which the company depends. There are also environmental concerns over the life cycle

effects of the metals used in many of the components that the company sells. However, the strategic decisions about component materials and distribution policy are beyond the authority of the Scottish manufacturing unit. Within the context of an unsustainable operation, they have taken a number measures to minimise their environmental impacts. For smaller companies environmental good practice often consists of making such minor changes to daily practice.

Unfortunately, by the time of the follow-up study, manufacturing had ceased at the Scottish site. A sales office remained, but the manufacturing staff had moved on.

## 7.3 Bread Bags

The owner of Bread Bags was working as a broker in the packaging industry and perceived a niche opportunity in the production of printed polythene bags for supply to the the bread industry. Food packaging is dominated by a small number of very large firms and many smaller customers felt that they suffered from poor service compared with the large food producers. Bread Bags captured a significant portion of that market, taking some pride in a high level of customer responsiveness. The owner's expertise lay in her extensive market contacts and in the identification of new opportunities, based on existing, proven technologies. Production was managed by an engineer enticed from a much larger packaging organisation in which he had served for 20 years. This man, Tony, provided an interview in the company offices, but would not allow a full site visit.

Regulatory pressures were the predominant driver of changes in the firm, both in terms of air pollution control and reporting of packaging data. The printing inks which the firm used were all solvent based and they invested heavily in a solvent management system and pollution abatement technology. Following complaints from local residents, SEPA advised the firm that their processes were regulated under Part B of the Integrated Pollution Control system (IPC), requiring standards of emission control superior to those in use at the time. Bread Bags used consultants from Bell College in discussions with SEPA to identify appropriate abatement

technology. This included a solvent management system which allowed reclaimed solvents to be sent for recycling. A monitoring system was put in place which ensured that emissions were tightly controlled and SEPA was satisfied that the firm was fully compliant with their obligations under IPC.

Their other main environmental concern was the impact of the packaging waste regulations which lead to detailed information collection and reporting to all major customers. The company was obligated under the packaging waste regulations as a producer, packer and seller of packaging material, which incurred high compliance costs. They joined Valpak compliance scheme and estimated that this cost them approximately £9000 per annum. In addition, they had to extend their information systems to provide their clients with details of weights and volumes of packaging used and delivered.

Bread Bags provides a striking contrast to the practices of Components, both in terms of their approach to improvement and in their practice. The company has made some major investments in improved environmental performance, but the manager with environmental responsibility shows no personal interest in greening the company. This evaluation is based only on the interview with the manufacturing director, since he was very reluctant to allow access to the production areas of the factory. The interview was conducted in the luxuriously furnished boardroom, separate from the production facilities.

The company's product is of environmental concern both in terms of materials use, production impacts and as a contributor to household waste disposal problems. The introduction of the packaging waste regulations has had a significant effect on Bread Bags' business, incurring compliance costs of £9000 per annum in addition to the management costs of collating the necessary information on materials flows. Bread Bags joined the Valpak compliance scheme and have also taken some measures to reduce the weight of their packaging. They experimented with finer gauge polythene for the bread bags, but found it to be insufficiently reliable for their customers. They have also increased the amount of waste that is recycled in order to off-set the compliance costs. Plastics, cardboard, pallets and solvents are now routinely

recycled. Food hygiene standards forbid the use of recycled materials for food packaging, so they are limited in the extent of reuse that is possible within the facility.

The company considers that the visual appeal of their packaging is a critical component of customers' buying decisions. Although the printing process created significant problems of local air pollution, the company was unwilling to experiment with water-based or Ultra-violetly cured inks. They considered that neither technology was sufficiently proven in the food packaging industry to justify their investment. They were very anxious to assure customers that their products were as reliable as those of the larger producers and would not take any steps which might jeopardise that reliability. Alternative printing methods were viewed as one such threat. Instead of reducing solvent use through printing technology change, the company invested in a costly solvent recovery system.

The company has encountered problems in plastics recycling, as a number of contractors have gone out of business, leaving the company with large volumes of plastic waste to dispose of. At the time of the first visit most of the plastic had to be transported to recycling facilities in England. The lack of local recycling facilities incurred transportation costs which off-set any potential gains from recycling . The manufacturing director was clearly of the opinion that environmental performance had imposed significant costs to the business which could not be recovered through efficiency savings. They had supported LEBC, partly to gain access to the expertise of staff and students from the local college. This had resulted in a number of work placements which helped to identify minor savings. Nonetheless, the abiding view of the production manager was that environmental concern was a costly business that did not bring any benefits to the business.

Clearly, it is difficult to compare the environmental performance of Bread Bags with Components because their operations and their practices are very different. In terms of staff engagement and enthusiasm for environmental improvement, Components is superior, but the improvements that Components achieved are quite minor in relation to the changes made by Bread Bags. The study suffers from a lack of detailed

information regarding the practices at Bread Bags, because the manufacturing director was reluctant to provide personal access to the facility and he was unwilling to explain what practical improvements had been suggested by the college students. Nonetheless, on the basis of practical performance improvements, Bread Bags has been ranked slightly higher than Components although they fall within a similar banding of 'middling' performers.

By the time of the follow-up study, Bread Bags had ceased trading and no further information was available.

## 7.4 Pulp Packaging

The company occupied the site of a Victorian dye-works and began pulp manufacture in 1926. The firm was family owned and employed 26 people producing a range of standardised and custom designed packaging materials. At the time of the first visit, they were actively working towards ISO 14001 registration and were already ISO 9002 registered. The raw materials for the process are water and waste paper and cardboard, which are used to produce packaging materials that are fully recyclable and biodegradable - a significantly more sustainable alternative to expanded polystyrene.

Their business had been greatly helped by European regulations requiring manufacturers to take back non-biodegradable packaging and by the stringent packaging regulations in Germany. As a result of research investment, the business could produce computer images of prototypes in a very short time frame and had a high level of confidence in the packaging's protective performance. This technology put them at the forefront of customised pulp packaging manufacture. A number of larger packaging firms were seeking to develop capacity in pulp mouldings and had shown interest in buying the firm.

Fig 7.3 – Pulp packaging products

Although the product has clear environmental benefits over its main competitors, the company has to consider a number of issues in terms of its environmental and social impacts. The process uses a lot of water, extracted from a reservoir in the Campsie Fells which the company owns. Until shortly before the first visit in 2002, the factory pumped untreated effluent into the local river, but waste water was then screened prior to discharge for treatment by the water company. The volume of waste water had been reduced through reuse within the process and the chemicals used in the process had been changed to reduce the level of treatment required. Bill, the manufacturing director provided a lengthy interview and an extensive tour of the production facility.

Pulp could potentially be a highly sustainable company, adding value to waste materials to make fully recyclable product. However, at the time of the first visit, they were faced with a number of environmental challenges, and many opportunities were ignored.

The company's product carries many environmental advantages. It uses water and waste paper to make packaging materials that provide a fully recyclable or biodegradable alternative to expanded polystyrene. By offering a reliable alternative, the company is helping to reduce the volume of polystyrene waste, an extremely persistent material with high environmental costs of production. The use of waste materials in production further enhances the company's claims to sustainability.

However, their practices leave something to be desired in environmental terms.

The process used water which collected in a local reservoir, owned by the company. The water supply had been an important consideration when the company was first set up and working practices were based on the assumption of abundant free water. For many years large volumes of highly polluted waste water had been discharged to the local sewers and a major change in the company involved the installation of a water screening facility. Since water charges were based on effluent volumes and constitution, managers began to take more consideration of the chemicals used in the production process. Some of the more persistent chemicals had been phased out and the production manager was keen to carry this improvement further.

Some time after the problem of untreated effluent had been resolved, the company faced prosecution from SEPA, because a pump had broken down and a pipe was leaking into the stream . The charges were dropped when a system was developed to ensure that faults would be automatically alerted to the production management team.

The water company had worked closely with the production manager in the installation of the water screening facilities and was seen to be very supportive. In discussion it emerged that Pulp used a lot of sand in the moulding process and the water company had to dispose of large quantities of sand from their new freshwater treatment facility located 5 miles away. The connection was made and the moulding sand was switched to 'pre used' sand from the water company.

Although some improvements had been made, there remained a great deal of room for further improvement. The factory layout was tortuous, waste was not properly monitored and recycling was limited to the reuse of rejected products. There had been no efforts taken to examine energy use and the improvement of water use still had some way to go. A reduction in waste had come about simply from improving the quality systems to produce fewer bad products or bad orders, although this would not be visible in the management information systems. The production manager was keen to exploit these opportunities and to demonstrate good practice to customers. A quality management system had been developed and approved to ISO9001 and the

manager was working towards an ISO14001 level EMS at the time of the first visit.

The comparison between Bread Bags and Pulp was a difficult one to make. On the basis of current practice at the first visit, Bread Bags seemed to be the greener company, but the environmental qualities of the respective products and the management commitment to change gave Pulp a clear advantage. Following the first visit I predicted that, if both companies survived, Pulp would be clearly ahead within a few years. In the event, Bread Bags did not survive the two years until the follow up visits and after that time Pulp had been transformed into a modern clean green company investing in many new opportunities for cleaner production. A full description of this transformation is provided in chapter nine.

## 7.5 Compressors

The firm started up in the early 1990's, supplying a compressed air service to a range of manufacturers. At the time of the first visit they employed around 30 people and included among their customer base many very large companies such as Blue Circle Cement, Ibstock Brick, Scottish Power, and United Distillers. They view themselves as a 'fourth utility', providing a complete compressed air service including design and maintenance. Compressors believes that it provides a high quality professional service and recognises good environmental practice as part of that. The manufacturing element of the operation involves specialist design and assembly to meet particular requirements of customers. Responsibility for environmental management rests with the finance director, Roderick, who was the principal interviewee. However, the owner and the sales director each joined the interview and contributed their comments.

Environmental concerns affect the business both in terms of their daily practices and in terms of market demand for their services. Most significantly, compressed air systems require a great deal of energy, so efficient systems can make a substantial improvement to customers' energy demand. The managers were aware that the introduction of the climate change levy had stimulated much greater interest in the service they provide, by focusing attention on high energy users such as compressors.

Significant amounts of oil are used in the operation of compressed air equipment and Compressors provides oil separators as part of their systems and takes back used oil for recycling. Its compressors are also much quieter in operation than many of their competitors so, combined with the energy savings and oil treatment service, Compressors believes that it has some competitive advantage in the environmental aspects of the service.

Like the previous case, Compressors has benefited from growing environmental awareness to expand its customer base. The Climate Change Levy forced many manufacturing companies to consider their energy use, leading many to improve their compressed air systems, a common source of wasted energy. The company has also striven to provide high professional standards, which includes proper control of environmental impacts.

However, in spite of their professed environmental awareness, the managers could cite few examples of measures they had taken to improve their environmental performance. It was only after persistent questioning on different aspects of the operation that environmental features came to light. When the company was started, they used the occasion of a free consultant's visit to pick up ideas to improve recycling and establish clean working practices. Managers could not recall what these practices were and it was clear that they were not monitored, but the owner believed that his staff had clean working habits. Despite this discouraging start, further investigation did reveal some investment in good practice.

Significant amounts of oil are used in the operation of compressed air equipment and Compressors provides oil separators within their systems and they take back the used oil for recycling. This practice is not universal to the industry and some staff were not convinced that it was cost-effective. One environmental investment was the building of a bunded oil storage facility to prevent accidental oil spills from contaminating the drainage system. When that was being constructed they also built a vehicle wash-down area to ensure that dirty water was disposed to the sewage system rather than to surface drains. As well as avoiding water pollution, the company had made some efforts to reduce the noise pollution effects of their operation. Their

products incorporate high levels of sound insulation and on the site they have developed a sound insulated area for equipment testing. Local residents had passed comments to staff about the noise levels and the company installed the insulation before any official complaints were made. The owner claimed that recycling rates were good, but this was based only on his personal observation, unsupported by monitored data. The lack of data would not necessarily undermine his claims, but what raised more suspicion was the common complaint among other companies of the unreliability of recyclers. This company made no such complaints and provided no detail on what materials they could recycle successfully. This led the researcher to view the recycling claims with some scepticism.

The first visit to the company allowed brief interviews with three managers - the owner, the sales director and the financial director. On that occasion it was clear that the owner was keen to develop an EMS to ISO14001 standards, but that his colleagues did not share his enthusiasm. Two years later the owner spoke with more conviction of the need for the EMS, but it had not yet been implemented. A quality management system had been approved to ISO9001/2000 and the company had gained the Investors in People award and it seemed that ISO14001 would be the next target on the list of certificates.

Clearly this company has some grounds for its claims to be environmentally conscious, but they do not yet manage their environmental impacts systematically. The owner believed that their practices were good and that certification would only provide a stamp of approval, but it seemed to the researcher that further improvements could be found. At the time of the second visit the company had just discovered that they required a waste carriers licence for the transportation of waste oil from customers' sites to their holding facility. It was this discovery that confirmed for the owner the need for a more systematic management of the company's environmental performance. It seems likely that the implementation of the EMS may reveal more opportunities for improvement.

The evaluation of environmental performance was hampered by the fact that most of the company's work takes place at client sites and no work was being done at the

main facility when the visits took place. The evidence of environmental performance therefore relies on the accounts provided by the managers. Clearly, they were keen to demonstrate good environmental credentials, but they did not seem to have the information needed to support their claims. It is quite possible that the staff did indeed keep up good working practices, but the researcher saw no evidence for or against this claim.

Comparing the performance of Compressors with Pulp, it was quite clear that on the first visit Compressors was more conscious of its environmental impacts than Pulp. The fact of Pulp's transformation over the two year gap reversed that ranking on the second visit. Compressors had taken a number of measures to limit the environmental impacts of their operation, but they had not invested in systematic management of those impacts. On the first visit, Pulp had made fewer changes and was struggling to develop a management system. By the second visit the system was established and many more improvements had been made.

## 7.6 Furniture

This is a company which renovates and reupholsters furniture, employing a workforce with learning difficulties or other special needs. The firm was started in 1962 under the auspices of the local authority in order to provide employment for people with learning difficulties. Throughout its life it has been run for the employees, although in recent years it has come under increasing pressure to become profitable. In 1996 it was losing £300,000 and the local authority were considering closure. However, a stay of execution was granted and two new managers were drafted in to turn the company around. Following a programme of increasing production efficiency and marketing innovations, the company was operating profitably at the time of the first visit.

The environmental improvements resulted from a series of innovations intended to increase efficiency and improve worker safety. Environmental improvement was not the driver for change, but a beneficial side-effect of the efficiency drive. Managers

were keen to take up opportunities with environmental benefits, but that was not the main focus of their attention. The researcher interviewed the managing director, George and conducted an extensive site visit, observing discussions among managers and workers.

At the time of the first visit in 2001, the workforce was subsidised through a government employment scheme which was administered by the local authority. The government favoured encouraging employment by mainstream employers and threatened to stop the sheltered employment scheme, leaving the costs with the local authority. This uncertainty was discouraging authorities from investing in the future of such schemes, leaving this company in an uncertain position. Securing the future of the workforce and establishing political support for the company were high priorities for management.

Pulp and Compressors both used the environmental advantages of their products to attract customers, although their practical environmental performance was unremarkable. In contrast, Furniture made a significant contribution to wider sustainability in both the environmental and social dimensions, yet it apparently gained no market advantage from that. The business of the company is the re-upholstery of used furniture, mainly from care homes and hospitals and it does so by employing a labour force that need special support to be able to engage in society. The actions of the business divert waste from landfill and improve the social conditions of disadvantaged individuals. However, the company avoids using the sympathy vote to attract customers, competing instead on the basis of reliability of service. As well as performing a service that is environmentally and socially beneficial, the company had made a number of improvements in practice to reduce their environmental impacts.

Waste reduction had been achieved by improving cutting techniques to reduce textile waste and by investment in energy efficient sewing machines and a more efficient compressed air system. Foam off-cuts were reused in the production cycle or given to retirement homes for therapeutic uses and cardboard packaging was reused to protect finished furniture. Recycling was limited to the take-back of off-cuts by the textile

supplier who recycled the fibres for use in other fabrics. However, beyond the waste minimisation process, the company had also made a significant improvement in environmental performance by switching from solvent based to water based glues. The company's procurement practices took some consideration of the environmental practices of suppliers. Many of these improvements arose from a desire to increase efficiency or to enhance worker safety, but the manager was also conscious of a wider responsibility to minimise the environmental costs of the business.

This company is ranked above the two preceding ones on the basis of the number and diversity of improvement measures taken. It may be argued that Compressors was operating more efficiently to start with, so had less room for improvement than Furniture, but the market for environmentally friendly products and services grows daily, providing scope for change for those companies which seek it out. Compressors did not make much effort to identify improvement opportunities, while Furniture clearly did, with good effect. However, on the second visit, Furniture had not made many improvements beyond those identified on the first visit, while Pulp had improved significantly. The second visit ranking would place Pulp far ahead of Furniture and it is the reasons supporting this reversal that make for an interesting analysis of the case studies.

## 7.7 Toner

Toner is a company which re-manufactures toner cartridges for laser printers and photocopiers. The cartridges are collected through a charity network and sold to office supply companies in the UK and Europe. It is a family owned and run business which has been highly successful because of the engineering and entrepreneurial skills of the managing director, Ron and a well trained and innovative workforce.

High quality toner re-manufacture is a rapidly advancing technology, calling for constant development as new types of cartridges come to market. The engineering abilities of the staff are continually challenged by the need for new products and

improved processes. Good environmental performance is an integral part of the business and the creative effort includes identifying new ways to close the materials loop, improving recycling rates and minimising materials wastage. The company has positioned itself as a high quality supplier and strenuously distances itself from cartridge re-fillers who are reputed to provide an unreliable product. The company invested in ISO 9001 to assure customers of their quality standards and have obtained ISO14001, partly to assure cartridge suppliers of their green credentials. However, staff found the EMS to be surprisingly useful in maintaining systematic improvements in environmental performance.


Fig 7.4 – Toner's re-manufactured cartridges

Toner was founded on the owner's perception of the need to improve efficiency in the use of materials. Resource efficiency is a core value underpinning the business, and this is demonstrated in many areas of good practice.

Toner cartridges include about 10-15 components which the firm disassembles. Some parts are replaced, as they are subject to wear, and the old parts are sent for recycling. Other parts, such as the seal, are destroyed in use and have to be replaced. Once the cartridge has been taken apart the old toner has to be removed, which is the dirtiest process. Cartridges are then re-assembled and tested for quality before packing and shipping. As the firm is based on recycling and reuse, they are very aware of their own materials flows, reusing and recycling wherever possible.

Packaging materials were a particularly problematic area for the company, both for incoming supplies and finished product. Used cartridges arrived in very many different kinds of cardboard boxes which could not be directly reused because of integral labelling. The company investigated the possibility of purchasing cardboard recycling equipment to generate animal bedding, but found the venture to be unviable. At the time of the first visit all cardboard was recycled at no cost, since the recycler profited from the sale of PRNs.[1] However, should the volumes of packaging increase to a level that would obligate the company under the packaging waste regulations, the cost of transportation would be borne by Toner. There were practical difficulties of monitoring all packaging used, particularly when returned cartridges come in a wide variety of packaging materials. At the time of the first visit the company were in discussions with their packaging suppliers to reduce the quantity of material used for the customised boxes for final product and they were also testing the use of water-based inks for the labelling.

Plastics recycling was also problematic due to the instability of the market. On the first visit, all plastic was sent to landfill, since all the local plastics recyclers had collapsed, claiming that volumes of recyclate in Scotland were insufficient to cover the transportation costs. Wooden pallets were routinely reused and broken ones recycled into MDF by a local company.

The production manager relied on his EMS to provide information and feedback on the most significant areas for improvement. The system also allowed him to produce graphs recording recycling rates, energy and water use, and various types of waste produced. These were displayed in the staff canteen. He cut his skip collections by spending a day wading through the skip to find out what was in it. He found vast quantities of plastic bottles which had held toner liquid. The supplier refused to take back the bottles, so they found a company that would supply them in bulk and the bottles are now reused within the factory. After a poor experience with ISO9001 ('you could make concrete life-jackets and still get ISO9001') he found the EMS experience surprisingly helpful.

1 Packaging Recovery Notes are the effective 'currency' of the recycling economy devised to enable producers to meet their obligations under the Producer Responsibility Obligations (Packaging Waste) Regulations 1997

When the company introduced a pension scheme, the production manager investigated the options for ethical investing ' to make sure my pension isn't going to Nike sweat shops'. Staff transport was not a matter of management concern, although most people employed there had joined via friends and travelled in groups, sharing cars or taxis. The factory is situated next to a motorway, with no public transport links, but 3 or 4 staff were brave enough to cycle to work. The company tried to streamline distribution, avoiding half-filled vans, but they believed that there was little scope for improvement there. Energy use was not well monitored, due to metering problems and there appeared to be some scope for minor improvements here. The process is labour intensive and energy is mainly used for heating and lighting. There is no water used in the process. The production manager was aware of the need to gain better data on energy use and was working on the problem.

Toner was the only company among the case studies to have achieved ISO14001 and they clearly made good use of the system. When looking for areas of improvement, the production manager and the owner's son wandered round the factory, looking for ideas. They held meetings in the staff canteen with the owner and an environmental consultant to come up with fresh ideas.

The production manager used the internet, an external consultant, SEPA and LEBC contacts and wider business contacts to gather the information he needed, looking for quite specific information relating to his business. His 'research' has concerned the 'Blue Angel' and 'Nordic Swan' eco-labels, packaging waste regulations and scares about the composition of toner fluid. In each of these areas he gathered data and discussed it with the owner and evaluated the information in relation to the business.

At the time of the first visit there were clearly many areas showing some scope for improvement, such as energy use and packaging materials management. However, the company had clearly demonstrated a systematic determination to deal with issues as they became apparent. The business activity was primarily based on improving the efficiency of material resource use and those values influenced other areas of the business. By the second visit many further improvements had been made to the

operation, including tighter management of packaging resources and improvements in energy management.

## 7.8 Pressed Steel

Pressed Steel was formed in 1996 to provide steel casings and clips for Chunghwa's manufacturing plant in North Lanarkshire. Chunghwa made Cathode Ray Tubes (CRTs) which were sold to computer and TV manufacturers worldwide. Pressed Steel was set up by a former Chunghwa engineer, it occupied a site next to the Chunghwa facility and sold all output to Chunghwa. At the time of the first visit demand was falling and the company was attempting to form new alliances with other clients.

Fig 7.5 – Pressed Steel casings


Many Asian electronics firms have been quick to adopt international standards of environmental management and perceive good environmental performance as an essential element in any successful business. Pressed Steel shared this attitude and employed an experienced manager with responsibility for health, safety and environmental management. He reported to the administration manager, but worked closely with the engineering and production managers.

The environmental concerns of the firm were those common to many manufacturing organisations - material flows and wastage, recycling rates, energy efficiency and

effluent management. However, the determination of the workforce and the environmental manager, Jim, had brought out some innovative solutions to common problems. The firm was also aware of a degree of social responsibility which was demonstrated in generous training schemes and cheap, high quality catering facilities. Their success had resulted from a healthy combination of customer and management commitment to high performance, together with personal enthusiasm and skills in the workforce.

Although most of the case studies examined so far have demonstrated some examples of good practice, none have come close to the standards demonstrated by Pressed Steel. Even although the product carries no clear environmental advantages, this company concentrated outstanding effort in minimising the environmental impacts of production.

The factory had been designed to aid the recycling of scrap metal, by automatically collecting the off-cuts via an underground conveyor system which took the metal to closed skips for regular collection by the recycler. The presses required substantial amounts of oil for maintenance and the environmental manager identified a vegetable based oil which performed to higher standards and could be reused more than the original type. When the oil was finally disposed of, it was passed to a refiner for clarifying and reuse. The compressors were checked annually for efficiency and the exhaust gases were used in a heat transfer system to warm the factory. The factory was well insulated and included large glazed areas for natural lighting. Storage areas were unlit, unless staff were operating in them and passage areas were only partially lit, by the simple method of removing half the light bulbs. The factory was not connected to the national grid, but used surplus electricity from the Chunghwa factory generators and energy used in the factory was monitored to provide feedback on efficiency initiatives.

Many of these good features were present because environmental and efficiency considerations were central to the design of the facility. However, the staff had also come up with smaller scale improvements that continued to improve recycling rates. To engage staff in the improvement process, a scheme was set up to recycle

aluminium drinks cans, which proved a great success. No cans were put in the waste bins. As the improvement process continued, staff were kept fully informed of developments in waste treatment. When a new type of waste was encountered, they automatically checked with the environmental manager to find out how it could be recycled. The success of this awareness raising was demonstrated by the staff reaction to a new waste problem. Parts were moved around the plant in plastic boxes that were also used for transporting the finished products to Chunghwa, just down the road and were returned for reuse. Originally the boxes were lined with plastic bags which were recycled. However, the plastics recycler ceased trading and the plastic waste was building up again. Due to the high levels of staff awareness, the workers were complaining about the waste of plastic. A new solution was developed to use paper liners which were partially reusable and fully recyclable. This took quite some research to identify a source of paper liners of a sufficiently high standard to prevent contamination of the product, which must remain perfectly clean for use in computers. Line workers were closely involved in thinking of possible solutions and took some pride in their new idea. It was viewed as a great success since it cut out a non-recyclable waste stream and made a noticeable difference to the environmental performance of the factory.

The development of the factory was part of a huge investment which was heavily supported by European, UK and local government. The facility was close to critical motorway links and it was also in an area of very high unemployment and social deprivation. Most of the line workers had little previous work experience and very low levels of training or education. For these reasons the factory was designed to include excellent catering and training facilities, but until the employment of the environmental manager, these had remained unused. Shortly after he arrived he contacted local catering colleges to make them aware of the unused facilities that were available and came to an agreement with one of these. The kitchens could be used to train catering staff for a hotel chain and their meals would be served to the workforce. The result was that the workforce had very high quality low cost meals available at their workplace, although some complained that they would prefer Pie & Chips to Salmon Hollandaise. In response the kitchens produced at least one 'simple meal' each day, but tried as far as acceptable to make it relatively healthy. The

kitchen waste was the responsibility of the college, but the environmental manager had been working closely with the college co-ordinator to identify composting facilities and to find ways of improving their environmental impacts.

The environmental manager also took on responsibility for training and set up a system of training needs assessment for all staff. Realising that staff were entitled to training through the government scheme of Individual Learning Accounts, he set up arrangements with local training organisations to allow the company staff to use this entitlement. He was pleased to find that almost all the staff were very enthusiastic to make use of the training opportunities offered and he had to put on more sessions to cope with the high demand. Computers were purchased to support the training sessions and in slack periods the staff are allowed to study for their European Computer Drivers Licence. The training room had a library of training materials and details of risk assessments on all operations, as well as all health, safety and environmental procedures. Induction refresher courses were run from time to time to remind people of the importance of good practices. These training session included some discussion of stress management and the manager provides an informal personal counselling service. The willingness of the workforce to discuss personal problems with a manager speaks volumes for the open and supportive atmosphere of the workplace.

This company was clearly far in advance of most of the other case studies in terms of the range of measures to improve environmental performance and the degree of innovation shown by the workforce. Although the number of improvement measures exceeds that of Toner, it is ranked closely with that company for two main reasons. Pressed Steel depends on steel from Japan to make parts for computers that are shipped all over the globe. The profits from their activities benefit foreign nationals who may be seen to have invaded a greenfield site and used taxpayers money to exploit the labour of disadvantaged people. Although this is a highly emotive description, it does make the point that the basic activity of the company has severe environmental impacts which are only partially mitigated by its good performance. Toner, in contrast, is specifically engaged in the high grade re manufacture of components, limiting the use of non-renewable resources and diverting valuable

materials from landfill. One might debate at length which of these companies should be credited as the better environmental performer, but that would not be particularly helpful to this analysis. Both companies demonstrate significantly better performance than the other case studies and the analysis in the following chapter considers why this should be so.

## 7.9 Summary

The analysis of environmental performance provides a heuristic ranking of the relative performance of the case study companies. Plywood was clearly the weakest environmental performer, demonstrating very few concessions to environmental concerns. Components, Bread Bags and Pulp were also relatively weak performers, but each for different reasons. In all of those cases, efforts had been made to improve performance, but there was little evidence of continuing improvement. In contrast, Compressors and Furniture demonstrated a more significant range of improvements over a number of areas of the operation. However, both of those cases remained rather passive in their approach to environmental improvement compared with the pro-active approach demonstrated in the two best companies, Toner and Pressed Steel.

These cases demonstrate a range of activities taking place within SMEs which have contributed to more sustainable ways of working. The majority of the evidence concerns improvements in recycling rates and reduction of waste, mainly in terms of materials streams. However, there are also examples of reductions in energy use and transportation impacts. None of the companies had given any consideration to the use of renewable energy sources, either for power or for transport fuel. Issues of biodiversity were not considered to have any relevance for any of the businesses, even Plywood, which would be the most obvious candidate. Three of the cases showed some concern for the social impacts of their business, ranging from ethical pension schemes to employment and training policies. It is interesting to note that even among those companies which gave consideration to social impacts, the words 'sustainability' or 'sustainable business' were not used.

In comparing the practice of these case study companies with the wider issues of sustainability, it is clear that only a limited selection of the components of the sustainability discourse are viewed as relevant to business operations. The concentration on material waste accords with existing 'common sense' of good business practice. Waste minimisation sits easily within the existing business epistemology and does not demand a significant break from past knowledge. In contrast, the social element of sustainability was most clearly adopted by a company in public ownership with an explicit mandate for social inclusion. The other 'socially aware' company had received substantial public funding for those elements of the operation. This suggests that the social inclusion agenda does not sit well with small business sustainability within the current business framework.

The following chapter uses the sourdough model to analyse the significant features of these companies in order to explain the variation in their environmental engagement.

*Power should come from within the person and the community, and be made responsible to those it affects. The ultimate criteria in the organisation of work should be human dignity and service to others instead of solely economic performance'*
Scott Bader Corporate Constitution, 1963,
Quaker Faith and Practice 23.57

# Chapter Eight

## Case Study Evaluations

The aim of this stage of analysis was to derive a theory to explain the responsiveness of the case study companies to sustainability, although in most cases this was restricted to environmental improvement. The initial evaluation had distinguished between relatively good and relatively poor performers and the next stage was to structure an explanation for that variation. The analysis of the data used the constant comparative method advocated by Glaser and Strauss (1967), gradually developing categories of influence by comparing the experience of each of the case studies.

The preliminary study and the phone survey had suggested some potential influences on environmental responsiveness – regulations, support services, customer interest and efficiency motives. This stage of analysis compared the effect of these influences across the group of case studies. One technique used in this process was to map the relative strength of each of these influences among the study companies and compare this ranking with the ranking of environmental performance. However, it was clear that such a simple approach would be inadequate to account for the variation in behaviour. The comparative process revealed the degree to which behavioural influences were inter-related.

Interview notes were analysed to identify evidence of categories of influence on behaviour, such as customer interest or regulations. The data was then scrutinised further to identify properties of each of these categories which might influence their effect. When a property was revealed in one case, the other cases were then analysed for evidence of that property, either as a positive or negative influence on behaviour.

Such analysis allowed for the development of a richer understanding of the nature of the influences at work.

Much of the literary research was conducted at this stage, concurrently with the analysis of the case study evidence, highlighting the potential influence of learning styles, consultants' roles and organisational features. The concepts derived from the theoretical literature were tested against the case studies. The analysis produced a very rich amalgam of conceptual categories and properties which combined to affect business responsiveness to environmental concerns.

This gradual process of analysis, testing and refinement guided the theory towards the process of knowledge development. The sour-dough model emerged from the practical context of the researcher's personal experience. In struggling to bring together these diverse, yet inter-related influences, a simple home-baking analogy encapsulated the nature of the learning process. The sour-dough model provides a conceptual framework to combine the categories of influence and identify relevant features of individual experience. This analysis of the case studies is presented using the framework that emerged from this process.

For each case, the analysis examines existing knowledge, customer expectations, 'other knowledge sources', rules of formation, organisation, grid of specification and authority of limitation. Comparing this structure with the table shows that four of the categories of influence (regulatory interest, supplier network, business network and business advisers) have been combined under the heading 'other knowledge sources'. This has been done because most of the case study companies did not use the full range of knowledge sources identified. This clearly demonstrates an important feature of the sourdough model, namely that many knowledge sources, or ingredients, are there for personal selection. Other elements of the model, such as the rules of formation and the authority of limitation, determine the use that is made of available knowledge resources.

Figure 8.1 – Categories of influence on environmental performance

| ***Categories of Influence*** | ***Category Properties*** |
|---|---|
| Existing Knowledge | Previous working experience of environmental champion |
| | Core environmental or social values |
| Customer Expectations | Inclusion of 'big name' customers |
| | Customers' proximity to retail sector |
| | Environmental interest of customers |
| | Degree of customer engagement |
| | Level of price competition |
| | Practical influence of customers |
| Regulatory Interest | Policing or advisory roles |
| Supplier Network | Availability of environmentally conscious suppliers |
| | Quality of supplier information |
| Business Networks | Environmental standards of major competitors |
| | Environmental business clubs |
| | Informal social networks |
| | Trade associations |
| Business Advisers | Knowledge source or subcontract |
| Rules of formation | Value of environmental information |
| | Inclusion of social effects |
| | Evaluation of environmental claims |
| | Influence on strategy |
| Organisation | Authority of environmental champion |
| | Dispersion of environmental responsibility |
| | Social integration |
| | Environmental discussion opportunities |
| | Personal engagement of champion |
| Grid of Specification | Collection and use of environmental data |
| | EMS |
| Authority of limitation (owners) | Sustainable business objective |
| | Focus on continuous learning |
| Epistemological Break | Clear point of departure from 'business as usual' |

## 8.1 Plywood

Plywood was the manufacturer of fire doors and the importer of plywood and sheet materials. Their performance was ranked lowest of the group, in spite of some strategic decisions to make the company less unsustainable. Although the company's core business depends on practices seen as threatening to planetary sustainability, they had made some changes in recent years to take account of such concerns. Nonetheless the business epistemology did not include many influences favouring the development of sustainable business knowledge. The existing knowledge base, the concerns of customers and suppliers and, most significantly the authority of limitation all worked against the development of a sustainable business epistemology. The organisation and the rules of formation served to minimise the impact of environmental concern on business practice. These limited any positive influence of customers or other knowledge sources on the company knowledge base. The company had not undergone any form of epistemological break, and did not appear likely to do so.

### 8.1.1 Existing Knowledge

The company was a partnership, which grew out of another established timber trading business. The four partners had worked together for most of their lives and had always worked in timber trading. They had a lifelong commitment to the timber trade and specific experience in tropical timber trading. Global concern about the effects of the tropical timber trade have been debated since before the company was formed, but the company was founded on an assumption that the trade would continue to be profitable for many years and that environmental concerns were not sufficient to drive the owners out of the business where they were experts. In contrast to some of the other cases, the core identity of this business was in conflict with, and explicitly discounted, environmental interests.

Nonetheless, the owners were conscious that environmental considerations could not be completely ignored, despite their personal ambivalence to those concerns. They

were anxious to be accommodating to people with environmental concerns, such as the researcher, but they were also keen to argue why such concerns were, in their view, misplaced. For example, Derek complained that pressures from environmentalists had forced many of their suppliers out of business, leaving the market open to unscrupulous mills. These, he claimed, would mislabel plywoods as 'sustainably managed' when they were not. The logic of this argument was, at best, tenuous, but it serves to demonstrate the perception that environmentalists were problematic for the company.

Thus, the existing knowledge base of the company did not favour the establishment of good environmental practice. No one in the company had positive experience of environmental management and it was viewed as threatening to the growth of the company.

### 8.1.2 Customer Expectations

Plywood's client base was very diverse, including some very large building trade suppliers, such as Jewsons, as well as DIY stores, smaller builders merchants and building firms and local authorities. They did not supply directly to the retail DIY chains, but some of their clients did, so they would be classed as '2nd tier' suppliers to those companies. Although most of their client base was in the UK, they also had many overseas clients in Europe, the Middle East and the Caribbean. One implication of the diversity of the customer base was that environmental concerns were inconsistent.

Some retail DIY chains, such as B&Q, have actively promoted their environmental credentials for a number of years and have provided support and incentives to first tier suppliers to develop environmental management systems and investigate the environmental implications of their sourcing policies. Clearly, as a supplier to those companies, Plywood could expect greater customer concern about their environmental practices. At the time of the first visit these concerns were beginning to surface and were more apparent by the time of the second interview. One of the

partners cited these customers as the main reason for the company's interest in EMS. Local authorities were also showing increasing interest in the environmental policies of their suppliers and frequently asked for sight of a company environmental policy as a part of the tendering process. A policy had been drafted to meet those demands, but it did not appear to be supported by any implementation process. Although local authorities required sight of an environmental policy, the directors believed that they continued to base their purchasing decisions on price alone. Although they might seek information about FSC sourced products, they were rarely willing to pay extra for sustainably sourced timber.

Price competition was perceived as the most significant marketing issue by the directors. In particular, they were concerned that poor quality, cheap plywood was being imported and mislabelled, cutting into their markets. Plywood had chosen to market itself on the basis of quality and invested in ISO9002 and the 'Q-mark' to support their claims. The partners were acutely aware of the costs of implementing such management systems, particularly in terms of management time, and they were unconvinced of the business gains to be made from them. They had seen customers' interest in quality wax and wane as price competition became an increasingly dominant feature and they feared that ISO14001 would follow a similar path.

Plywood did not have close relations with clients, as their product was a commodity item, offering little to distinguish it from many other suppliers. The company publicity stressed their reliability of supply, rather than any product features. In contrast to some of the other cases, such as Pulp or Pressed Steel, Plywoods customers demanded very little information concerning their working practices.

In general, customer expectations had not offered much encouragement to improved environmental performance. Although the company supplied a few big name companies serving retail markets, their influence was diluted by the large number of other customers who appeared to have no interest in environmental performance. Price competition was intense, and quality and environmental considerations were perceived to carry limited additional value to the customers. The company did not see environmental practice as an important feature for attracting business. Nonetheless,

the development of FSC sourcing was one indication that at least some customers were willing to pay for environmentally sound products. This undoubtedly influenced the partners to develop FSC sourcing, but they were reluctant to make any greater investment until it was clear that wider industry standards required it. The overall effect of customers' concerns has been to discourage investment in the environmental knowledge base.

### 8.1.3 Other Knowledge Sources

Plywood belonged to a number of trade associations - the Timber Trades Federation, Forests Forever and Trada. The last of these is a research and development organisation serving the timber industry. Plywood had used them for many different purposes over the years, including arbitration on quality investigations, informational help on specific issues and more recently, helping to implement ISO14001. It was clear from the interview that the Trada consultants saw EMS implementation as a potential revenue source and were promoting it within the industry. However, in Plywood's case, the business managers were highly suspicious of the benefits to be gained and were reluctant to invest time in system development. It came as no surprise in the follow-up visit to discover that the EMS had not been implemented.

Plywood's suppliers were the sawmills close to timber sources and it was very clear that they were not actively promoting sustainable forestry practices. Some FSC sources had been identified, but the suppliers were resentful of the bureaucratic demands of the scheme and did not encourage Plywood to promote it. The supplier relationship was clearly a matter of great concern to Plywood, as it was frequently referred to throughout the interview. However, the issues of most concern within that relationship were reliability of quality in the product, not sustainable forestry practices or other environmental performance issues. Where FSC approved suppliers were available, the price premium was also a matter of concern. Plywood did not believe that such premiums could be fully accepted by their customers.

The company was a member of Forests Forever which produces educational material

highlighting the environmental benefits of good forestry practices. This is a trade organisation set up specifically to encourage environmentally conscious forestry practices and it might be assumed that such a grouping would support the company's efforts to become more sustainable. However, Plywood's membership of the group appeared to be purely financial, requiring no conformity to standards of good practice. Membership did not require any personal engagement of Plywood staff and seems to have had a negligible influence on their environmental performance.

Although there are some organisations which could provide support for improving environmental performance, Plywood had made little use of these services. The Trada consultants did raise the company's interest in EMS, but not to a sufficient level to encourage them to develop it. Although there were plenty of ingredients available to the company, the rules of formation were screening out a great deal of the information on offer.

### 8.1.4 Rules of formation

By now it should be clear that there was a deep-seated conflict in the epistemology of the business with respect to the environment. On the one hand the company was committed to a business that widely criticised by environmentalists and on the other, they were anxious to avoid attracting critical publicity and therefore sought to give the appearance of environmental concern. The degree to which the knowledge base might be influenced by information or advice from external parties was tightly controlled. The response of the company to the researcher's visit and their engagement with Forests Forever indicated a willingness to engage, at least superficially, with people with environmental concerns. However, closer examination showed that the business was unwilling to invest much time or money in improving performance. This was clearly demonstrated in the experience of the waste recycling initiative.

Having developed the environmental policy, the partners thought that they should at least investigate the feasibility of recycling their waste and they approached their

existing waste contractor to suggest a possible solution. In the search for possible solutions the company relied on its existing contractor, without seeking out alternative possibilities. The contractor provided separate skips for plastic and cardboard waste, but after a few collections it was clear that waste was not being properly segregated. Staff were not engaged in the process of testing potential solutions or contributing to the implementation process. When the contractor complained of mixed waste, the work teams argued that it took too much extra time to carry the segregated waste to the different skips. They also complained about the amount of factory space taken up by the extra skips. The contractor offered, for a higher fee, to collect unsorted waste and segregate it off-site, and this was the solution that was adopted, but the company did not have any knowledge of the amount of their waste that was recycled. The managers were aware of the additional cost to the company of recycling, since they paid higher charges to the waste contractor, but they had gained no benefits from it. The experience reinforced the original perception that enhanced environmental performance imposes costs but no gains. The knowledge base remained firmly 'anti-environment'.

It was interesting to see that the partners continued to speak of environmental concern in positive terms, proclaiming their support for 'Forests Forever' and their use of FSC timber. Clearly, the rules of business discourse reject an openly anti-environmental stance. However, during the course of discussion the costs and challenges of environmental concern received most attention. They were willing to take time to explain why they had not fully responded to the challenges and how difficult it had been for the business. In order to reconcile this conflict, the picture emerges of naive environmentalists who do not fully understand the problems of sustainable forestry and the timber professionals who are working against the odds to overcome the problems. Although this image may be comforting for the managers of the business, their limited efforts to improve environmental practice did not lend it much credence.

The rules of formation developed over the years, such that the company believes it necessary to engage in discussion of environmental issues, but they carefully select those who may contribute.

### 8.1.5 Organisation

The key point of interest in this case was the relative absence of internal drivers for change. The external drivers effectively forced the firm's managers to take some steps towards establishing environmental management, but progress was hampered by internal resistance. Derek was assigned responsibility for developing an environmental management system and for identifying areas for potential improvement. He had been closely involved in the implementation of the quality management systems and the extension into environmental management seemed a natural step. He had no experience of environmental management and his interest in it only extended as far as meeting the demands of the larger customers. He was keenly aware of the costs to the firm of implementing the EMS and clearly viewed it as an unwelcome distraction from his other pressing responsibilities of managing the business operations and administration. Initially he had hoped that using the external consultants would limit the time required of him, but when that hope proved unfounded he considered taking on a new member of staff who would have responsibility for the management of the quality, health and safety and environmental systems. It seems likely that if such a person had been appointed, progress towards EMS implementation would have been substantially improved. However, by the time of the follow-up interview no appointment had been made and the EMS project had been abandoned.

The second interview was conducted by telephone and the researcher was directed towards the partner with responsibility for sales rather than operations, demonstrating, perhaps, the altered perspective within the company of environmental matters. It took repeated calls to reach this person and the receptionist did not offer any help in establishing contact. This could be taken to indicate a diminution in the priority accorded to environmental concerns, or simply an unhelpful receptionist.

There was no evidence of staff involvement in environmental improvement and the manager gave every indication of having a low opinion of the qualities of his staff. He described the local housing estate as 'Little Bosnia' and recounted stories of extreme violence among the workers. The early months in the new facility at

Uddingston showed a high staff turnover rate, but this stabilised as troublesome workers were replaced with more reliable ones. During the tour of the facility, the workers ignored the partner and researcher and there appeared to be little social interaction among the workforce.

The only training provided by the company was for fork-lift operators and was required to satisfy health and safety regulations. In interview, the partner was clearly puzzled by the question of training and repeated his stories of the barbarity of the local populace. In recounting the recycling experience he stressed his low expectations of worker co-operation and used the failure to demonstrate their ineptitude. It was abundantly clear that workers' experience would not be a significant consideration in the developing knowledge base of the company.

### 8.1.6 Grid of Specification

On the first visit, the internal information systems of the company had been recently upgraded to include packaging information for larger clients. This was the result of the packaging waste regulations. The partner claimed that the company was not itself obligated under these regulations, but had to provide packaging information to customers who were. This was apparently the only environmental information specifically available from the company's information systems.

The company also produced a brief environmental policy, including a commitment to 'set and monitor environmental objectives'. In spite of the aim to minimise waste and water use and make efficient use of energy, no records were maintained of any of these resources. Both the environmental policy and the packaging information were documented for the benefit of customers, rather than for informing internal decisions. The absence of basic waste information highlights the lack of internal concern for environmental performance.

### 8.1.7 Authority of limitation

Plywood was an owner managed company, reliant on four partners for all key

decisions. The owners were closely involved in the day-do-day management of the business . These individuals had developed a strong bond and shared values over a lifetime's work experience. They had invested personal and financial resources to continue working together in the business where they had developed expertise. During the first interview this common bond was mentioned as an important founding basis for the company. It follows that they place a high value on each other's opinions and evaluate any new ideas by reference to their common goals.

The strategy of the business had shifted over the years, as the company diversified into softwoods and the manufacture of fire doors, suggesting that they were responsive to new opportunities. They also continued to develop their website as a new way of reaching customers worldwide. The adoption in 1995 of the quality management standard ISO9002 also indicates a degree of responsiveness to market concerns, and a willingness to test out new ideas. The partners were not reluctant to innovate, but they were sceptical of innovations relating to environmental performance. The use that was made of advice from consultants, customers and trade organisations was highly selective and was evaluated only on the basis of clear and rapid contribution to profits. Although they considered the development of an EMS, the partners did not anticipate much benefit from it and as the time cost became apparent they abandoned the project.

The rules of formation allowed a degree of discourse of some environmental concerns, but the owners effectively contained that within the context of sourcing policies. By making available FSC sourced products, they believed that they had done all that was necessary to satisfy the environmental interests of customers. Their underlying antipathy to environmentalism was unaffected.

### 8.1.8 Conclusion

The study of Plywood demonstrates clearly the importance of internal epistemology in the moderation of social influences for sustainability. The company values and experience are not favourable towards environmental concerns and customers' environmental expectations are not sufficiently strong to overcome this antipathy.

Thus, the existing knowledge base, the concerns of customers and suppliers all worked against the development of a sustainable business epistemology. The internal rules of formation discourage the development of a sustainable knowledge base, by undervaluing the knowledge of staff and by failing to engage them in the process of performance improvement. In spite of support from consultants and a few customers, the company made very little progress towards a sustainable knowledge base. The company had not undergone any form of epistemological break, and did not appear likely to do so. Their business practices and their business strategy were based on a trade that is inimical to sustainability.

## 8.2 Components

The small electronic component manufacturer was not a great environmental performer, but they had made a large number of small improvements to daily practice. The knowledge base of the manufacturing unit included some elements of good practice in waste minimisation and recycling, based on personal experience and qualities of the informal organisation. In spite of the disinterest of owners and a lack of management support, sustainable thinking influenced practical behaviour. In terms of the theoretical structure of this work, the only elements which had a positive effect on the business epistemology were customer expectations and suppliers. The grid of specification and the authority of limitation effectively undermined sustainable knowledge development by placing no value on such knowledge. All other influences were neutral, allowing the enthusiastic individual to make small changes favouring sustainability. Like Plywood, this company had clearly not undergone an epistemological break in favour of sustainable business knowledge.

### 8.2.1 Existing Knowledge

The foundation of the company in 1976 was based on the experience of an American engineer who saw the potential of flexible manufacturing techniques for rapid supply to the global electronics industry. Although the values of engineering efficiency formed the basis of the parent business, it would be fair to say that those values had been somewhat lost in the practice of the Scottish operation. The small manufacturing site was set up to serve the European market and gain the advantages of being classed as a European manufacturer. The success of the unit was measured in terms of sales and speed of delivery, with no information being available on the material efficiency of the operation. From the perspective of corporate identity, there was nothing in this business that would make it a good environmental performer.

The work force varied in size from a core team of about 15 people to about twice that number at busy periods, with the difference made up of temporary unskilled workers. The core team included a skeleton assembly and packing crew, office staff and two

business development managers who carried responsibility for European sales. A critical team member, at least for the purposes of the case study, was Peter , an experienced, conscientious worker who, in his own words, 'just looks after things'.

Peter was a common-sense champion who had made substantial savings for the firm from the practice of looking around him. He trained as a toolmaker and worked in a number of different places in Scotland and overseas, but now prefers to stay at home, enjoy the hills and work with people he likes. In other jobs he has undergone training in Control of Substances Hazardous to Health (COSHH) and he is a Red Cross member. He was aware of the need to comply with regulations on waste handling and routinely conformed with regulatory requirements. The word 'unassuming' fails to give full credit to his modesty. He appeared utterly baffled that anyone should take interest in what he has done. Peter believed that all he ever did was use straightforward common sense to save a few pounds here and there. He firmly believed that he had done nothing out of the ordinary. He had never used the support services, such as the energy efficiency office or Envirowise, and professed himself to be not one for reading stuff - ' I just get on with things'.

### 8.2.2 Customer Expectations

The company supplied a very large number of companies in the electronics and electrical goods sectors. Some of these firms are household names, and it might be expected that they would require information regarding their suppliers' environmental practices. However, the components offered by this Scottish company were a very insignificant part of the final products. Given that these large companies have a vast number of suppliers, they did not generally take much interest in the practices of the smaller ones, beyond conformance with widely accepted standards, such as ISO9001. The products were a commodity item and their main sales advantage was in the speed of delivery and flexibility of specification. As a rule, customers had little interest in the environmental performance of the company.

However, there was one example of a specific customer request which changed

working practices in relation to packaging materials. Some German customers alerted the sales managers to a problem with their existing packaging, since German companies were heavily penalised for disposing of expanded polystyrene. In effect, it was German regulatory control that affected the practice at the Scottish site. For the sales managers the problem was to identify an alternative means of packaging the products that would not use the polystyrene pellets and would therefore satisfy their customers. Responsibility for the solution was passed to the foreman, who used trade journals to identify alternatives. The problem, as specified by the managers, was not to find the most environmentally friendly alternative to the pellets, but to find an acceptable alternative. Nonetheless, the personal interests of the foreman ensured that he requested environmental information from potential suppliers. The specification of the problem changed from the customers requirements, the sales manager's understanding to the personal interests of the foreman. It is clear that the absence of management control of the manufacturing unit allowed the foreman some freedom to redefine the problem in environmental terms. The demands of the German customers for better packaging prompted Components to identify alternatives to expanded polystyrene. In practice this generated cost savings and a significant space saving in the factory. In this example the customer interest concerned a specific aspect of the operation which imposed costs on the customer. The appropriate solution was dependent on the company, but the customer had set in train the learning process.

Customer concern had not been a strong driver for improving environmental performance, but it made a slightly positive contribution. Although most customers were not interested in this aspect of the business, those concerns that arose were taken up with enthusiasm and used to improve performance overall.

### 8.2.3 Other Knowledge Sources

The most senior staff at the Cumbernauld site were sales managers, whose primary interest was in extending the customer base. Their main concerns for the manufacturing unit were for the speed and reliability of production, with no real consideration of costs. These managers took little interest in the manufacturing side

of the business and trusted Peter to make any changes that were necessary.

Peter's external contacts were limited. He used existing suppliers and trade journal advertisements for new ideas, as well as watching out for good practice he encountered. He had not heard of the LEBC or the SEEO and he could not recall management consultants providing any support. Nonetheless, he was a relatively sociable character and the can recycling initiative grew from his voluntary contacts with the special needs school. In this example it is clear that the informal social network has had a far greater influence on behaviour than formal or government supported networks. Peter's awareness of water pollution issues derived from his interest in fishing and his concern to minimise landfill waste came from his love of the countryside. The cost saving elements of waste minimisation served to justify his values to managers with a different motivation.

It is clear from this example that support networks have done little to encourage the development of a green knowledge base in this company. The dominant driver has been the personal values of one individual working with the co-operation of the whole staff. He achieved some good results, but suffered from management disinterest and lack of external support. There was no-one with whom he could share his ideas and experience and develop new solutions.

### 8.2.4 Rules of formation

Within Components there was a clear boundary around the discussion of environmental impacts, marked by the position of Peter, the foreman. He could discuss matters of environmental performance in relation to customer satisfaction, as in the case of the packaging materials, or in relation to costs. The sales managers had no further interest in these matters and delegated all responsibility to the foreman. The senior sales director personally recruited Peter back into the firm to take on this role, because he was confident of his ability and reliability. Peter, in his turn, enjoyed the lack of management interference and developed good practice in his own way. There was a clear understanding between these two men that Peter was free to improve working practices as long as it did not impinge on the directors main interest

of output.

In contrast, the comments of the line workers indicated that Peter regularly spoke to them about improving environmental performance. During the visit there was a lot of good-natured banter about his obsession with waste segregation. Staff had been involved with the can recycling initiative and helped with experiments in reuse of plastic tubes. The contribution of this informal network is discussed in more detail below.

### 8.2.5 Organisation

The Cumbernauld operation had a friendly, egalitarian feel. Peter clearly had a friendly relationship with the managers, office staff and production workers. During the visit many of the staff smiled, said 'hello' or joked with Peter. When the European Sales Director stopped, screwdriver in hand, to ask for cleaning fluid, he showed respect to Peter and apologised for interrupting our discussion. Peter later explained that he had enjoyed helping John to learn about the technical aspects of the product many years ago and took some pleasure in John's subsequent elevation within the company. However, it is clear that Peter worked fairly independently in search of savings. The managers were happy to comply with his suggestions as long as they saved money, but they had little contribution to make. Line workers kept the place tidy and segregated waste, but didn't come up with suggestions.

The open working atmosphere allowed good standards of performance to be supported by informal reinforcement. Anyone mixing metals in with plastic waste could expect to be teased and badgered until their habits improved.

The weakness of the informal structure was that Peter was relatively unsupported when it came to identifying new saving opportunities. He was not confident in approaching external organisations and relied on trade advertisements to identify new suppliers. Neither the sales managers in Cumbernauld nor the manufacturing managers in the US provided any support or interest in his achievements. The information systems did not record data on recycling rates or materials savings. Peter

had some idea of his success based on the reduction in waste collections, but the organisation had no means of recognising what he had done and provided no practical encouragement to identify further measures.

### 8.2.6 Grid of Specification

Components invested in a quality management system approved to ISO9001, which they believe to be a necessary standard for their industry. During the first interview, the foreman indicated that he thought it likely that the company would develop an ISO14001 approved EMS in response to industry demand. He was aware of some preliminary discussions with the parent company about it, but had not seriously begun the implementation process. Although this was implemented for the American manufacturing business, this happened after the closure of the Scottish unit. If the Scottish operation had been maintained it is likely that the formal EMS would have identified further opportunities for improvement, but that had not been the driver for the achievements recorded in the first visit.

In the factory there was a highly visible whiteboard which showed the numbers of orders outstanding and a running average of the elapsed time from order placement to delivery. These figures were amended daily, providing the workforce with a regular update of key performance indicators. The other measures on display were European sales figures, which were the responsibility of the sales team in the office. It was very clear that the key objectives for the business concerned sales volume and speed of delivery. Wider considerations such as waste and material use were not recorded or reported within the formal management information systems. This case differs from the others in the sample as being the only subsidiary of a larger organisation and it is possible that this feature may account for the narrow focus of the information systems.

### 8.2.7 Authority of limitation

Components was unique among the case studies in being a subsidiary of a larger organisation. The parent company in the US did not view the Scottish operation as a significant manufacturing unit. The emphasis was on European sales and packaging to customer specification. All of the main manufacturing decisions were taken in the US, with no reference to Scottish staff. This directly affected the business epistemology by constraining the scope for discretion in the UK. If decisions affecting environmental performance were mainly taken in the US there would be little incentive for UK staff to develop knowledge of their environmental effects. Within a limited domain, the foreman was free to develop his own knowledge, but received no encouragement to do so.

### 8.2.8 Conclusion

The epistemology of Components did not favour the development of an environmental knowledge base. The formal organisation, the ownership structure and the management information systems did not place any value on knowledge of environmental effects. The individual with responsibility for the manufacturing operation was isolated from external influences, such as support services or customer interest and relied on a few suppliers to build up his personal knowledge. There were no mechanisms for sharing this knowledge and developing it within the organisation. There was no evidence of an epistemological break in this case, and few indicators that such a break was likely within the existing management structure. Nonetheless, environmental performance had improved as a result of personal drive and enthusiasm and sheer force of character.

## 8.3 Bread Bags

Bread Bags ranked as a low middling performer, in spite of significant investment in end-of-pipe pollution abatement technology. Their environmental performance had been heavily influenced by regulatory pressures in terms of air pollution controls and packaging waste regulations. The most interesting feature of this case is that the company invested in environmental knowledge – using consultants and installing equipment, but it had not developed an internal knowledge base. In analysing the business epistemology, one is struck by the isolation of environmental knowledge from the internal knowledge base of the company. In the sour-dough metaphor, this company has made two separate cakes – one of environmental knowledge developed by the consultants and another of internal knowledge that excluded environmental considerations.

The elements of this case which favoured a sustainable business epistemology were the influences of regulators, business networks and advisers. However, these were countered by undermining influences low levels of existing knowledge, negligible customer interest in sustainability, a lack of engagement from the authority of limitation and poor organisation for learning or innovation.

### 8.3.1 Existing Knowledge

The owner of Bread Bags had extensive experience in the marketing of packaging materials, but little experience of the production process. This responsibility was delegated to the production manager, an engineer enticed from a much larger packaging organisation in which he had served for 20 years. By his own account, he was the only person in the company with any interest in environmental performance, and he also made clear that this was a professional and not a personal interest. He had no previous experience of environmental management, although he had implemented quality management systems elsewhere. This experience had proved valuable in the development of an ISO9001 approved quality management system for Bread Bags. The production manager, Tony, commented in the interview that he had been

surprised by the amount of time he had to devote to the management of environmental impacts. It was clear that the existing knowledge base of the two senior managers of the business did not include environmental considerations prior to their engagement in the Bread Bags enterprise.

### 8.3.2 Customer Expectations

The company supplied wrappings to a large number of smaller local bakeries across the UK and they operated in a highly price competitive market. Bread Bags competed against a very large international corporation, and they perceived their market advantage to be in the personalised service they could provide in terms of design, delivery times and smaller order sizes. The business was founded on the basis that the bread market, which included many relatively small local producers, was not appropriately supported by the packaging giants. Key concerns for clients surrounded the strength and reliability of the products and their visual appeal. Since most bread is sold in supermarkets offering a bewildering array of options, the visual attractiveness of the product was seen as critical.

Public concern over the food industry tended to focus on issues of food safety. Environmental concern centred around the use of GM crops, standards of food hygiene and perhaps the pollution implications of bulk food transport. Bread Bags customers sought assurances of the purity of the materials used in the product and of the cleanliness of the production process. In the opinion of the production manager, those bakeries which wished to capture the 'green consumer' tended to provide unwrapped bread. As a result, the bakeries which provided wrapped, sliced bread were not overly concerned to ensure that the wrappers were 'environmentally friendly'. As an external observer, it would seem likely that the supermarkets, which are increasingly keen to market their green credentials, would be interested in more recyclable packaging products, but this was not the perception of the production manager at the time of the interview.

It is helpful to analyse the properties of customer expectations that influence the

company's environmental stance. Two features might suggest a positive influence on environmental performance. Firstly, the company supplied an industry close to retail consumers, which might lead to an expectation of environmental concern. However, packaging materials and their production standards did not seem to figure largely in the buying decisions of consumers of sliced bread. The owner of the company was a marketing specialist and was convinced, based on her reading of published research, that visual factors were very much more important than any environmental considerations. Secondly, the company sought to develop a close working relationship with customers to ensure that the product met their specific requirements. In the case of Pulp, this relationship had encouraged the development of good environmental practice. However, in the case of Bread Bags, the nature of customer concern was not environmentally focussed. The qualities of print design and durability were far more significant than environmental qualities.

It is worth repeating here that each of the influences on business epistemology cannot be analysed in isolation. It is quite possible that a business with a similar customer base, but different experience and values may identify different concerns of customers. The rules of formation serve to identify commonalities of interest between internal and external knowledge sources. Where the existing knowledge base does not include environmental considerations, the rules of formation are unlikely to select those concerns among customers. The epistemology of the business can be described in terms of the interactions among each of the categories of influence described here.

The overall effect of customer interest did not encourage the development of environmental knowledge within the company, perhaps in part due to the existing perceptions of the management.

### 8.3.3 Other Knowledge Sources

Neither the existing knowledge base, management systems nor customer expectations offered any support to the development of an environmentally oriented knowledge base within the company. However, there were two external influences that had a

significant effect on environmental performance – regulatory interest and business advisers. In this case there was also a degree of mutual support between these parties which reinforced their effectiveness.

Regulation was an important influence on the environmental knowledge base of Bread Bags. Their initial interest in environmental matters came about when local residents complained to SEPA about the smell from emissions from the factory. This lead to the discovery that their process was regulated under Part B of IPC[1], the responsibility of SEPA. The staff of SEPA introduced the production manager to the Lanarkshire Environmental Business Club, of which Bread Bags soon became a member. This contact allowed the company to use the consultancy service available through the club to help them develop a solvent management system. Tony spoke highly of the quality of support offered by the consultants, acknowledging that he would have found it very hard to satisfy the regulators without their help. During the interview Tony was reluctant to go into any detail about either the operation of the technology or the process of implementation. He commented that most of the detail was handled by the consultants. It was clear that the knowledge base of the company had not extracted much of the knowledge developed during the process of addressing the solvent problem. The most significant point of this exercise for Tony was the realisation that they could not ignore environmental considerations in the business.

Bread Bags became a relatively active member of LEBC, with Tony attending most meetings in the first few years. Through this, he developed a close association with Bell College and offered work placements to students. The students carried out studies of solvent emissions within the factory and studied their options for waste minimisation. Tony also used the consultants at Bell to discuss particular problems as they arose. He regularly attended the LEBC meetings to keep abreast of legislation likely to affect his business.

The packaging waste regulations placed a significant burden on the business, both in terms of information processing and direct financial costs of membership in a

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1 Integrated Pollution Control enacted in Part I of Environmental Protection Act (1990)

compliance scheme[2]. LEBC membership allowed an opportunity to discuss the detail of the regulations and their impact on practice. Working with students from Bell College, the company investigated the potential for reducing the gauge of their plastic bags in order to minimise the compliance costs. However, the impact on product quality was viewed as unacceptable. The regulations alerted the company to the effect of packaging materials flows and they used the students to increase the rates of recycling and reuse of non-product packaging materials.

The company's supplier network was not uniformly supportive in the process of improving environmental performance. The instability in the recycling market referred to in other cases also affected Bread Bags. Tony voiced great frustration with unreliable recyclers and the high transportation costs they imposed on the business. From this he drew a cynical view of environmentalism in general. '*A lot of this green stuff is just a chance for the cowboys to clean up.*' He confirmed that his phrase 'clean up' was not intended to mean 'reduce waste', but rather ' to make excessive profits'.

Concerning the influence of competitors, Tony was quite clear. Bread Bags was a small company and could not afford to make any changes to product to distinguish them from the major suppliers. They would not investigate UV cured inks unless the big companies made that change. Any changes in technology would have to be tested out by the competition before Bread Bags would risk any investment. Tony claimed to keep a close watch on the competitors offerings to keep up to date with their practices.

It was clear from the interview that regulators and consultants had been the main influences on the development of environmental awareness in this company. Although the consultants offered support in reducing the costs of compliance, the abiding view remained that environmental good practice was a significant cost to the business.

### 8.3.4 Rules of formation

2 See appendices for fuller description of packaging waste regulations.

The point was made above that the rules of formation have a strong bearing on the influence of different knowledge sources. There was a clear view articulated at various stages of the interview that environmental good practice was a cost to the business levied by the government through regulators. Tony saw no value in it to customers and believed that suppliers were profiting unreasonably from regulation.

Nonetheless, Bread Bags had made a significant investment in complying with those regulations. They would not knowingly flout the law and had taken time to find out how new regulations would affect their business. The rules of formation reveal a respect for regulatory compliance, in spite of antipathy towards the wider purposes of the regulations. For example, when discussing the pollution abatement problem, Tony remarked that it had been a foolish planning decision to build houses so close to the factory. They clearly believed that environmental responsibility was an unfair burden imposed on the business.

An interesting feature of this case is the relationship that developed between Tony and the LEBC organiser. The general manager trusted the opinions of the consultant, who also had many years experience in manufacturing. A personal bond developed which allowed Tony to speak freely of his concerns and resentments about the effects of regulation. The consultant offered a range of support that addressed the company's practical problems without exposing the general manager's discomfort.

### 8.3.5 Organisation

The analysis of this organisation is limited, because the company would not allow a full site visit, which would have revealed important features of the informal organisation. Nonetheless, the following information was provided by the general manager.

Responsibility for environmental performance was held by the general manager and he did not have any other support for this task within the organisation. His

comments suggested a rather authoritarian approach to management. When asked about any difficulties in implementation of the pollution abatement technology, he simply commented that the staff had no option but to comply with what the regulator required. Although this would strictly be the case, it did suggest a reluctance to consider the experience and opinions of workers. Within the workplace, all training was carried out on the job, with no investment in external training. The workforce was relatively stable and people usually remained at one operation all the time, 'because of the specific skills needed for each job.' Features such as flexible communication, cross-functional working and shared environmental responsibility were not apparent in this case.

### 8.3.6 Grid of Specification

One of Tony's first tasks in the company had been to establish a quality management system. This was viewed as a necessary requirement to allow the company to win business from their large competitors. This was an area where Tony already had some experience and he was keen to explain how he had devised the system for simplicity and flexibility. The system was viewed as serving external interests and it was structured in such a way as to minimise disruption to existing working practices.

At the time of the interview the food industry was subject to intense public scrutiny following the emergence of BSE and a number of other food safety scares. The company believed that this was likely to result in increased customer concerns for assurances of the safety of packaging products, mainly from the view of hygiene standards in production. They were investigating the need for external accreditation of these production hygiene standards. In contrast, environmental management was seen as a much lower priority for the company. The management information systems recorded some environmentally related information concerning, for example, air emissions and volumes of packaging materials, but there were no plans to systematise the reporting of this information. The production manager clearly viewed such grids of specification only in terms of customer requirements. He did not believe that they could offer any improvement in the decision making of the

company.

### 8.3.7 Authority of limitation

The owner of Bread Bags came from a marketing background and developed the company on the basis of a perceived market niche. She had very little experience of or interest in the manufacturing operation and the general manager commented that manufacturing standards were poor when he first arrived. The owner had become aware of this from customer comments and this had inspired the appointment of the general manager with manufacturing experience. It was also clear that any decisions about production were tested with respect to their effect on customer perceptions. Possible changes to polythene gauge or print quality were rejected on the basis of customer acceptability. Tony indicated that environmental consideration held no interest for the owner in any way. It is hardly surprising, therefore, that the internal knowledge base of the company did not develop a rich culture of environmental consciousness.

### 8.3.8 Conclusion

The case of Bread Bags demonstrates the extent to which environmental business clubs could improve environmental performance, particularly when supported by regulatory pressures. It is inconceivable that this company would have reached a middling performance level without the support of LEBC and it is also clear that regulation was a major spur to their involvement. The company was unlikely to stand out as a leader in environmental performance, given their over-riding scepticism and reluctance, but they performed far better than they would without LEBC support. The knowledge base of the company included some awareness of the importance of environmental regulation and a reassurance that they can call on external expertise to help them to deal with new issues that develop. It seemed highly unlikely that Bread Bags was likely to have an epistemological break to favour sustainable knowledge development.By the time of the follow-up visits, this company had ceased trading and the researcher could not uncover any further information.

## 8.4 Pulp

At the time of the first visit, Pulp had made a number of improvements to their environmental performance, but still had a lot of scope for further changes. Environmental practices were driven by regulation, rather than any internal commitment to good practice, in spite of customer concern for high production standards. Pulp enjoyed a number of influences favouring sustainable knowledge development, including customer interest, supportive suppliers, good advisers, regulatory interest and environmentally favourable rules of formation. Nonetheless, these positive influences were constrained by the authority of limitation and organisational weaknesses.

### 8.4.1 Existing Knowledge

The owners found themselves in something of a predicament following the transformation of the business from a small scale supplier of healthcare products to customised designer and producer of environmentally friendly packaging. Although the business had benefited enormously from environmental awareness in customers, the owners were not ready to invest in building up a green business. The managing director clearly had no interest in the environmental performance of the company except where it was deemed critical by customers. These factors were a severe constraint on the manufacturing director's efforts to improve business practices.

The fact that any progress had been made at all was largely due to the work of Bill, the manufacturing director. He had spent much of his career working for Johnson and Johnson as a production engineer and then worked part-time as a consultant. He was first drafted into the company to resolve their problems of production volumes and quality, but he soon extended his remit to incorporate environmental aspects of production. It would be misleading to suggest that this man was a committed environmentalist, but his experience of modern manufacturing practice ensured that he was concerned to make the production environment clean and efficient. He was also aware that customers would expect higher environmental standards in

production because they perceived the product to be 'environmentally friendly'.

In Bill's opinion, most of the factory workers had no concern for the environment. Although the factory was in a rural location, it was one with a long industrial heritage, and generations of pollution. The local river was heavily stained with iron oxide from the nail factory upstream and fly tipping was very common in the area. Although it may be unfair to assume that the line workers did not care for the environment, it was clear that if they did, their concern was not expressed at their work.

A production team of three men had organised production prior to the appointment of the manufacturing director and they were important figures in the implementation of the quality management system. Most had worked at the factory for many years and were apparently well regarded by the line workers. Bill conceded that his appointment had resulted in some hostility in the early years, but it was clear from the observed discussions that a good relationship had developed. He recounted the difficulties of implementing the quality management system, particularly in overcoming entrenched habits and attitudes. It seemed as if the practices of the long established workforce were somewhat inflexible.

### 8.4.2 Customer Expectations

The customer base of this company had changed radically in the last decade. For many years it produced pulp paper products for the healthcare sector - bed-pans, 'hats', etc. However, the growing awareness of environmental costs of expanded polystyrene packaging, encouraged by German legislation, provided the company with a new opportunity. Pulp packaging had been used for many years for egg-boxes, but the company saw an opportunity to develop customised pulp packaging for a wide range of uses. An early product was protective corner pieces for washing machines and fridges and they also developed bottle protectors for use in transporting small volumes of chemicals. After investing in research to improve the design process, the company became a world leader in the design and production of

customised pulp packaging. Their customer base was highly diverse, including some household name brands, such as Black and Decker and Motorola. Many of their clients produced electrical equipment, such as mobile phones and household work-tools for world markets, and they were increasingly interested in the environmental credentials of their suppliers. Since pulp packaging was offered on the basis of providing an environmentally friendly option, it was assumed that the company would conform to ISO14001. The manufacturing director estimated that around 90% of customers expect to view the firm's environmental policy and at least six large customers include environmental aspects within their supplier audit visits. Since Pulp offers a highly specialised design service, many contracts would require a high level of customer interaction. As well as ensuring that designs met client requirements, this interaction could also provide the opportunity for clients to discuss a range of wider interests, including environmental performance.

Although the design service offered by Pulp was unique, they were a very small company operating in a highly competitive market. Pulp packaging was clearly not the only alternative to expanded polystyrene and there were many companies vying to offer 'green' packaging options. It was the view of the manufacturing director that environmental good practice would be necessary to remain competitive and ISO14001 would become a minimum requirement to tender for work with larger clients. Many managers at other companies also aired this view, in some cases with tones of resentment. For some it was simply another badge, another hoop that companies had to leap through to stay in business. Others viewed it more as an opportunity to bring performance standards up to their personal expectations of good practice. Bill clearly belonged to the latter camp, but the owner apparently fell into the former. The extent to which customers could influence environmental knowledge development was moderated by the perceptions and attitudes of the owner and his manufacturing director. Bill viewed supplier audits as an opportunity to pick up ideas from customers to identify good practice elsewhere, while the owner was anxious to appear professional and hide any deficiencies. These alternative views served to direct customer discussions toward different topics, in one case encouraging investigation of environmental practices and in the other preventing it. It was a clear demonstration of the unspoken rules of formation, where the social context could

constrain the subjects which were open for discussion.

### 8.4.3 Other Knowledge Sources

SEPA had been called to investigate a pollution incident and those discussions were recalled as being tense and confrontational. It was clear that Bill would not consider seeking any advice from that organisation to help improve the company's environmental performance. In contrast, the relations with the water company were highly fruitful and their suggestions of ways to reduce water pollution were followed up. Bill also made good use of those discussions to identify a source of used sand for the moulding process. It was clear that, where support was offered the company were competent to make use of it.

Pulp did not belong to an environmental business club or trade association. However, Bill had many years of consultancy experience in manufacturing businesses and drew on these contacts to identify sources of support in the process of improving the management structures of the company. The consultants who were used to support the implementation of the quality management system were also contacted to help in the development of the environmental management system. Other suppliers, such as the dye companies provided some information on developments in colour technology which would reduce pollution. Nonetheless, while the company was not isolated, it did not enjoy the benefits of a strong environmental support network.

### 8.4.4 Rules of formation

Prior to the appointment of the manufacturing director little consideration had been given to the environmental performance of the company. This is not to say that individuals in the company were necessarily unaware of the pollution they created, but no-one had the authority to suggest change to the owner. An interesting combination of events served to grant that authority to the manufacturing director. The strategic decision to develop pulp packaging as an environmentally friendly option necessarily forced greening up the management agenda. That decision grew

out of historical accident and changes in the wider business environment. The company had been a recycler of waste paper long before the term gained common currency. The growth of the packaging business and the need to develop alternatives to expanded polystyrene were driven by global factors. It was a set of circumstances that encouraged Pulp to develop its existing knowledge base to exploit these new opportunities. Global environmental awareness forced the company to see themselves as being environmentally friendly. However, those factors alone would not have made much impact on the environmental performance of the production side of the business without some other drivers. The owner was highly unlikely to have appointed an environmental manager , given his ambivalence to environmental performance. The issues that prompted the engagement of the manufacturing director concerned production quality and efficiency. The growth in market demand forced the company to adopt a more professional approach to production management and the manufacturing director was initially contracted on a consultancy basis. It was his concern with increasing output and quality that lead to some of the early changes. He established a recognition that ignoring health and safety requirements could cost production. Similarly, poor maintenance routines caused machine failures with direct costs in terms of lost production. For the manufacturing director the link between production efficiency and explicit, controlled management systems was clear. This knowledge had grown out of his professional experience and he could demonstrate it within the factory. By identifying a common interest in productivity with his concern for clear systematic management, he won the attention and support of the owner.

Once the environmental champion was in place, other external circumstances supported progress towards improved environmental performance. Although the company used its own fresh water, it did produce large volumes of waste-water for treatment. With a growth in local housebuilding and rising standards of water treatment, the water company were keen to engage with Pulp to improve the quality of their effluent. The screening equipment served to cut the company's water charges and allowed the filtered fibre to be fed back into the process. This learning experience developed the thinking of the production manager who began to take an interest in the chemical additives used. The discussions with the water company staff had opened his thinking to the possibilities of further improvements. However, at this

stage he came into conflict with the concerns of the owner. The screening facility made a clear and fairly immediate contribution to profits by reducing water charges, but further improvements with a longer pay-back period were rejected.

At the time of the first interview, the rules of formation of environmental discourse were restricted to those subjects which could realise rapid improvements in profitability. Regulators were respected only to the extent that they could affect production, potentially by closing the factory. The perceived scope for change was limited by the attitude of the owner, the authority of limitation.

### 8.4.5 Organisation

The formal organisational structure of Pulp was unusually hierarchical for the size of the company. The production staff were responsible to three production managers, who reported to the manufacturing director who was, in turn responsible to the owner and managing director. Bill, the manufacturing director, took responsibility for environmental performance, but received little support in this task from the production managers. Given, the owner's attitude to environmental matters, there was little co-operation or sharing of ideas between him and Bill. It was clear from the interview that Bill found far more support from external organisations than from within the company.

Bill's authority was limited by a number of factors. One of these was the nature of relations between him and the production managers. The fact of his appointment over them was, in itself a source of discord, reflecting the owner's dissatisfaction with their previous work. Although Bill had won some support and respect in the working environment, it was clear that they did not have an easy friendship, such as was evident in Components or Furniture. The comparison with Furniture is an interesting one, because in each case the environmental champion was brought in to resolve deep-seated problems in an existing manufacturing system. In the case of Furniture, however, the preceding managers had been removed from office, while Bill had to work with production managers who remained in post. One of the production

managers had formed a stronger relationship with Bill than the others and was open to training in new methods. However, he did not contribute greatly to the development of the environmental knowledge base.

The fact that Bill had been appointed above the production managers might imply that he would have the support of the owner for changes to the manufacturing processes. Although this was true for matters of quality management and production efficiency, it did not appear to be the case concerning environmental management. The owner did not share his concern for environmental performance and was reluctant to invest in it beyond the minimum necessary to maintain production.

The formal and informal organisation of Pulp did not support the development of an environmental knowledge base. The individual with primary environmental responsibility did not enjoy good working relations with the owner or his immediate reports. Lacking authority and support, his influence was severely constrained.

### 8.4.6 Grid of Specification

The specialist experience that Bill brought to the company was his knowledge of management systems in manufacturing. He was fully aware of the significance of internal information systems in guiding the agenda for management attention. He demonstrated this in the quality improvement process by conducting a survey of customers' quality perceptions. Producing monthly graphs of customer satisfaction ratings, he showed the workforce and the owner the effects of implementing the quality management practices. Similarly, he conducted annual training reviews for all staff to encourage staff development and to reveal to the owner the need for knowledge development in the company. At the time of the first visit he was working on developing an EMS,with the clear intention of impressing upon the owner the significance of the company's environmental performance.

The workforce had been reluctant to cooperate with the changes in working practices demanded by the quality management system. In particular, they were wary of the

level of personal responsibility demanded of them, fearing that they would be blamed for failings they believed to be beyond their control. Each worker was aware of the failings of the production system as a whole, which resulted in blockages at specific points. The management system was seen as an external imposition, providing no personal benefits and increased stress. However, as the system took effect and the production process began to work more smoothly, workers gained greater satisfaction. They were no longer held up by blockages elsewhere in the production system and they could fulfil their own quality objectives more easily. This altered the perception of the system from an external imposition to an internal support, which encouraged far greater cooperation from the workforce.

### 8.4.7 Authority of limitation

A dominant theme of this case study has been the effect of the authority of limitation in circumscribing the development of environmental knowledge within the company. At the time of the first visit the owner was in discussion with a number of companies who had shown some interest in buying over the company. The existing customer base and the design technology were seen as the most attractive features of the business, with the production facility and its history of contamination a potential drawback. In those circumstance it was clear that investment in the production process was out of the question, except where it prevented the fulfilment of existing orders. The managing director clearly had no interest in the environmental performance of the company except where it was deemed critical by customers. His prime concern was to maximise the return on his investment by attracting a suitably generous buyer. With this in mind, measures to improve environmental performance were irrelevant to his thinking. What is most interesting about this case is the transformation that occurred as a result of the change in ownership of the business. This provided the epistemological break that completely changed the knowledge base of the company.

### 8.4.8 Conclusion

The epistemology of this company highlighted some conflicting pressures. The experience of the manufacturing director and the concerns of customers and regulators were all supportive of the development of a sustainable knowledge base. However, the interests of the owner, the rules of formation and the organisation all undermined those influences. Although the business had made some improvements and Bill could identify many more, the pursuit of environmental good practice was not a priority for the owner and further progress was discouraged. The change that resulted from the change in ownership demonstrated the significance of the authority of limitation in defining the business epistemology. On the first visit this company had not experienced an epistemological break, but the follow up study, described in Chapter Nine, demonstrates the effect of such a break.

## 8.5 Compressors

This company demonstrated a relatively good standard of environmental performance, based on their investments in oil storage facilities, noise abatement and vehicle wash-down areas. At first sight, they seemed to be a company that was conscious of environmental responsibility and strove to provide a clean service. However, closer inspection revealed weaknesses within the organisation which might undermine the development of a sustainable knowledge base.

The existing knowledge base, customer expectations, rules of formation and a range of external knowledge sources were favourable to the development of sustainable business epistemology. However, weaknesses in the organisation and grid of specification prevented the business from fully developing the sustainable knowledge base.

### 8.5.1 Existing Knowledge

The founding knowledge of the company was based on engineering principles of resource efficiency and on developing practical, work-based learning. All of the directors received their professional education through work sponsored training schemes. The owner gained his engineering degree while working for British Coal and the sales director obtained his through British Steel, both men having joined those firms as unqualified manual labourers. Their progress was the result of natural enthusiasm and intelligence, identified through a systematic training programme. The value of that experience was reflected in Compressors investment in staff training which attracted the Investor in People certification. Practical business knowledge was highly valued and rewarded in the company and the development of the knowledge base was a strategic priority. All staff are regularly sent on training programmes offered by component suppliers. The directors believed that their company offered all staff the opportunity to develop their professional careers. Reflecting on the nature of the training, there was a clear preference for practical training which informed people of accepted standards.

The business was formed in 1990, principally as a sales unit, supplying a compressed air service to manufacturers. They viewed themselves as a 'fourth utility', providing a complete compressed air service including design and maintenance. Compressors' owner believed that they provide a high quality professional service and recognised good environmental practice as part of that. When they were setting up the business they used free consultancy advice to develop an efficient production system. During the interview the owner, Ian commented that when they had started out with three workers it had been easy to set high standards, and he believed that those values had been maintained with the growth of the business. Environmental good practice was not perceived as a goal in itself, but as a necessary component of good engineering practice. The founding knowledge base of the company was relatively favourable to the development of good environmental practice.

### 8.5.2 Customer Expectations

At the time of the first visit the customer base was predominantly Scottish, but the business was starting to expand into Ireland and the North of England. During that visit, price competition was often repeated as a constraint on the development of good environmental practice:

> *' It is all very well for a company to say it wants ISO9001, but if a cheaper offer comes along that is not from a registered company, they will go for the cheaper option every time. It is the same with environmental standards, unless the environmental authorities are policing pollution levels adequately people won't invest in cleaner technology. ISO 14001 will go the same way as ISO9001 - there may be big rush of enthusiasm at the start, but when it adds to costs they will lose interest'. - Allan, Sales Director*

The owner consciously picked up ideas and models of good practice from his customers. He claimed that the environmental policy of Scottish Power, a major

customer, was '*just what we do anyway*', although the company did not have a documented environmental policy of its own. It was through customer demands that Compressors became aware of the need for a waste carriers licence for the removal of waste oil. Most of Compressors work was conducted on client sites and Ian believed that his staff were alert to any good practice they might observe there. However, he could not provide any examples of improvements in practice arising from such staff observations and there was no systematic practice of drawing out such knowledge from the workforce. Although the owner may have used knowledge derived from his customer base, there was no evidence that this practice was common throughout the company.

Overall, customer interest had a positive influence on the environmental knowledge base of the company, mainly by raising the expectations of systematic environmental management. The owner remained of the opinion that his business could provide an environmentally responsible service, but conceded that they may need to take more measures to ensure that this continued.

### 8.5.3 Other Knowledge Sources

This company was young and entrepreneurial and claimed to make use of any connections possible to help the business to improve. The environmental knowledge base of the company had been influenced by regulatory requirements concerning the disposal of waste oil, the need to avoid pollution of surface drainage systems and the impact of noise pollution. In each of these examples, the company investigated their legal obligations and developed engineering based solutions to prevent environmental harm. In none of the cases were SEPA engaged in any discussions or potential solutions, but the information published by them was used to inform the practice within the business. The company clearly wanted to comply with all legal requirements concerning their environmental performance and demonstrated a relatively proactive stance to identifying those requirements. At the company's inception they used a consultant to '*give them the once over*', in Ian's words, to ensure that their practices were compliant with environmental requirements. This reassured them, but it also allowed a degree of complacency to develop. Since the company did

not have systematic means of keeping abreast of legislation, they overlooked the need for a waste carriers licence when they instigated the oil reclamation service. It was only when a customer requested sight of the licence that they were alerted to their inadvertent transgression. Although the company saw itself as fully compliant, they did not have a management system to ensure that this continued.

The influence of regulation was moderated by the perceived lack of policing of environmental regulation. The directors were clearly resentful of the inadequate policing of pollution controls which failed to punish those disposing of used oil to open drains. They claimed that this was common practice in industry and that their cleaner and legally compliant service was sometimes compared unfavourably with cheaper rival bids which were less environmentally responsible.

Government policy had also affected the developing knowledge base through the imposition of the climate change levy. This placed higher emphasis on energy efficiency and stimulated demand for Compressors services. The owner had little regard for government services to business, particularly relating to energy efficiency. He claimed that government sponsored websites were contradictory and confusing and that this allowed inefficient equipment to be mis-labelled as 'energy saving'.

Business consultants with a variety of specialisms had been used to augment the knowledge base of the company. They contacted Glasgow University to identify a consultant to help to implement the quality management system (QMS), although they also modified the documentation to fit more closely with their practices. In discussions about the QMS implementation it seemed that this was a company ready to use specialist knowledge in a proactive and engaged way. They believed that they had learned a lot about management systems from the experience of QMS implementation and expected to apply that to the EMS when they eventually got round to it. Their approach to consultancy was in stark contrast to that of Bread Bags, who used the consultants to subcontract their environmental responsibilities. It was clear that Compressors saw external consultants as sources of knowledge who could be used to enhance the existing knowledge base of the company through active learning and working together.

The owner was keen to seek out ideas from a number of sources, but he was missing out on some obvious opportunities. Suppliers were not required to provide information on the environmental performance of their products or services and the company had no connections with LEBC or any other environmental business organisations.

### 8.5.4 Rules of formation

This company was enthusiastic to make use of external support services for many different purposes and in some cases these could also provide information relating to environmental performance. However, the company did not seem to seek out environmental information specifically and any environmentally related support they received had come to them almost by accident. Although they were proactive in their use of the QMS consultant, they had been less proactive in the search for information to improve their environmental performance.

The testing of environmental claims provides an interesting contrast. During the interviews, discussion turned to the perceived prevalence of unfounded claims to environmental good practice. Compressors believed that the service they offered was significantly superior to the competition in environmental terms, but were unable to contradict competitors claims without taking costly legal action. This was clearly an issue of some concern and resentment among the directors. In contrast, they did not consider the environmental performance of their own suppliers to be particularly important. They could provide no examples of suppliers offering environmental advantages and consequently had made no efforts to verify suppliers claims. This suggests, at least, an inconsistent approach to environmental information.

The company demonstrated an openness to new ideas, particularly in terms of market development and they were somewhat open to environmental concerns. However, their interest in claims to environmental good practice was contradictory – although they are keen to validate their own claims they show no interest in any claims of their suppliers.

### 8.5.5 Organisation

This case demonstrates how organisation, even in a small company, can affect the development of an environmental knowledge base. One quality identified from all of the case studies was the authority of the environmental champion. In Compressors the 'champion' was the owner and technical director of the company, who had ultimate responsibility for the whole company. He was conscious that he could not ensure good environmental performance without other support and looked to the financial director to implement an EMS. However, it was also clear that the financial director had less interest in this than in other improvements, such as investing in new information technology. This highlights the significance of sharing of environmental responsibility, because it was this failure which undermined environmental progress in the company. The conflict of personal interests between these two directors inhibited the development of the EMS. In those areas of the business where the owner had more direct control, such as the production facilities, environmental practice was relatively good, but the information systems, which were controlled by the financial director, did not support further improvement.

Another feature of the organisation which is impossible to ignore is the importance of football as the binding force within the company. The company supports a local youth football team and clearly spends a lot of time entertaining clients and staff at football events. The receptionist commented on the importance of the sport for all of the staff and this was illustrated by the photographs displayed in the reception area. One of the research interviews was delayed while the owner went to watch Celtic play in Seville. What possible significance could this have for environmental performance? It was clear in the first interviews that the directors see themselves as a team with strong bonds of loyalty and friendship. They were comfortable working together as friends and would not allow different points of view to disrupt the harmony of the workplace. While they were happy to voice their disagreements over environmental policy, they were not going to get too worked up about it. It is easy to imagine that this forgiving atmosphere would allow deep-seated disagreements to continue unresolved for a long time. Although the owner may have been frustrated by the lack of progress on the EMS, he was not about to sack his finance director over

the matter.

The engineering workers were mainly based at client sites, where they designed, installed and maintained the customised compressed air systems. The investment in information technology was needed to improve co-ordination among this dispersed workforce. The workers did not normally work together on a daily basis and communication among them took place mainly at training events or social events, such as football matches. Discussions of working practices might arise in training, but that was not the intended purpose, since the training was provided by component suppliers to promote their products. Given that the workers did not have a shared work environment, a systematic approach was needed to maintain common working standards, and the quality management system served that purpose. The owner acknowledged that the growth in the company had made it more difficult to ensure common standards in environmental performance, but he was confident that his workers shared his concern for good practice.

Although the research interview inspired some discussion of environmental management, it was also apparent that it did not commonly form the topic of conversation. The owner stated the importance of environmental practice for customers, but he was more likely to discuss clients' football allegiances than their environmental priorities.

### 8.5.6 Grid of Specification

The financial director was enthusiastic to develop efficient information systems to enable good management of the business. They had established a quality management system which was approved to ISO 9001 and their staff training programme had been certified to the standards of Investors in People. However, the development of an EMS was the subject of some debate among the directors.

During the first visit, the main interviewee was the financial director, but he was joined for a brief time by the marketing director and the technical director. From this

it became clear that each held quite different views on the desirability of ISO14001 registration. The technical director saw it as a priority, both in terms of identifying means of improving performance and in gaining recognition for their existing high standards. The marketing director, Allan was less enthusiastic, fearing that the cost of implementation would exceed any sales advantage that might be gained. The financial director was principally concerned over the cost and time involved in implementation and doubted whether significant financial advantage could be gained from the exercise. The discussion turned to experience of implementing the quality standard and the perception that ISO registration was a necessary club membership to gain access to certain markets. They voiced dissatisfaction over the ISO 9001 experience, and feared that the time costs were not adequately rewarded in marketing advantages.

The directors each took a different view of the potential benefits of an EMS. The financial director recognised the possible benefits that an EMS could bring in ensuring compliance with environmental regulations, while the sales director viewed it in relation to attracting customers. The technical director and owner was interested in the information they could draw from the system to improve their management of environmental impacts. The purpose of the system was clearly not the same for each manager and their use of it would be influenced by these different perceptions.

Internal information systems were primarily developed to ensure that customer requirements were met as efficiently as possible. The financial director was enthusiastic in his use of information technology to keep tight control of the operation. He was involved in the development of the quality management system and would be expected to take charge of the EMS programme. The majority of the interview time on the first visit was spent with this director, during which he explained meticulously the difficulties of designing a management system to be sufficiently flexible for a growing business as well as rigorous enough to satisfy assessors. He gave the strong impression that his personal preference was for rigorous detail. He clearly had some reservations about the benefits that an EMS might bring to the company, believing that their current practices were environmentally sound.

### 8.5.7 Authority of limitation

One of the most intriguing features of this case is the limited control exercised by the owner with respect to environmental performance. It is, of course, possible that the owner spoke more enthusiastically about this to the researcher, given the stated objective of the interview. However, the evidence that was presented of investment, in noise abatement and pollution prevention, suggested that his enthusiasm was more than simply verbal. He seemed to have a genuine concern that his company should operate to the highest environmental standards in the industry. However, this was not his over-riding priority. The growth of the business and the maintenance of good engineering standards were more critical to him than environmental standards, although he did see a connection among these objectives. His difficulty in implementing further improvement was based on the lack of internal or external support, combined with a belief that they were already performing well.

### 8.5.8 Conclusion

Compressors had established a knowledge base that was favourable to good environmental performance, recognising that this was important in satisfying customer expectations. However, there were features of the organisation and grid of specification which prevented the continued enrichment of that knowledge base. Some environmental knowledge was drawn from regulators or business advisers.

The founding knowledge base of the company was based on engineering principles, which valued material and energy efficiency. The personal values of the owner also favoured the development of good environmental practices. The company was open to innovation and used information from regulators, a trade association and consultants to build up the knowledge base of good practice in the early stages of the business. The company had a well developed internal information system, providing data on a wide range of operational matters, but they had not yet implemented an EMS, in spite of declared intentions to do so. Although the environmental champion was the owner of the company, he could not readily share that responsibility, with the result that his influence was diluted.

## 8.6 Furniture

Furniture was a re-upholstery company which had done a lot to improve worker safety and environmental performance prior to the first visit. Their primary concern was for the well-being of staff, which led to a number of changes to improve the working environment. Wider sustainability was not a high priority, although they were keen to take up any opportunities for improvement that arose. The relatively good performance of the firm was mainly attributable to the importance of welfare and not to wider sustainability concerns. Nonetheless, the knowledge base had taken greater account of environmental performance in recent years. Many features of the business epistemology were favourable to the development of a sustainable knowledge base, but they were constrained by the grid of specification, which did not extract information of environmental effects. It is debatable whether one could argue that this company had an epistemological break. The arguments in favour include the initial basis of the company purpose and the efficiency revolution brought about by the appointment of new managers. However, the strength of environmental concern was limited and it does not seem that this company has fully adopted a sustainable business epistemology.

### 8.6.1 Existing Knowledge

Furniture was purposefully involved in tackling social disadvantage, by employing people who would be very difficult to employ in unsupported working environments. Their primary function, therefore, was to provide a social service to its workforce and neighbourhood, and this service was paid for by their business activity along with some state support. The business activity of the firm was in furniture renovation and upholstery, taking worn and damaged seating from hospitals and care homes for refurbishment and resale. Again, this can be seen as a business that was intrinsically contributing to sustainability through the high grade reuse and recycling of materials and consequent reduction of wastes. By working to reduce social exclusion and to make more efficient use of material resources, the company was making a contribution to sustainability in two important areas. The core values of the business

were already attuned to the wider challenges of sustainability. The staff at Furniture included two managers, two supervisors, around 20 production workers and two secretaries. Each of these groups made a clear contribution to the culture of the organisation and influenced the development of the knowledge base.

The managers both had many years of manufacturing experience and the senior manager, George had also worked as a management consultant in the public sector. His first contact with the company had been as a consultant, but when the opportunity arose to make a more personal commitment to the firm, he accepted it with some enthusiasm. He was conscientious with respect to the environment and would not allow practices that were known to be harmful or wasteful. However, he had little experience of environmental management and relied on efficiency measures to improve performance. He was keen to experiment with new ideas and used an extensive network of personal contacts to gain support for the business.

The two supervisors had worked for many years with people facing learning challenges and it was clear from observation that the role they play in the organisation was at least as much a caring one as a supervisory one. While dealing with production problems, they also shared much of the burden of social problems that the workforce brought. It was clearly recognised that they played a critical role in helping to integrate the firms business needs with the social needs of the workforce. This was particularly notable during the introduction of water based adhesives, which many workers found difficult to cope with. Their support for these changes was a vital part of the success of the change. Although they were not ones to initiate change, they worked in collaboration with the managers when any changes were planned and their suggestions clearly had a significant influence within the decision process.

In many ways Furniture benefited from the services of a workforce that would be the envy of many small manufacturing firms. Staff turnover was negligible and work was the main focus of life for most of the workforce. Many turned up hours early for work and avoided taking holidays. On the other hand, they faced different problems from most firms. The staff were there because of personal difficulties that could

sometimes create major distractions and many staff were highly suspicious of any changes to their routines. Some exhibited challenging behaviour which demanded a substantial investment of management and supervisory resources to moderate. Their working experience was predominantly formed within the company and few had brought with them transferable skills or knowledge of good practice elsewhere. Nonetheless, many workers had built up a lifetime of expertise in re-manufacture and took great personal satisfaction from working well.

Secretarial staff are commonly overlooked in any evaluation of an organisation, but they too have contributed to the special qualities of Furniture. One's first impression of the people at Furniture was of a remarkable friendliness among secretaries, managers, supervisors and production staff. Amongst all of the case studies these secretaries were by far the most helpful in providing travel directions and arranging interviews. The social commitment of the organisation was clear from first contact. The front office area was clearly designed as a showcase of the company's achievements, both in terms of product ranges and personal development. There were displays in the reception area and around the factory showing the development of the company, recognising training achievements, commemorating important events and illustrating the quality of the work done. The office staff were obviously aware of their responsibility to project a caring, professional introduction to the firm.

### 8.6.2 Customer Expectations

Furniture's traditional customer base was dominated by healthcare and social service providers, who sent worn chairs to the company for refurbishment. However more recently the company had attracted customers from the leisure industry and public transport providers. In addition to the refurbishment of seating, the company had also developed a sewing service, and an innovative development was the construction of flotation casings for nautical ropes. The move into new markets proved to be highly profitable and was a significant factor in the businesses survival.

Among this diverse customer base, there appeared to be few who took any interest in the company's environmental performance. At the time of the first visit the local

authorities did not expect their suppliers to have accredited EMS in place and it was clear that the business benefited from a favoured supplier status within the authority. Although the senior manager would not be averse to implementing an EMS, he believed that it would not make any difference to his customers and would not be worth the investment of his time. The private sector clients made no environmental demands of the firm either.

It has already been noted that the perception of customer environmental interest could be a subjective one, potentially influenced by the interests of business managers. In this case, the manager had made some improvements to environmental performance that he was keen to demonstrate. It was clear from the interview that he was proud of what the company had achieved and welcomed the opportunity to talk about it. However, he was disappointed to note that his customers appeared quite disinterested in their success.

Customer expectations could not be said to have had either a positive or a negative influence on the development of the environmental knowledge base of this company.

### 8.6.3 Other Knowledge Sources

Regulation could be viewed as a contributor to the company's improved environmental performance, since the emissions from the solvent-based glues were unacceptable by modern standards. When the new management team took over, the air quality issue was their first concern, both for the safety of the workforce and to ensure regulatory compliance. They had not been reported to SEPA and the agency apparently took no interest in the operation but the managers sought to clean up the process, mainly for the improvement of working conditions within the factory. Health and safety standards were more critical than external air quality standards in the view of the managers. The solution adopted – to switch to water-based glues, did not require any involvement from the regulatory authorities.

The company made use of an extensive business network, including a number of other 'sheltered' employers. For example, they were developing a range of office

furniture in collaboration with the war veterans hospital at Erskine, and were investigating another collaborative venture with Blindcraft. It was clear that the business gained a significant amount of sympathetic support from many organisations in the area, including the local college. Staff at South Lanarkshire College provide training support for the workforce, which is discussed in more detail in the later section on Organisation. They also provided advice on many issues of health and safety and workplace improvements.

When the big efficiency drive began, with the appointment of the new directors, the company started to gather information from their suppliers to make better use of their resources. It was noted above that the textile company which secured the majority of the company's business had developed a return and recycle service. This company, Interface, is one that is commonly quoted as a demonstration of sustainable thinking in business,(see Elkington 1997) and it was their support which improved Furniture's production efficiency. A supplier of chair frames claims to provide sustainable products by planting more trees than they use in production. These suppliers have given the managers more information about how their products benefit the environment and made some contribution to the environmental knowledge base of the company. However, in neither case was the selection of the supplier based on their environmental advantages. The green suppliers were also the cheapest ones for the quality standards required.

Furniture had no contact with LEBC, which seemed rather surprising, given the level of local authority support for the club. The other explicitly environmental support services had also gone unnoticed by the managers. It is curious that a company which made use of many other supportive organisations should have gathered no benefit from these environmental services. However it is quite possible that the chance connections that have helped the business, have simply not happened for environmental support.

The knowledge base of Furniture had undoubtedly benefited from the contributions of many external influences. Having questioned suppliers about the material or energy efficiency of their products, Furniture's managers learned of good practice in

many areas, such as cutting technology, sustainable forestry and energy efficiency. They also formed collaborative ventures with similar organisations which, in a more profit-focussed company, might be viewed as competitors. Although regulatory agencies did not provide specific advice, their published standards alerted the mangers to areas in need of modernisation. These managers have shown themselves to be open to new ideas from a variety of sources and used new information to their advantage.

### 8.6.4 Rules of formation

Although the company was open to new ideas, their particular concerns were dominated by the safety and well-being of the workforce. Profitability was important within the context of securing the future employment of the workers. In analysing the rules of formation, it is useful to consider what innovations the company rejected and the reasons for those decisions.

Given the growth in demand for the company's services, the managers considered extending the premises to incorporate drive-in facilities for coach refurbishment. This would have provided another profitable market and built on the existing skills in the work-force. However, this venture was rejected because the local authority was unwilling to make such a substantial investment, given the insecurity of the sheltered employment scheme. They were willing to invest in more modern equipment within the factory, but would not risk a significant expansion of the facility. The managers effectively identified the boundaries of their scope for change – they had some freedom to innovate within the existing premises and could develop new markets that could be served with existing capacity, but the business could not grow beyond that.

Another option that the managers rejected was the development of an EMS to ISO14001 standards. The reason for this decision was predominantly the effect on the workforce and a low expectation of the benefits of such a system. George had worked for the prison service to establish quality management systems, which he believed to be a complete waste of time and a paper exercise only. He did not choose to pursue ISO 9000 or 14001, but instead had been working towards City and Guilds

recognition for their Master-craftsmen which he believed to be more important both for his staff and potential customers. This decision did not signify a lack of care for environmental impacts, but a distrust of those accredited management systems. The managers did take time to investigate environmental aspects of suppliers and working practices, but perceived no advantages in establishing a bureaucratic system of control.

In assessing the environmental claims of suppliers, the managers seemed willing to accept any assurances of good practice that were offered. It was notable that these suppliers offered a reasonable balance between quality and price from the managers perspective. The environmental claims were simply one feature of good quality.

The rules of formation for the company knowledge base strongly favoured information that enhanced the working experience of staff. Profitability and environmental good practice are also valued features, but always within the context of workers' well-being.

### 8.6.5 Organisation

The description already given has made clear that communication within Furniture was very open and flexible. The discussions observed during the site visit demonstrated that managers, supervisors and production workers were in continual conversation regarding the detail of work practices. The managers appeared to be open to the suggestions and comments of the supervisors. However, the managers carried a great deal of responsibility for all aspects of the operation. All changes had occurred at the instigation of the managers, although they were discussed with the supervisors concerning implementation. The supervisors' advice was sought on practical matters, particularly where changes might affect the practices of the workers.

It has already been noted that the business was specifically intended to support its workers, but such organisations can become paternalistic, showing little respect for

their intended beneficiaries. One development illustrates how this firm demonstrated its respect for the workers it supports. Many of the production staff had served at Furniture for most of their working lives and depended on it for more than financial support. However, few of them had received any recognition for the skills they developed over these years. The firm initiated a training programme which encouraged and supported workers in gaining qualifications recognising their skills. Some were working towards Master Craftsman status recognised by the City and Guilds. Clearly this carried rewards both for the individuals and for the business in demonstrating quality workmanship and care for workers. It took significant effort to establish this programme as training had to be closely tailored to the specific needs of this special workforce. Staff at South Lanarkshire college were experienced, not only in developing the craft skills necessary, but also in catering for the needs of those with learning difficulties and Furniture developed a strong relationship with them over the years. The college link was very important in developing the capacities and confidence of the workforce.

Nonetheless, the organisation at Furniture was not one which encouraged the development of a rich sustainable knowledge base. Environmental responsibility fell primarily to the senior manager and was one of a long list of obligations. Since the sheltered employment scheme was fundamental to the business, that was a far stronger influence on his priorities than environmental practice. While he was keen to develop his knowledge from external sources, this was not widely shared within the company. A great improvement had been achieved with limited resources, but further improvement might require more systematic support.

### 8.6.6 Grid of Specification

In discussion with the senior manager, it was clear that his objective for the company was to secure enough custom to keep the workforce fully employed and to ensure adequate political support to continue the public funding of the employment scheme. Profit was viewed as a contribution to the political battle for survival. The future of the sheltered employment scheme was uncertain because the UK government was

questioning whether it was an economically efficient way of supporting workers with special needs. There was an argument that government subsidies to support such workers should be available for all potential employers in both the public and private sectors, encouraging a greater integration among the average workforce and those with special needs. This alleged concern for workers welfare was also influenced by the costs of the scheme. Furniture hae worked hard to demonstrate that it was possible to run an efficient and profitable business, at the same time as meeting the needs of the workforce. The company had received visits from national politicians and the senior manager spent a great deal of effort in promoting the firm's achievements both nationally and within the local authority. Nonetheless, the political uncertainty had immediate effects on the business operation. The managers had identified many opportunities for profitable expansion, which would demand an increased workforce and investment in the premises. However, their major investors, the local authority were unwilling to invest further while the employment scheme was under review. The scheme's uncertainty therefore has a number of direct impacts on the operation. In the worst scenario it could threaten the survival of the company or at least limit its scope for expansion. In addition, the political lobbying and promotional work, took up substantial amounts of management time, distracting attention from the further development of environmental management systems and other areas of potential improvement.

This company was not managed by the owners but by managers with no financial holding in the company. It maintained close ties with the local authority and the accounting system was closely integrated with those of the authority. For example, transport and energy costs were borne by the authority and charged back to the company at a fixed rate, unrelated to the use of those services. Clearly, this provided no incentive for the managers to make efficiency savings in energy or transport use. Nonetheless, Furniture had made some changes which resulted in reductions in energy use as a secondary benefit.

During the interview, the senior manager was asked about his attitude to the development of an EMS, possibly to ISO 14001 standards. His view was that since his customers showed no interest in it, and since it would not bring benefits to the

workforce, he did not see it as a sensible priority for the business. In his view the purpose of any accreditation is to enhance the status and self-respect of the workforce. The training investment took a great deal of energy and time to put into practice, but it served his ultimate aim of improving the situation of the production staff. He could not perceive such benefits to be drawn from implementing an EMS.

### 8.6.7 Authority of limitation

As noted above, this case differed from the others in that it was owned by a local authority with the purpose of providing employment. The importance of profitability varied over the life of the company. When it was founded it was expected to be self-financing within the support structures of the sheltered employment scheme and occasional losses could be sustained within the social services budget. However, as the financial constraints on the local authority became more acute, and as the losses increased annually, the situation changed. In 1996 Furniture was losing £300,000 and the local authority were considering closure. The recruitment of the new managers signalled a change in the objectives of the authority. If they could return to profitability then the business could survive, but urgent change was necessary. Following a programme of increasing production efficiency and marketing innovations, the company was operating profitably by the first visit, and this profit was used for investment in the facilities, but not for expansion.

Changes in the rules of the sheltered employment scheme made it difficult for the company to recruit new staff, and those it did recruit had more severe problems than the existing staff. The company therefore did not seek to grow, which marked it out from other case studies. The objectives of the owners were therefore concerned with improving quality of life for workers, which sometimes included environmental improvement.

### 8.6.8 Conclusion

This case provides an insight into the social dimension of sustainability which many of the other cases ignore. Human welfare was at the core of this business and was a dominant influence on most decision making. To the extent that environmental welfare accords with this aim, it also flourished. However the epistemology of the business did not encourage the development of that strand of sustainability. The shared discourse was dominated by social welfare and only included the environmental aspect where these two coincide. Resource efficiency was one means by which these two were brought together – by making better use of material resources, profitability was enhanced which in turn improved job security for the workers. The organisation, grid of specification and rules of formation did not favour the enhancement of an environmental knowledge base. External support such as suppliers and similar businesses helped to build up the knowledge base, but it remained largely in the mind of one manager. Unless the knowledge and the responsibility were more widely shared, it might stagnate.

## 8.7 Toner

Toner was the company that re-manufactured toner cartridges for printers and photocopiers. Their environmental performance ranked highly and the business epistemology was directed towards the development of the sustainable knowledge base. All of the categories of influence support the enrichment of that knowledge, drawing on a broad range of sources and integrating them into all aspects of the operation. This is the only case which had clearly undergone an epistemological break, although this break was the event which led to the creation of the company. The recognition of the significance of re-use and re-manufacture were the inspiration for the founding of the business and that reconceptualisation enabled the development of a sustainable business epistemology.

### 8.7.1 Existing Knowledge

The company was founded in 1992 by an engineer who had worked for many years with a large, internationally recognised producer of printers and photocopiers. He already knew a great deal about cartridge design and knew of their potential for re-use, although this was not established practice at that time. The waste of material and energy in cartridge disposal was an obvious opportunity to exploit. From its inception, the company set out to re-use high quality materials that would otherwise become landfill waste. A good environmental principle underpinned the business strategy from day one. The company set out, not only to recycle waste products, but to do so in a way that maximised their re-use value. Thus, the existing knowledge base explicitly placed a high priority to care for the environment, from the foundation of the company. In terms of 'epistemological breaks', the sustainable business epistemology was defined from the first days of the business. The break effectively took place in the mind of the owner in his previous job, when he chose to set up his own business to re-use the spent cartridges. The mindset of the printer makers was based on a linear material flow, while the entrepreneur recognised the benefits of a circular material flow enabled by high quality re-manufacture. From this initial break , there followed a learning process to work out the practical implications of this new way of thinking.

From its inception the company had seen itself as a sustainable business, helping to reduce the environmental costs of printed materials. The challenge was to ensure that these good principles were translated into good practice. There are plenty anecdotal examples of badly managed charities to demonstrate that an ethical motivation does not necessarily lead to ethical practice and the same could be said for environmental practice. Early in the life of the company, decisions were taken to ensure that good environmental principles were implemented and that the practical knowledge base continued to develop with emerging green technologies. Staff were recruited with the qualities to enrich the company's knowledge base and organisational practices emerged to concentrate attention on good environmental practice. Management systems and business organisation were developed in such a way as to develop a practical knowledge base to support the company's environmental principles.

### 8.7.2 Customer Expectations

In order to secure supplies of used cartridges, Toner worked closely with a number of charities. The charitable sector had extensive experience of recycling collection and Friends of the Earth worked with Toner to develop a collection scheme in return for donations to their work. The company has a charitable division which co-ordinates office based collection schemes and makes regular and substantial donations to a number of charities. Environmental charities were the first and most obvious group to support, but other charities became more involved in subsequent years. The office-based collection scheme gave workers the option to choose a charity to benefit from their collections, so children's charities and medical charities have also benefited from Toner's donations.

The analysis of customer interest is particularly interesting in this case. To some extent the company saw itself as providing a service - removing and recycling waste from one group of organisations and providing recycled toner cartridges to another group. Although the first group might normally be classed as suppliers, the nature of the relationship was not that simple. Charitable endorsement was important for

securing the supply of used cartridges. It was therefore critical for the business to satisfy those charities that the recycling process was performed to high environmental standards. Some of the charities were not overly concerned about such issues, simply accepting the company donation with gratitude. However, other charities were specifically environmentally focussed and poor environmental performance by their endorsed recycler could be highly damaging. The company therefore had a clear interest in assuring those charities that their recycling operation was as environmentally friendly as possible. While the charities did not have the staff resources to check out the detail of the production process, it was clear that the company was aware of its responsibility to ensure that environmental performance was of the highest possible standard. It would be misleading to suggest that performance changed as a result of the charities' interest, but the charitable relations were based on an understanding that the company performed well in relation to the environment. Their interest provided implicit support to the process of continuous improvement.

The company had a diverse and expanding customer base in the UK and mainland Europe, supplying branded and unbranded products to office supply companies. On the first visit the customer base was predominantly British, with a small number of other European clients, but by the time of the second visit the company supplied far more European countries with more products. These companies had no particular interest in the environmental performance of the producers and therefore exerted no pressure on the business practice in direct environmental terms. Their interest was simply in obtaining fast and reliable supplies of products that sell easily. The interests of the final consumers were more complex. There are many companies which refill toner cartridges, so the environmental advantage to the consumer of using recycled cartridges would be available from many sources. However, there have been many problems with refilled cartridges in terms of reliability in use. The key advantage which Toner promoted was the high quality of their products which was maintained by a rigorous quality management programme. Their products were cheaper than new cartridges, but more expensive than simple refills.

In order to attract major customers to the product, the company promoted an office

based collection scheme. This provided companies with a highly visible symbol of environmental good practice and also promoted the sale of the recycled cartridges via the distributor network. This was a clear example where major customers wanted to be able to demonstrate their green credentials and it was up to the suppliers to show them how to do this. Customer interest in environmentalism was an advantage to Toner, but it did not drive their environmental performance standards. It was simply another supporting feature. The level of direct customer interest was probably a lot lower than many of the other case studies in the sample. Toner cartridges are not a major expense for users and they do not warrant detailed investigation. Good environmental performance could be assumed as a basic customer requirement, but the detail would be the responsibility of Toner.

In terms of the continuously developing knowledge base, customer expectations played a less significant role in this firm than the existing knowledge base. The company had developed specialised knowledge of re-manufacture and good environmental practice, that was in advance of most of their customers of any category. Broadly speaking, customers expected good performance and trusted the company to provide it, supported by the standard of ISO14001. However, the detailed knowledge of good practice came from other 'ingredients' in the knowledge mix.

### 8.7.3 Other Knowledge Sources

The knowledge base of Toner was enriched by a particularly diverse range of external influences. This is one characteristic that marks them out from other cases in the study. Suppliers, a range of business advisers and even competitors have all helped to build up the knowledge base of the company.

The influence of the suppliers of used cartridges has already been discussed and need not be repeated here. However, the production manager routinely discussed environmental performance with a range of service contractors and suppliers. This did not simply entail checking that they conform to basic good practice or supply 'green' options. It involved a persistent learning process of interaction between

supplier information and the existing knowledge base.

An illustration of this comes from the treatment of waste components. A critical feature of Toner's cartridges was that the used cartridges were completely dismantled and worn parts replaced prior to reassembly and filling. This naturally produced quantities of waste in the form of worn components which were unfit for re-use. Aluminium parts were recycled easily, but the instability in the plastics recycling market had caused the company some problems. The first plastic recycler they used went out of business and they found it difficult to identify a reliable contractor to take over the business. One major waste contractor had agreed to recycle the plastics, but failed to collect regularly and was found to be dumping some plastic waste in landfill, contrary to their agreement. The significant point here is that the company never considered giving up on plastic recycling. In spite of the difficulties they encountered, it was fundamental to the business ethos that all waste should be reused or recycled. They continued to devote management time to identifying suitable contractors, negotiating agreements to ensure full recycling of plastic waste and monitoring the performance of the contractors. Each failed contract taught them more about the requirements for future potential contractors. In spite of the small size of the company in relation to the giants of the waste business, they persisted in demanding high standards of service.

The identification of potential solutions, and the selection of one for implementation, depended on the actions of the production manager and the owner. While the owner had established the need for plastic recycling, responsibility for identifying an appropriate contractor fell to the production manager. The sharing of the problem helped to ensure that it was not lost among other tasks as the manager was required to report back to the owner on his progress. Problems and difficulties were openly discussed to ensure that the solution was workable in practice. One of the problems with one contractor was the use of special collection containers which were not delivered sufficiently reliably. This problem could have undermined the recycling effort as it did in the Plywood case study, but in this case it did not. The discussion of the problem and the underlying determination that a recycling solution was required, ensured that alternatives were brought in. New contractors were considered and more

detailed requirements set out. In the Plywood case workers undermined the recycling effort because their practical difficulties were not considered. In Toner, the problems were voiced, discussed and partially resolved. At the time of the second visit, the management team were still working on improving the reliability of their plastic recycling system.

Toner was keen to use many different sources of support and ideas. They belonged to the LEBC for a period and two staff attended a number of seminars there. They allowed their membership to lapse when their own knowledge developed further and they found the clubs seminars to be of no further interest. Consultants were used for a number of different purposes including marketing, packaging design and environmental management support. In the last case the management team worked closely with the consultant to identify opportunities for improvement and tap into his experience of EMS implementation. It was clear from the discussion that the production manager took a great deal of personal responsibility for the environmental performance, but used the support of the consultant to develop his own knowledge.

The company was an active member of a European trade association of re-manufacture. The industry is entrenched in legal battles which could determine the survival of the business. They have been lobbying to ensure that computer consumables, such as toner cartridges are covered by the Waste Electrical and Electronic Equipment (WEEE) directive. Having won the battle in Brussels they are having to fight it again in London to ensure that the transposition uses the agreed wording. The original equipment manufacturer (OEMs) are pitting extensive legal resources against the re-manufacturing industry.

One of these giants uses microchips to prevent reuse of their cartridges and has taken legal action against an American manufacturer which produces similar chips for use by recyclers. The courts have ruled against the OEM, arguing that copyright law cannot be used to prevent re-manufacturing. The same company has also sued Toner regarding the sizing of trademark names used on their packaging. Although Toner was willing to comply with the original request, settlement was delayed until significant legal costs had been incurred. Toner's experience has been used by the

trade association to demonstrate the use of bullying tactics by the OEMs.

The principle benefit to Toner of the trade association was the political support in fighting off the OEMs, but it also brought them into contact with a wide range of European companies with similar interests in re-manufacture. While the association did not deliberately share environmental information, it did provide an informal network of environmentally aware companies. This was useful when Toner was investigating some environmental claims of suppliers of toner fluids. One supplier claimed that their product was 'free of Chromium13'. The production manager was concerned that other toner may contain this chemical and took time to investigate the production process. He discovered that the production of carbon black no longer allowed the transmission of Chromium 13 and that in fact all toner fluid is now 'free' of this chemical. The informal network of re-manufacture effectively pooled their knowledge resources to resolve this concern. The supplier company which made the original misleading claim has suffered as a result. There were no formal structures set up to provide this information network, but contact and shared interests made it simple to chat about the common problem.

The epistemology of Toner is marked by a proactive use of a broad range of external knowledge sources. The use that was made of these diverse 'ingredients' depended on the rules of formation, which sift out the valuable from the irrelevant.

### 8.7.4 Rules of formation

A core value of the business was that information about environmental performance and, to a lesser extent, social performance was worthy of investment. Time was provided for the production manager, the owner and his son to investigate and evaluate new technological, regulatory and market developments relating to the wider concerns of sustainability. Time was spent seeking out information, attending seminars or trade fairs to keep up to date with changes in technology. They worked together to test out new ideas and evaluate new opportunities. There was a personal dynamic at work to support the development of a shared knowledge base . One

interesting feature of this company is the investment of personal creative energy that went into identifying performance improvements.

However, the management team were highly selective in the ideas they pursued. For example, the production manager investigated the use and operation of two European eco-labels, 'Nordic Swan' and 'Blue Angel', but the company chose not to use either label because they believed that the schemes were predominantly marketing exercises. The cost to the company of using these logos would be a percentage of sales, but Toner were not convinced that the logos carried sufficient recognition within their markets to give any significant marketing advantage. However, the more important criticism from the production managers point of view, was that conforming to the scheme requirements would not improve their performance. The company was specifically not interested in 'green-washing' their service by making empty environmental claims. Likewise, they remained sceptical of such claims made by suppliers. The investigation of the Chromium 13 claim, which was mentioned above, demonstrates their concern to carefully evaluate any claims to good environmental practice. They take the view that any such claims need careful investigation so that they can learn from the good ideas and expose the empty claims.

The use that was made of the consultant and the LEBC also demonstrate an open, but critical approach to new ideas. In each of these examples the company made use of the available advice to develop their own knowledge base, but they lost interest when the advisers could offer nothing new. In the case of the consultant, occasional contact was maintained as a 'listening outpost' – ensuring that the company kept abreast of new information that might reach the consultant.

### 8.7.5 Organisation

The owner worked in the open-plan office, with an untidy desk in the middle of all the others and it was clear from the atmosphere in the office that he was very open with his staff. If he needed to work in quiet with his assistant, they did so in the foyer of the factory, occasionally interrupted by people passing through from the workroom

to the office. There was no private space in the unit at all. Office staff were young, friendly and enthusiastic and the office had a vibrant atmosphere. Discussions were interrupted with progress updates on other projects. There was a clear sense that every employee had a right and responsibility to contribute to making the business work better.

As a small company, Toner did not have a rigid organisational structure and the owner was closely involved in all of the major decisions. The owner had a clear sense that environmental responsibility was a fundamental feature of the business, which should be shared among all staff. However, he also recognised the need to ensure that there was one person who could drive forward the continued improvement in environmental performance. Although the subject did interest him, he was aware that his other obligations were likely to distract him and therefore chose to appoint the highly capable and respected production manager to manage the process.

The delegation of environmental responsibility is not necessarily a path to good performance. The case of Pulp demonstrated how delegation could be used as a means of avoiding responsibility for good practice. In Toner's case the owner remained highly concerned about environmental performance and he sent staff to many external events and used consultants to develop the knowledge base. The difference between these cases suggests a distinction may be drawn between delegation of responsibility and delegation of action. In Toner the ultimate responsibility for good environmental performance remained with the owner and the production manager was responsible for making it happen. In contrast, the Pulp owner delegated all environmental responsibility to his manager, without allowing him the authority to implement good practice.

Production and office staff co-operated in the improvement process, but did not take any individual responsibility for it. Nonetheless, they were keen to work together on areas of shared concern. For example, one year the production manager suggested that they run a company cardboard recycling initiative. The company already sent a lot of cardboard boxes for recycling and suggested to staff that after Christmas they might want to bring their household cardboard waste in to the factory to be included

in the recycling collection. This was a great success and continued each year since then.

The owner was keen to stress the significance of the skilled workforce in establishing the company's success. The production staff were taken on without skills and trained up systematically on the job. They gradually learned different tasks in the process, with the most experienced staff working on the final stages where quality is critical. If workers stayed long enough to become charge hands, they began to get training provided by commercial training organisations and colleges. The production manager was unwilling to offer much training at early stages or allow extended training time off, because he recalled his own poor experience of job training. However core staff received training in health and safety and first aid. With the rapid development of new cartridge designs staff had to be adept at learning new routines. The skilled workforce were recognised to provide a key competitive advantage over re-fillers based in the more volatile labour markets of southern England. One customer recounted visiting a competitor and seeing line workers reading manuals while trying to re-manufacture cartridges! Maintaining the expertise of the workforce was seen to be critical for quality, which was Toner's major selling point. They won a contract worth £3million for a major office supplier, but they were not the cheapest bid. They won on their proven quality and reliability. In the owner's mind, this depended critically on the skill and high standards of the workforce, who had to learn new techniques and routines regularly to keep up to date with changing technology. Keeping up to date with environmental good practice was simply one aspect of staying on top of the job.

Many of the properties of Toner's organisation encourage the development of the knowledge base – informality, open communication, work variety for production staff allow ideas to be freely shared. The formal organisation also places responsibility for good practice in the hands of people with authority and ability to implement it. The company is innovative and attracts people with the skills to evaluate and test new ideas. This is largely the result of the efforts of the owner, the ultimate authority of limitation.

### 8.7.6 Grid of Specification

A grid of specification is a set of rules that define what knowledge and information must be incorporated into the developing knowledge base of an organisation. This case study differs from the others because they have developed an environmental management system to the standards required for ISO14001. The comments from other cases suggested that many managers of small business were reluctant to establish such reporting systems on the basis of the cost of information management and scepticism on the internal value of the reports produced. However, Toner was a wonderful advertisement for the benefits to be gained from ISO14001 accreditation for an EMS. The production manager spoke with some scorn of the standard for the quality management system, but he was quite fulsome in his praise for the EMS implementation. Up-to-date graphs of recycling rates and waste collections were on display in the staff canteen and information drawn from the system was widely discussed. Both the production manager and the owner claimed to find the information produced by the system to be a useful stimulus and guide for further improvements, helping to identify areas of the operation which could be better. The production manager confessed openly that he was suspicious of standards as 'badges of respectability' and would not want to waste time building up a badge collection. However, he saw the EMS as a tool that helped him in his job of controlling and improving environmental performance.

These comments point out the distinction between reporting for internal or external use. In the case of the quality management system, the information provided by the system did not extend the internal knowledge base, but it was required to satisfy customer demands. In contrast, the EMS was perceived to have internal value, providing information that could guide the decisions of the management team. The EMS had far greater significance for the future knowledge of the organisation than the QMS.

### 8.7.7 Authority of limitation

Toner was a family business primarily defined by the founder and main shareholder. His professional education was in engineering, and to some extent he viewed good environmental practice as an extension of good engineering principles. The minimisation of waste and the maximisation of value from material inputs were fundamental to his way of thinking. However he also perceived the operation in wider environmental terms, conscious, for example, of the effect of the chemicals in toner fluids. This man was not a stereotypical environmentalist. He drove a large-engined luxury car and travelled a great deal for business. Environmental concerns were not his preferred topic of discussion. He much preferred talking about the engineering achievements of the company and their success in overcoming the opposition of the big OEMs. Nonetheless, he perceived that high standards of environmental performance were a basic requirement of the business. From the inception of the business he was determined to run an environmentally responsible operation and his subsequent decisions allowed for the continuing realisation of that ambition. Just as the baker selects the recipe, the ingredients and the method of mixing, so a business owner/manager defines the business through the values and objectives of the company, its organisation and the range of knowledge resources drawn into the business.

The owner set up the organisation in such a way as to encourage innovation and learning and he continued to recognise the value of skilled workers. The organisation did not develop that way from some theoretical prescription for innovative business, but rather, it reflected the preferred working style of the owner, who was naturally gregarious and creative. He recognised the need to balance diversified responsibility with personal accountability and set up reporting systems to ensure that environmental good practice continued to develop throughout the operation. The rules of formation and the grid of specification developed from his initial attitudes and the developing knowledge base of the company.

The influence of the owner was critical in forming a company that could build up an internal knowledge base that was widely shared. However, it is important to

recognise that the evolving knowledge base itself influenced the rules of formation and the grid of specification. The experience of implementing the EMS provided understanding of what could be useful to the company from recognised standards. This in turn influenced the approach to other eco-labels which could not provide such benefits. This demonstrates a very significant feature of the model, namely that each element cannot be viewed in isolation from the wider system. The development of a corporate knowledge base is a complex process involving feedback and adaptation. The authority of limitation may set the broad scope of the project, but the way in which it proceeds depends on the interactions of a great diversity of influences.

### 8.7.8 Conclusion

The analysis of Toner's experience using the sour-dough model highlights many categories of influence and their properties which have shaped the epistemology of the company. The values and interests of the owner placed the business in a context of environmentally aware business practice. The organisation and rules of formation guided the process of knowledge development, placing a high value on practical improvements to environmental performance. Conscious efforts were made to draw in external information and experience which could support the learning process. These had been the result of the conscious decisions of the owner in setting up the business with the aim of developing a sustainable knowledge base.

## 8.8 Pressed Steel

Pressed Steel manufactured steel casings for CRT monitors and TVs, supplying the Chunghwa Picture Tubes factory adjacent to the site. Their environmental performance was the best of all of the case study companies, based on a rich and actively developing knowledge base. This company demonstrated many features that contributed to sustainable knowledge development.

### 8.8.1 Existing Knowledge

The owner of Pressed Steel had worked for many years for Chunghwa, the company's sole customer. That company stresses environmental safety and health as part of its corporate identity, aiming for ' *customer satisfaction, employee satisfaction, society satisfaction and global satisfaction*' (Chunghwa 2005). Pressed Steel was founded in 1996 to supply the new Chunghwa CRT plant opened at that time and was intended to conform to the highest standards of environmental performance. Many examples of good practice were designed into the factory and it was clear that the owner remained in close collaboration with his former colleagues when the facility was initiated.

The environmental officer, Jim was appointed in 2000, only one year before the researcher's visit and four years after the factory opened. He had worked for many years in the construction industry until he was made redundant. Using his redundancy money to invest in training, he started studying for qualifications in Health and Safety and went on to take a diploma in environmental management at Paisley University. These experiences combined to make him a highly effective trainer, balancing a desire and enthusiasm for learning with a good understanding of the practical context for the ideas. Jim was personally committed to environmental responsibility, to the extent that he took two buses and a train to commute to work rather than use a car.

The values of the owner and the environmental manager combined to place a high value on the development of a corporate knowledge base of business sustainability.

### 8.8.2 Customer Expectations

An unusual, but not unique, feature of this company is its exclusive reliance on one very large customer, Chunghwa Picture Tubes, making it, in effect a subsidiary of that company. The Taiwanese owner set up Pressed Steel with their financial support. However, in theory, Pressed Steel could attract business from many other companies. At the time of the first visit they were actively engaged in an attempt to develop alternative customers, following the decline in CRT demand, but after two years they had not been sufficiently successful and the company had ceased trading.

Chunghwa is committed to good environmental performance as a necessary feature of modern manufacturing practice, and made it clear that it expected such standards of its suppliers. The small company included a surprising number of managers for the size of the operation and it was clear that the hierarchy was based on the standards set by the larger organisation. The appointment of a dedicated health, safety and environmental officer reflected this corporate model. It is impossible to imagine Pressed Steel without their giant neighbour and customer, but it would be misleading to suggest that all of the environmental practices were driven by the dictates of Chunghwa. Having supported the environmental design of the factory and encouraged the appointment of the environmental officer, the customer took little further engagement in the practicalities of improving environmental performance.

### 8.8.3 Other Knowledge Sources

The environmental officer made good use of his business contacts to identify opportunities to improve the environmental performance of Pressed Steel. He worked with the steel suppliers to ensure that their packaging materials could be re-used or recycled. The imported steel was packaged in a variety of ways, each requiring different treatment. Japanese steel came on steel pallets that were recycled along with the scrap metal and French steel was delivered in recyclable cardboard boxes, with wooden reinforcements which were disposed to landfill. The British steel came on non-standard sized wooden pallets which could be recycled into MDF, but the

costs of transport and recycling were high and the pallets would be cheaper to landfill. The environmental manager negotiated with the supplier to take back unbroken pallets, leaving only the broken pallets to be recycled. Even although the cost of recycling the pallets was slightly higher than the cost of landfill disposal, the company continued to recycle, based on its environmental commitment. The reader may be wondering why steel was transported from Japan, incurring high environmental costs of transportation when it could be acquired in the UK. Apparently the quality of UK steel was not sufficiently hard for certain components and was only usable for a small part of the production.

Other improvement ideas came from scanning trade journals and internet sites, including the discovery of vegetable based lubrication oils. The environmental officer clearly took some pleasure in finding new improvement possibilities and was routinely on the lookout for new ideas. However, he had not encountered the LEBC and was keen to find out more about it from the researcher. He maintained contact with Paisley University, where he gained his environmental qualifications, and where he picked up many features of good practice that had been implemented in the factory.

This company's experience of greening production could clearly benefit many other small firms, but they have not had any opportunity to share this experience, beyond this research project. This appears to be a notable failing on the part of LEBC.

### 8.8.4 Rules of formation

Pressed Steel was remarkably open to ideas for environmental improvement from very many sources and demonstrated a willingness to experiment in many aspects of the operation where improvements could be found. This company was one of only two in the study which also took some consideration of the social impacts of their business activity. The investment in staff training was notable, partly because it included training in skills not required for work performance, such as computer skills. Since the company closed, it is likely that this training could have helped in the re-employment of the workers following the closure.

There was one aspect of the business that was closed to questioning with respect to impacts on sustainability, and this was the core strategic issue of globalised manufacturing systems. The company used Japanese steel to produce components which would be shipped first to the neighbouring factory and then onwards throughout Europe and Africa . Although the capital equipment could be used for a range of other purposes, the company had not developed a sales capability to diversify its customer base or its product range. Ultimately this strategic failing led to the collapse of the business.

The rules of formation were unusually open with respect to the range of sustainability issues that could be addressed and the scope for change allowed to the environmental manager. This allowed for the development of a rich knowledge base of the application of sustainability to a manufacturing business. However, the business strategy was not subject to environmental scrutiny and it was weakness in this area that caused the business to fail.

### 8.8.5 Organisation

The organisation of this business was unusually hierarchical for such a small firm, possibly reflecting the influence of Chunghwa at its inception. When production began in 1996, 200 staff were employed 24 hours a day, for 7 days a week, but by the time of the first research visit in 2001, the work force was down to 50 people working 40 hours a week. The management structure, designed for a larger operation seemed absurdly top-heavy in the latter period. Five managers reported directly to the managing director and the environmental officer was one of a team of four people who reported to one of these, the administration manager. Although the management structure placed environmental responsibility as an administrative function, it was clear that the person in that role worked far more closely with production and engineering staff than with those in the offices. Within the factory, personal relationships were far more significant than the organisational chart, and the environmental officer clearly had much more influence than suggested by the

management structure. For example, the washing process used large volumes of hot water and the environment officer was investigating an alternative process that significantly reduced the wastage of hot water. Although such investment would require the support of the engineering and production managers, it was clear that both of these men trusted the environmental officer to find a good solution.

When the environmental officer was appointed, the catering facilities lay idle and workers brought sandwiches for lunch. Jim gained instant respect from all of the staff by making the contacts with the college to open up the canteen to provide hot meals for all of the staff. It is a folk-saying that 'the way to a man's heart is through his stomach' and this was clearly a successful component of a clever 'hearts and minds' strategy. It is clearly not an option available to most newly appointed environment officers, but it does demonstrate the importance of winning confidence throughout the organisation. Practical demonstrations of effectiveness win respect.

Although he was appointed as a health, safety and environment officer, the incumbent also took on responsibility for facility management and training. The link with training and HSE is a particularly interesting one. It has already been noted that the factory incorporated a large training facility, which was used for an extensive training programme including health and safety, risk assessment, computer skills, stress management and environmental awareness. Some of the training was provided by commercial training providers, supported by government funding, and some was provided by the environmental manager. This greatly enhanced his personal influence within the company, allowing space for discussion of those issues close to his heart, including environmental practice. Having space, physically and temporally, to reflect on working practices allowed staff to develop a deeper understanding of their work and how it affected the environment. The result was an unusually engaged and innovative work force who created their own solutions to internally identified problems.

In other companies which had good environmental performance the approach to staff training was far less committed than in this company. Many managers regard training as a distraction from the work routines and line workers view it as an opportunity for

a rest from the daily tedium. There was nothing to suggest that the workers at Pressed Steel did not take a similar view, but it was clear that they gained more from training sessions than a holiday. The computer courses were oversubscribed and many gained their first qualifications through that training programme. Personal confidence was enhanced with the enthusiastic support of the environment and training officer. The message was clearly understood that every member of staff was worthy of attention and could benefit from active participation in training. The unspoken rules of formation were being redrawn to give voice to those previously disregarded.

The box liner development grew out of the workers' awareness of a failure in performance, made manifest in the build-up of waste plastic liners. The environment officer set up a team to identify possible solutions, so the knowledge base was further enriched by their investigations. When they encountered difficulties identifying an alternative recycler they reconsidered the waste problem by questioning the need for the waste stream. This led to an examination of alternative liners and practical experimentation which finally resulted in a good solution. A significant feature is the fact that the environmental officer did not take sole responsibility for resolving the problem. The solution came out of a learning process which enhanced the workers understanding of waste minimisation and of the practicalities of green procurement. A member of that team spoke to the researcher about her pride in their achievement and how she started to look at things in a new light.

### 8.8.6 Grid of Specification

It is interesting to note that Pressed Steel made active use of its environmental management system to identify failures and saving opportunities, but the system had not been approved to ISO14001. During the interview, Jim made clear his pride in the system and demonstrated charts of their progress on waste reduction. He was keen to get the system approved, but was also under pressure to increase his business development role. This discouraged him from taking the time to set in train the process of accreditation.

Nonetheless, the internal information systems were designed to provide information on environmental performance and to make this data available and accessible to all staff. The frequent updating and display of progress charts encouraged workers to engage in the improvement process and consider how their experience could improve environmental performance.

### 8.8.7 Authority of limitation

Although this company was nominally independent of Chunghwa, it was clear that the Taiwanese giant had a very significant influence on the business epistemology, as the customer, as a financial sponsor and as the previous employer of the major shareholder. It is difficult to separate the interests of the owner from the interests of Chunghwa. Their corporate web-site describes their identity in the three words – Creation, Perfection and Teamwork. This is expanded in the following advice:

> *' Pursuing perfection is an expression of attitude, a motivation for self-actualisation. Accumulate experiences and continuous learning through the process of pursuing perfection and this will eventually lead to perfect living' Chunghwa 2005*

This curious combination of Maslow with tones of oriental mysticism seems far removed from the reality of a North Lanarkshire factory. Nonetheless, the values of continuous learning and teamwork were evident in the practice of Pressed Steel. The organisation, both formal and informal and the rules of formation favoured the continual enrichment of the knowledge base to keep improving environmental performance in all aspects of the operation.

### 8.8.8 Conclusion

Pressed Steel had made the greatest improvement in environmental performance of all of the case study companies and the business epistemology systematically favoured the development of environmental knowledge. The internal organisation, the rules of formation and the authority of limitation all encouraged the continuous development of the knowledge base. The company built up this knowledge through a continual learning process, drawing general principles from specific practical experience. Knowledge was drawn from many sources, both internal and external, and subjected to testing and experimentation. However, Pressed Steel was not owned by Chunghwa and when the corporation divested from Scotland, the small company was also discarded. While a redeployment of the resources should have been possible, it did not come to fruition and the work force was made redundant. The local press questioned the waste of government subsidies with the plant closure, but it knew nothing of the waste of personal effort of the dedicated work force. It is to be hoped that their computer training and environmental experience would help them to make valuable contributions to future employers, but the researcher could not track down this evidence.

## 8.9 Summary Evaluation

The case studies provide a rich demonstration of the complexity of interacting influences which guide the development of knowledge in small and medium sized businesses. In order to make sense of this process, this section provides a summary and simplification of the evidence, within the structure of the sour-dough model. It is intended to provide a visual synthesis of the elements of business epistemology identified in the case studies.

Under each category of influence are listed a number of properties that emerged from the studies. These are based on the comments of the interviewees and observations *in situ*. Certain properties have a positive influence on the development of an environmental knowledge base, while others undermine it. The effect of individual properties is shown by ticks and crosses, where (√) indicates a positive effect and (X) a negative effect. For example, many respondents commented that vigorous price competition discourages investment in improving environmental performance, so that is shown by (X) in the customer expectation table. Similarly, the significance of a property varies among the cases and this is shown by the number of marks attributed in each case. For example, the environmental interest shown by Toner's customer base (√√√) is far greater than that shown by Furniture's (√).

By evaluating the range of properties associated with each category of influence, a simple colour coding indicates whether the category had a positive (green) or negative (red) influence on the sustainable learning process. No colour indicates a neutral response. In some cases the properties may have contradictory effects on the overall influence, so the coding is a heuristic evaluation of the net effect. Clearly, this is a fairly crude summary of the detailed information already presented, but it is intended to enable the reader to grasp the totality of the findings and see how business epistemology as a whole influences business sustainability. The tables list the cases in the ranked order of their environmental performance, beginning with the weakest performer.

### 8.9.1 Existing Knowledge

In six out of the eight companies studied, there existed some knowledge base of good environmental practice, much of which was based on past working experience. This was commonly expressed in terms of personal values, or a simple recognition that environmental good practice was one aspect of professional service.

In four of the cases, concerns for sustainability were also important in the core values of the company. In these cases environmental or social good practice were identified as significant from the formation of the business, and influenced many other features of the organisation.

| *Case* | *Past Experience* | *Core Values* | *Overall Effect* |
|---|---|---|---|
| Plywood | | | |
| Components | √ | | |
| Bread Bags | | | |
| Pulp | √ | | |
| Compressors | √ | √ | |
| Furniture | √ | √ | |
| Toner | √ | √ | |
| Pressed Steel | √ | √ | |

Table 8.2 Existing Knowledge

### 8.9.2 Customer Expectations

In analysing the case study evidence, several properties emerge which influence the effect of customer expectations on the environmental knowledge base of the companies. All of the interviewees were asked to describe their customers and whether or not they had any influence on environmental performance. The information provided could be classified into the following properties:

- Description of customer base – what kind of companies buy their product, the number of 'big name' companies, the proximity to retail markets and the influence

of 'green consumerism'.

- Perception of customer expectations- what are the features most important to customers buying decisions and what is the level of interest in environmental performance?
- How closely do they work with customers – do they provide a bespoke service with a knowledge element or a commodity product subject to price competition?
- Evidence of ways in which customers influence practice - did customers have specific environmental requirements?

| *Case* | *Big name customer* | *Retail* | *Enviro-interest* | *Be-spoke* | *Price competition* | *Practical influence* | *Net effect* |
|---|---|---|---|---|---|---|---|
| Plywood | √ | √ | | | X | | |
| Components | √ | √ | √ | | X | √ | |
| Bread Bags | | √ | | √ | X | | |
| Pulp | √ | √ | √√ | √ | | √ | |
| Compressors | √ | √ | √√ | √ | | √ | |
| Furniture | | | √ | √ | | | |
| Toner | √ | | √√√ | | | | |
| Pressed Steel | √ | √ | √√√ | √ | | | |

Table 8.3 Customer Expectations

### 8.9.3 Other Knowledge Sources

The case studies demonstrated that companies drew their knowledge form a wide variety of sources, including suppliers, trade associations, consultants, informal business networks and LEBC. Regulators also played some part in advising companies on specific issues. Each case shows that the quality and impact of these information sources was quite variable and the table below only gives a crude indication of the contributions made. For example, the timber suppliers discouraged Plywood from FSC sourcing, but Toner developed a rich knowledge of many environmental aspects of each of their major suppliers. Similarly, companies made very different use of consultants' advice, ranging from sub-contracting of

environmental responsibility to active engagement in shared knowledge development.

| *Case* | *Regulators* | *Suppliers* | *Business networks* | *Advisers* |
|---|---|---|---|---|
| Plywood | | Timber Sourcing | | TRADA |
| Components | | Packaging | | |
| Bread Bags | Air emissions | | LEBC | LEBC |
| Pulp | Water emissions | Chemical dyes | Informal | Consultants |
| Compressors | Drainage, noise, waste carriage | | Trade Association and Informal | Consultants |
| Furniture | Air emissions | Textiles, chair frames | Informal | |
| Toner | | Various | Trade Association, LEBC and Informal | Consultants |
| Pressed Steel | | Various | Informal | |

Table 8.4 Other Knowledge Sources

## 8.9.4 Rules of Formation

The Rules of Formation are the unspoken norms which guide knowledge development, defining what kind of information is seen as important for the business. In analysing the rules of formation with respect to sustainability some key properties emerge which indicate the importance of sustainability for the business. The following questions point to these unspoken practices:

- What value is placed on environmental knowledge -do they spend time identifying new information?
- Do they seek out information concerning social impacts?

- How critical are they of environmental claims?
- Does sustainability inform strategy?

| *Case* | *Value of Environmental Knowledge* | *Social Impacts* | *Critical evaluation of claims* | *Effect on Strategy* | *Overall influence* |
|---|---|---|---|---|---|
| Plywood | | | | | |
| Components | √ | | | | |
| Bread Bags | √ | | | | |
| Pulp | √ | | | √ | |
| Compressors | √ | | | √ | |
| Furniture | √ | √√√ | | | |
| Toner | √√√ | | √√ | √ | |
| Pressed Steel | √√√ | √ | √ | | |

Table 8.5 Rules of Formation

## 8.9.5 Organisation

Certain properties of the formal and informal organisation of the study companies had an important influence on the development of environmental knowledge. At a formal level, the authority of the environmental champion and the dispersion of environmental responsibility were notable distinguishing features. There were also three important properties of the informal organisation that were apparent. Namely, the degree of social integration, demonstrated in informal chatting; the opportunity for discussion of environmental issues; and thirdly the level personal engagement between the environmental champion and the workforce.

| *Case* | *Authority of champion* | *Dispersion of responsibility* | *Social integration* | *Environmental discussion opportunities* | *Engagement of champion* | *Net Effect* |
|---|---|---|---|---|---|---|
| Plywood | √ | | | | | |
| Components | | | √ | | √√ | |
| Bread Bags | √ | | | | | |
| Pulp | √ | | | | | |
| Compressors | √ | | | | | |
| Furniture | √ | | √√ | | √ | |
| Toner | √ | √ | √√ | √ | √ | |
| Pressed Steel | √ | √ | √√ | √√ | √√ | |

Table 8.6 Organisation

## 8.9.6 Grids of Specification

The grid of specification refers to the internal information systems in a company, including financial accounting systems and the use that is made of recorded data. It can also refer to the environmental management system and the use that is made of it. The analysis indicates the use that was made of information systems in improving environmental performance, whether or not it was a formally accredited ISO14001 EMS.

| *Case* | *Collection of environmental data* | *EMS* | *Overall effect* |
|---|---|---|---|
| Plywood | | | |
| Components | | | |
| Bread Bags | √ | | |
| Pulp | √ | | |
| Compressors | | | |
| Furniture | | | |
| Toner | √ | √ | |
| Pressed Steel | √ | √ | |

Table 8.7 Grid of Specification

### 8.9.7 Authority of Limitation

The owners of a business are the ultimate authority of limitation in that they *define* the critical knowledge base of the organisation and determine what other influences may contribute the development of that knowledge base. The means of exercising that authority can include formal organisational elements as well as unspoken rules of formation. At the start of this chapter the existing knowledge base was described in relatively static terms, such as past experience and core values. However, a key feature of the sour-dough metaphor is that the existing knowledge base is continually changing through the learning process which incorporates influences from many different sources. The authority of limitation guides that process, using the tools already described. This analysis evaluates the significance of sustainable business for the owners of the companies and their capacity to use the grid of specification, the rules of formation and the organisation to build up the sustainable knowledge base of their firms.

| ***Case*** | ***Sustainable business objective*** | ***Use of Continuous learning*** | ***Overall Effect*** |
|---|---|---|---|
| Plywood | | | |
| Components | | | |
| Bread Bags | | | |
| Pulp | | | |
| Compressors | √ | | |
| Furniture | √ | | |
| Toner | √ | √ | |
| Pressed Steel | √ | √ | |

Table 8.8 Authority of Limitation

### 8.9.8 Business Epistemology

The final table overleaf presents a summary of this information, demonstrating how the combination of influences marks a clear distinction between the strong and the weak environmental performers. The epistemology of the weak performers is dominated by red, indicating that the influence of most elements is not favourable to the development of a sustainable knowledge base. In contrast, the good performers have a green epistemology, encouraging the development of sustainable knowledge. The middle ground is marked by inconsistent influences both supporting and undermining the development of an environmental knowledge base. Those middling performers have some influences encouraging sustainable knowledge development, but are also constrained by internal features. It is notable that the colour coding of the authority of limitation most clearly corresponds to the ranking of environmental performance.

| *Case* | *Existing Knowledge* | *Customer Expectation* | *Regulators* | *Suppliers* | *Business networks* | *Advisers* | *Rules of formation* | *Organisation* | *Grid of Specification* | *Authority of limitation* |
|---|---|---|---|---|---|---|---|---|---|---|
| Plywood | | | | | | | | | | |
| Components | | | | | | | | | | |
| Bread Bags | | | | | | | | | | |
| Pulp | | | | | | | | | | |
| Compressors | | | | | | | | | | |
| Furniture | | | | | | | | | | |
| Toner | | | | | | | | | | |
| Pressed Steel | | | | | | | | | | |

Table 8.9 Combination of analyses

*We have only one world, and our present wasteful consumption of non-renewable resources and damage to the biosphere must stop. This requires alternative economic strategies, which are driven by need, not greed.*

Quaker Council for European Affairs in 1987
Quaker Faith and Practice 24.47

# Chapter Nine

## Follow-up Studies

Follow-up studies were intended to test how well the theoretical framework of the sourdough model could account for the progress of the case studies over time. The companies were contacted again after two years, to discover what progress had been made in their environmental performance and how the sustainable knowledge base had developed over the period.

Two of the original companies, Bread Bags and Pressed Steel, had ceased trading and Components no longer performed any manufacturing. Pulp had been bought over by a competitor, but retained some of the original staff. Phone interviews were conducted with managers at Furniture and Plywood and site visits were conducted at Pulp, Toner and Compressors. This section describes the changes that occurred in those companies over the two year period, highlighting how their relative environmental performance had changed. The epistemology of Pulp had undergone a very significant change over the period, which had substantially improved its performance ranking. In order to understand fully the effect of these changes a further analysis was conducted, based on the sour-dough model. This analysis is presented in 9.2 below.

### 9.1 Environmental performance

The relative performance of the companies changed over the period, for a number of reasons described here. Plywood had not made any significant improvement and had

abandoned the initiative to develop an EMS. A phone conversation with the marketing director confirmed that the company had increased the volume of FSC sourced wood that it supplied, but did not perceive any additional benefit from establishing an EMS. No further efforts had been made to develop the knowledge base of the company in respect of its environmental performance. The original analysis had indicated few incentives to improve environmental performance and there had been little change in the intervening years. The lack of progress supported the validity of the original analysis.

Furniture continue to increase profits, although they cannot expand significantly due to difficulties in recruitment. As people with learning difficulties are more readily employed in mainstream employment, the sheltered employment system is reserved for more severely disabled workers. Furniture are therefore constrained in their expansion opportunities, in spite of healthy demand for their services. However, they have invested in a modernised heating system which is intended to reduce energy use and increase comfort in the factory. They continue to invest in staff training and 15 staff gained vocational qualifications over the period. In the absence of strong drivers from the owners or customers and with no environmental management system, the progress towards more sustainable business practices had been slow. Nonetheless, the company continues to demonstrate the viability of a business model based on support for a vulnerable workforce.

Compressors have expanded their production substantially over the intervening two years, developing a highly specialised service for a number of big name food and drinks companies. Despite claiming on the first visit to want an EMS, the two year gap had not proved sufficient time for them to implement this objective. Nonetheless, the managing director, Ian spoke with far greater determination on this issue than had been the case before. The company had just discovered that they were in breach of regulations concerning the carriage of waste oil and this had alerted them to the potential of other oversights. The weaknesses identified in the initial analysis had been the lack of organisational support for improvement, the lack of investment in environmental management systems and poor use of continuous learning by the authority of limitation. These failings had clearly not been resolved by the second

visit, so although the business had enjoyed substantial growth over the period, their environmental performance had not improved in line.

The most remarkable change occurred as a result of the change of ownership of Pulp. The visit to their new factory in Glasgow demonstrated a very significant investment in the development of cleaner technology. The company had been bought over by a packaging rival which also produced cardboard boxes. The machinery had been refurbished and improved with the addition of electronic process control technology. Off-cuts from the box-cutting facility were used to feed the pulping machines, along with the dust gathered from the air filtration system. Rainwater was collected on the factory roof for use in the process and the level of water reuse had increased significantly as a result of changes to the chemical inputs. The transformation in production was highly impressive. A full analysis is provided in the following section of this chapter.

Toner's progress was less remarkable, although they were starting from a more advanced level. Nonetheless they continued to improve environmental performance. Plastics recycling has been a persistent problem, with some recyclers going out of business and others failing to meet their agreed obligations. The company continues to press their waste contractors for better service and adequate reporting of recycling levels. At a strategic level, the company has engaged with a European trade association of re-manufacturers to lobby for adequate coverage of the WEEE directive to include computer consumables. As printing technology changes, the team have to work hard to develop re-manufactured products to match each new cartridge that comes out. As the price of cartridges continues to increase with more advanced technology, the firm has an expanding range of profit opportunities. OEMs are developing lots of new ways to make their cartridges harder to re-manufacture, contrary to the intentions of the WEEE directive. It is possible that some may chose to move into design for re-manufacture and accept it as part of the business. There may be opportunities for alternative uses for the expertise built up within Toner. The original analysis of Toner's business epistemology had shown it to have a full range of supportive drivers for sustainability. The intervening years showed how the knowledge base continued to develop, based on technological changes in their

industry and in recycling markets.

The ranking of environmental performance of the study companies has changed, mainly as a result of the dramatic progress made by Pulp following the change in ownership. Although Furniture and Compressors made some progress over the period, this was minor in comparison with the improvements developed by Pulp and Toner. The business epistemology of most of these companies was not significantly different after two years, but the change in Pulp called for a further epistemological analysis.

## 9.2 Epistemological analysis of 'Pulp 2'

In Foucault's terms the change in the knowledge systems of the company might be described as an epistemological break, drawing forth new knowledge that was previously overlooked or ignored. In terms of the sour-dough metaphor, the change in ownership brought in a new baker who selected a whole new range of ingredients.

### 9.2.1 Existing Knowledge

The new owners were a group of three entrepreneurs who had bought over an ageing box producer and rejuvenated it through investment in technology and design capability. They already had some capacity in pulp manufacture, but they did not have the patented design technology that Pulp1 had developed. They had also recruited many of the Pulp 1 sales team prior to buying over the company. When the sale took place, all of the staff were offered work at the new factory, 10 miles away, although many chose to leave at that point. One of the production managers and the manufacturing director were both retained in the new company. The selection of knowledge for retention and for disposal is most interesting here and it is discussed in some detail under Rules of Formation. In effect, the sale of the business allowed a great deal of existing knowledge and attitudes to be over-ruled, where it was seen as unhelpful to future learning. The approach to new knowledge was transformed by the sale.

### 9.2.2 Customer Expectations

By bringing together the outer and inner packaging elements into one product, the company marketing could concentrate on offering a unified 'package' to customers. They had established visual design capability and had also worked on combining product packaging with in-store display units. The customer base did not change significantly from that of Pulp 1, since the two companies had been in vigorous competition for some time prior to the sale. Although the customer base was largely the same, the owners' perceptions of customer demands with respect to environmental performance were quite different. High environmental standards are recognised as an important element of a professional service, which the owners are keen to portray. They have seen the effect of Packaging Waste Regulations on their industry and seek to promote themselves as offering an environmentally responsible service.

### 9.2.3 Other Knowledge Sources

The change in the Rules of Formation allowed greater scope for the involvement of suppliers and business advisers in identifying possible improvements to environmental performance. Many developments which had been rejected by the original owners were endorsed by the new company and Bill made extensive use of a range of suppliers of environmentally improved products. Through discussions with suppliers, much of the delivery packaging was returned and reused and all suppliers were expected to provide information concerning the environmental effects of their products.

### 9.2.4 Rules of formation

There is a marked difference in the rules of formation of the company before and after the takeover. On the first visit discussion of environmental matters was limited to those which might threaten production or incur visible financial costs. By the second visit, environmental performance was recognised as a significant influence on

the success of the business. Knowledge from many sources was utilised in improving the performance of the company, and the knowledge arising from each innovation was used to influence further developments. On the first visit the learning process could be characterised as a small collection of single loop learning cycles. With each separate improvement a solution was identified and implemented but there was no evaluative reflection which might lead the company on to further improvements. There was no development of a wider understanding of the significance of the environment for the company, no reflective observation or abstract conceptualisation. What is interesting is that during this period the manufacturing director was clearly continuing his personal knowledge development, but was not in a position to express or implement his ideas without the support of the owner. By the second visit, this personal learning was allowed to influence the wider operation. He was very enthusiastic to demonstrate the improvements in the new facility, pointing out the many changes that had taken place. The main fibre used now is cardboard, including offcuts and returned boxes from the box production unit on site. They also make use of the dust filtered from the air in the box cutting rooms to feed into the pulp production units. The change in fibre source and in the chemical inputs has improved the level of process water recycling, but the process still requires a lot of fresh water. The new factory does not have its own reservoir, so a rainwater collection tank was installed on the factory roof. Each change carries implications for further potential improvements, which are investigated and implemented as appropriate.

The sale allowed the company to discard some of the long established and outdated knowledge, while maintaining that which was seen as valuable. When the sale occurred, production was transferred to a site in Glasgow, about 10 miles from the old factory. The pulping and moulding machinery was overhauled and updated to incorporate electronic process controls to improve efficiency. The right to use the design technology was clearly the most valuable of the assets transferred, and one of the mould-makers continued to work for the new owners. Some of the line workers, one production manager and the manufacturing director all chose to move with the firm and allowed the new company to acquire their tacit knowledge of the production process. Over time some of these staff moved away and the production manager was one of these. The sales staff had been recruited, or poached from Pulp a few months

before the sale of the company. Effectively the new owners acquired a significant amount of the practical knowledge base of the company, at least for the year following the sale. However, there were aspects of the old company knowledge base that were explicitly discarded. Although most of the staff were offered jobs at the new site, it was made clear that the new owners were much more ambitious and demanding than the old one had been. Many of the staff chose not to move. The master mould-maker retired, knowing that a great deal of his expertise was now incorporated into the computerised design technology the company had developed. All of the workers were expected to take more responsibility for the efficiency of the operation and had to contribute to the discussion of process changes. The new owners expected staff to engage thoughtfully with their working experience and would no longer accept that doing things 'as they had always been done' was necessarily the right way. A willingness to change and experiment was a clear expectation of all of the workers who transferred. This effectively filtered out the traditionalists by making them disinclined to work for the new owners. Many of the staff moved with the company at the time of the sale, but only a few stayed on for more than a year.

### 9.2.5 Grid of Specification

An environmental management system is fully implemented and approved to ISO14001. Responsibility for identifying potential improvements is now shared with production managers in the box production and pulping units. Management systems are in place to monitor performance and the staff are trained to look out for potential failings. The manufacturing director had been keen to develop an EMS under the original owner, but received little support. With the new owners, it was recognised as a useful mark for the purposes of marketing and also a tool for continuous improvement in environmental performance.

### 9.2.6 Organisation

An important result of the change of ownership was the increase in authority granted to the environmental champion. As the senior 'survivor' of Pulp 1, he had a

significant role to play in the relocation and refurbishment process. The resignations of two production managers left him with far greater personal authority and he was quick to develop strong relations with the new owners. As a result, Bill enjoyed far greater scope for innovation than was granted to him in Pulp 1.

His authority was also supported by a team who shared responsibility for improving environmental performance. He worked with the box production manager and the designers to identify new technological developments which they could apply. The owners of the company expect reports of further improvements in the process and have in place systems to monitor environmental performance. The learning process has clearly established that environmental practice is a critical component of business success and those values have been fully adopted by the new owners.

### 9.2.7 Authority of limitation

A key message to be drawn from this case study is the significance of the authority of limitation in influencing the development of a sustainable knowledge base. The objectives of the first owner were quite different from those of the second. While the former was seeking to retire from the business with a good capital gain, the latter wanted to expand their business by offering a professional packaging design and production service. Their attitude to environmental performance was also quite different – the former viewed it as a necessary chore to be avoided wherever possible, while the latter viewed it as a source of potential competitive advantage. In both cases the owners were actively engaged in business development and left the responsibility for manufacturing to subordinates, but the approach to this delegation was quite different. The first owner took very little interest in production and evaluated the performance of the manufacturing director simply in terms of production volumes and customer satisfaction. In contrast, the new owners saw efficient production as an important contribution to business success, and invested accordingly. Although they provided the manufacturing director with much more discretionary authority, they also engaged with him in discussing potential improvements and changes to the process.

However, as Bill made clear, the concern for environmental good practice remained firmly within the context of business profitability. All improvements were evaluated with respect to their contribution to profitability, even if broadly defined. For example, some more expensive dyes were used because they were less polluting and allowed for greater re-use of process water. The marketing advantages of being an environmentally responsible producer were also an important influence on decision making.

The concept of sustainable business for Pulp 2 was primarily concerned with material productivity and did not include much consideration of ecosystem effects or social effects of the business. The management were keen to encourage staff to develop skills and knowledge valuable to the company, but those who were unwilling or unable to do so were of no value to the new owners. Public transport between the old site and the new one is tortuous and no measures were taken to ease the travel burden of existing staff. The new company placed much greater personal demands on workers than the old one and Bill commented that this was the likely cause of many of the resignations during the first year.

### 9.2.8 Conclusion

The analysis of Pulp 2 demonstrates the significant effect of a change in authority of limitation in guiding the environmental knowledge development of a company. Through manipulation of organisation, management systems and rules of formation, the owners drew out a new combination of knowledge to inform business practices. The knowledge of suppliers, customers and of existing staff was re-evaluated to develop the environmental performance of the company.

## 9.3 Conclusion to follow-up study

The follow-up study provided an opportunity to evaluate the effectiveness of the model in explaining the change in environmental performance over the two-year period. While this was not a rigorous test of the model, it did provide striking support for the usefulness of the theory. The ranking of the environmental performance of

the surviving case study companies demonstrated that the relatively good performers continued to improve, while the weaker ones remained much as before. The most striking feature was the effect of the change in the business epistemology of Pulp which resulted from the change in ownership. The company's environmental performance improved dramatically.

The table overleaf shows the combined analysis of the remaining companies after two years. The relationship between environmental performance and sustainable business epistemology is clearly visible.

1st Visit

| *Case* | *Existing Knowledge* | *Customer Expectation* | *Regulators* | *Suppliers* | *Business networks* | *Advisers* | *Rules of formation* | *Organisation* | *Grid of Specification* | *Authority of limitation* |
|---|---|---|---|---|---|---|---|---|---|---|
| Plywood | | | | | | | | | | |
| Pulp | | | | | | | | | | |
| Compressors | | | | | | | | | | |
| Furniture | | | | | | | | | | |
| Toner | | | | | | | | | | |

2nd Visit

| *Case* | *Existing Knowledge* | *Customer Expectation* | *Regulators* | *Suppliers* | *Business networks* | *Advisers* | *Rules of formation* | *Organisation* | *Grid of Specification* | *Authority of limitation* |
|---|---|---|---|---|---|---|---|---|---|---|
| Plywood | | | | | | | | | | |
| Furniture | | | | | | | | | | |
| Compressors | | | | | | | | | | |
| Pulp | | | | | | | | | | |
| Toner | | | | | | | | | | |

Table 9.1 Comparative Summary based on second interviews

*If the call to speak comes, do not let the sense of your own unworthiness, or the fear of being unable to find the right words prevent you from being obedient to the leading of the Spirit. Ask wisdom of God that you may be sure of your guidance and be enabled humbly to discern and impart something of his glory and truth.*

Advices 1964
Quaker Faith and Practice, 2.55

# Chapter Ten

# Conclusions

This research set out to explain SME behaviour in respect of sustainability, with particular emphasis on environmental performance. Despite more than a decade of government support for environmental improvement among SMEs, many believed that the majority of SMEs remained ignorant of their environmental responsibilities (Holt et al 2000). This research sought to understand why some SMEs have benefited from managing their environmental effects, while so many have failed to do so.

The evidence demonstrates that in order to understand SME behaviour it is necessary to consider the full complexity of the business epistemology. The result of the research is a theoretical framework with which to analyse business epistemology. This framework demonstrates how a range of elements integrate in a complex and iterative manner to influence the environmental performance of SMEs. These findings suggest a number of potential applications, both for future research and for policy. This section summarises the research findings and demonstrates how this work contributes to the wider discourses of business sustainability and of knowledge development.

## 10.1 Summary

The research used iterative grounded theory methods to discover categories and properties of influences on the environmental behaviour of SMEs. This drew on the experience of service providers and manufacturing managers, as well as the

theoretical contributions of educationalists and organisational theorists. More than 100 individuals were interviewed from support agencies, regulatory authorities, environmental business clubs and business. This was intended to ensure that the theory was firmly based in the practical experience of business managers and was not overly influenced by one favoured theoretical perspective. The preliminary research guided the investigation towards certain categories, such as regulations, customer interests and efficiency motives. The influence of these categories on the study companies was investigated, together with influences noted by the business managers themselves. There emerged a rather more complex picture of interacting influences which combined to encourage or undermine the development of a sustainable business knowledge base.

This interaction is described as the business epistemology, because it defines the value that the company places on certain types of knowledge. The categories that contributed to the final theory were predominantly based on the experience of managers in the case study companies. Thus, the theory has emerged from a particular context – that of environmentally engaged, small manufacturing companies in Scotland. The purpose of grounded theory is to provide a framework to influence further research and this work provides much scope for further investigation. From the post-structuralist perspective, this theory already has validity as an expression of a particular area of experience.

The emergent framework, the sour-dough model of knowledge development, characterises a process of knowledge development by reference to a range of important influences on that process. A key principle of the model is that knowledge development is a continual process, with each successive stage influenced by the results of earlier learning. Knowledge development does not only depend on the variety of information sources that contribute, but on the process by which those sources are allowed to influence future knowledge. The strength of the sour-dough model is that it incorporates both knowledge sources, the ingredients of the cake, and the process of learning, the method. Thus the model points to matters of internal organisation, management information systems, rules of formation, and the ultimate objectives of business owners, the authority of limitation. This model allows a

detailed analysis of how business epistemology can support or undermine the development of sustainable business knowledge. It also shows how business epistemology can be abruptly changed, how an epistemological break can occur, when one or more significant elements of the epistemology are altered. The case of Pulp demonstrated the effect of change of ownership in initiating an epistemological break.

At the core of the model is the developing knowledge base of the company – the living cake dough. At any moment it is based on an existing knowledge base and a selection of additional knowledge sources, combined according to the company's epistemological framework. Because the learning process is a continual one, the existing knowledge base is always changing. The case study analysis picked out two properties to identify the existing knowledge that initially inspired the learning process – past working experience and core business values. This was intended to characterise a 'starting point' from which the business knowledge had developed. The follow-up study allowed a more realistic analysis, demonstrating how the knowledge base had changed over the intervening two years. The case of Pulp demonstrated how a change in the authority of limitation could have a profound effect on the overall epistemology, placing sustainability at the centre of the developing knowledge base. In the companies with relatively good environmental performance, the knowledge base was attuned to environmental concerns, which in turn encouraged the further development of sustainable business knowledge.

Customer interest has been an important factor for many of the companies, but in analysing the detail of their experience, this simple truism becomes far more complex. Firstly, the effect of customer interest is moderated by the other features of the business epistemology, such as existing knowledge and the authority of limitation. Those firms which offered a specialised service that involved a high level of client engagement were often more open to the environmental interests of customers than those offering a commodity product. There was significant variation in the extent of customer interest in the detail of a company's environmental performance. For some it was procedural, but others took a more active interest. This influenced the trust that case study companies placed in clients desire for

environmental good practice. Those companies which had a relatively advanced knowledge base, such as Toner and Pressed Steel, drew less knowledge from their customer base than did the less advance companies, partly because they were already aware of common standards of good practice. For those advanced businesses the effect of client interest was to reinforce the view that developing the sustainable knowledge base was an important aspect of good business practice.

The preliminary research identified a range of potential influences on how SMEs developed knowledge of sustainability, including regulators, environmental business networks, consultants and suppliers. The case studies demonstrated a very mixed range of such influences at work. The study companies also had very different experiences of these classes of influence. For example, while Bread Bags used consultants to avoid investing in internal knowledge development, Toner used consultants to supplement their own knowledge. Similarly, some were not interested in the environmental performance of suppliers, some accepted suppliers claims unquestioningly and Toner used supplier claims to further develop their knowledge base and to critically evaluate other claims. It is notable that informal business networks were frequently mentioned as a source of information on good practice. The environmental business club had been useful to one company, but most were not aware of its existence, similarly to Shearlock et al (2000)'s findings in the North of England. This suggests that existing business networks may be a more effective route to disseminating good practice than specialist environmental business networks. This finding is in tune with the work of deBruijn and Hofman (2001) and of Hoevenagel and Wolters (2000) It is also notable that most companies utilised a wide range of external information sources and were broadly open to new knowledge. The application of new ideas was influenced by the rules of formation within the business.

The rules of formation guided the knowledge development of the companies by selecting which information, from the many possible sources, would be used to influence business practice. The companies which valued the knowledge of sustainable business invested the time and effort to develop that knowledge internally. Only two of the case study companies consciously considered the social

impacts of their operation. This might suggest that the questions of social justice which are normally included in the wider sustainability discourse are seen as less relevant to SMEs. It was clear that the understanding of environmental impacts was far in advance of that for social impacts in all but one of the cases. As well as selecting knowledge for application within the business, the rules of formation also guide the extent to which environmental or sustainability concerns should influence the business strategy. In only three of the companies did sustainability influence the company's strategic decision making. The rules of formation establish the relationship between knowledge of sustainability and other types of knowledge relating to the business. They set the priority that is given to the development of sustainable business knowledge within the context of wider knowledge development.

The mechanism by which these rules take effect is through the organisation of the company, both at a formal and informal level. Within this category, important properties are the formal and the personal authority of the environmental champion and the degree to which responsibility for environmental performance is demonstrably shared throughout the company. This feature marked a clear distinction between the companies with a good environmental performance and the others. The exception to this was the case where informal values and personal responsibility had overcome the formal barriers to environmental improvement. Formal and informal organisation appeared to have a strong influence on the relative environmental performance of the case study companies.

Environmental performance was not significantly affected by management information systems – the grids of specification which identify certain classes of information as necessary. Only two of the companies had established environmental management systems and another two systematically gathered environmental information about aspects of the operation. However, the two best performers had an EMS and two middling performers are likely to have performed much better if they had used such a system. It seems that an EMS can improve performance if it is established within the context of a supportive business epistemology. The EMS only provides information and procedures that can help a business to become more sustainable if the authority of limitation chooses to make it so.

The owners of a business have ultimate authority to shape the epistemological framework of the business. They define the strategic objectives and establish the organisational structures to achieve them. In so doing, they determine what knowledge forms the basis of the company. In the picture of the sour-dough metaphor, the authority of limitation is represented by the baker – the individual who selects what kind of cake is to be made and how it is to be made. However, a key message of this work is that the environmental behaviour of a company is not simply determined by what the owner wants. Five of the eight case study companies had sustainable business objectives, but only two of them used the appropriate techniques to reach that goal. The baker requires skill, experience, the right recipe, the right method and good ingredients to bake a good cake. Similarly, business owners must make good use of all the elements of the business epistemology to build up a sustainable knowledge base.

By investigating the elements of business epistemology and the ways in which these elements interact, it is possible to identify influences that have encouraged or undermined the development of a sustainable knowledge base within the study companies. The theoretical framework of the sour-dough model provides an analysis that explains the behaviour of SMEs with regard to sustainability. The business epistemology of good environmental performers included many elements favourable to the development of a sustainable knowledge base. In contrast, the weaker performers had only a few influences encouraging sustainable knowledge development. What is most interesting is that the structure of the model helps to identify the absence of important influences in some cases. For example, it is significant that Furniture and Compressors do not benefit from supportive management systems or sufficiently supportive authorities of limitation. This model helps, not only to identify the most obvious influences on behaviour, such as customer expectations, but also to pick out internal features which moderate the effect of those influences.

The specific objectives of the research were:

- To identify what support was available for SMEs in central Scotland seeking to improve their environmental performance.
- To gain an indication of the *level of environmental awareness and engagement* among SMEs in North Lanarkshire, where support was relatively high.
- To test the influence of a range of potential 'drivers' for improved environmental performance among these SMEs.
- To identify a small number of companies which were relatively advanced in their thinking on sustainable business.
- To gather evidence of good practice from these companies to evaluate the extent of sustainable business thinking.
- To examine the learning processes involved in the development of sustainable business practices, at individual and organisational levels.
- To develop a theoretical framework to analyse the range of interacting influences on business behaviour
- To test how effectively this framework could usefully explain the progress of sustainable business thinking within SMEs.

In respect of these objectives, the research was successful, in the following terms.

- The preliminary research identified a broad range of support services available within central Scotland, and revealed a number of issues faced by the providers of such support. This suggested a number of potential drivers for improving environmental performance among SMEs, such as regulations and efficiency motivations.
- The phone survey revealed a low level of engagement with the support services, and widespread disinterest in environmental issues among the sample surveyed. However, it also revealed that there were many companies which had engaged actively in improving environmental performance, supporting the initial presumption of a wide variation in responsiveness.
- The survey results clearly demonstrated that the influences on responsiveness were highly varied among different companies and no single driver could account

for behaviour.

- Case study companies were identified from the phone survey and their practices were examined through site visits.
- This demonstrated that the social perspective of sustainable business is far less well developed than the environmental, with the studies showing very little consideration for the social impacts of their operations.
- These studies also showed that companies which made conscious efforts to develop their knowledge of environmental impacts demonstrated better environmental performance than those with a more ad hoc approach. Learning processes were clearly associated with improved performance.
- These processes formed the basis of the theoretical framework for understanding business behaviour.
- The framework was used to analyse the case study experience and seemed to reflect the full range of influences on their response to environmental considerations. When it was used to analyse their progress after two years, it helped to explain the changes in practice over that period.

## 10.2 Conclusions

The purpose of this research was to develop an explanatory theory of SME behaviour in respect of the environment. Work remains to be done to establish the scope for the application of this model. The extent of possible applications of the model can only be guessed at this stage, and relies on further research as well as practical testing. The researcher certainly believes it to have significant scope for elaboration and experimentation.

The research method developed a grounded theory which was based on the analysis of a selection of SMEs which have demonstrated some commitment to improving environmental performance. Further work may test the relevance of this theory to other SMEs. It concentrated on the development of knowledge of environmental effects, mainly due to the lack of evidence for social impact awareness. However, it

is conceivable that the model may also be applicable to the development of other forms of knowledge within SMEs. Similarly, the research was concentrated in manufacturing businesses, but the model could potentially be adapted for use in other business areas. The model has a simple conceptual appeal that encourages more widespread application.

The research was not designed with a particular policy context in mind, explicitly avoiding such an approach in order to discover a theory based on practical experience. Thus, it would require some further testing for application to specific policy areas. However, some of the categories identified in the research are clearly open to policy applications.

The research has demonstrated that the effect of business support services has been limited. Informal business networks and existing business associations provide a more accessible and trustworthy source of environmental information than environmental business clubs or support from specific agencies. This might suggest that a more appropriate approach to business support may be through the engagement of these existing networks.

Trade associations have an important part to play in establishing acceptable business standards in respect of many areas of operation. There may be an opportunity for support services to work more closely with these influential organisations to encourage sustainable working practices.

The influence of customer interest is important for the development of sustainable business knowledge in SMEs. It was striking that companies which supplied local government did not perceive their environmental performance to be significant for attracting those contracts. Given the scale of public sector procurement, this would seem to be an obvious way in which government could wield significant influence on environmental performance of local businesses.

Regulation was one influence on environmental performance most affecting the middling performers. The weakest performers remained unaware of regulations,

while the better performers aimed for 'beyond compliance' behaviour. The effect of regulation is clearly related to the extent of companies awareness of and compliance with the law. A common complaint among the study companies was the inadequacy of the enforcement of environmental regulation.

Given the significance of the influence of the authority of limitation, there is research potential in a deeper analysis of the forces acting upon those individuals. This model has demonstrated that a business knowledge base builds up through a continuous learning process, which directs attention to significant features of experience. The values and objectives of business owners are similarly based on a continuous learning process, influenced by education, professional training, social context.

The literature on business sustainability has often been concerned with the provision of support services for small businesses, concentrating on specific elements of business epistemology. This work highlights the importance of market drivers, business standards and knowledge management. In particular it demonstrates the role of individuals – personal values and influence, which are very important influences on the behaviour of SMEs.

- The environmental performance of SMEs depends on the business epistemology, which is affected by the attitudes of owners, internal organisation, rules of formation, management information systems and a large number of external sources of information.
- Sustainable business epistemology requires organisational features that elicit knowledge from many sources, internal and external to develop the shared knowledge base.
- Companies with relatively good environmental performance engage in a systematic process of developing internal knowledge and the establishment of EMS can support that process.
- Informal business networks of customers and suppliers play an important role setting standards and defining attitudes to environmental performance.
- The influence of customer expectations is moderated by features such as price competition, proximity to retail markets and the structure of the customer base.

- The rules of formation of business discourse of more sustainable companies places a high value on knowledge of environmental and social impacts, including those arising from the business strategy.
- In those companies where many of the elements of sustainable business epistemology are absent, environmental performance is far less advanced.
- Sustainable business is perceived in SMEs predominantly in terms of environmental performance, with very little awareness of social dimensions of the concept.

This work has made a contribution to the developing understanding of SME behaviour in respect of environmental performance. It provides a theoretical framework to point out the rich complexity of influences on knowledge development. As with all research, it is one contribution to the development of wider understanding. In particular, it provides a structure for analysis of a complex area of experience, allowing a more systematic investigation of the subject than was previously possible.

*'Looking after the environment is just common sense, but it is sense that we seem to have forgotten over the years. Now we need to get back to that way of thinking again' - Peter*

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# Appendix A - Interviewees for Preliminary Study.

## Scottish Enterprise Network

The Local Enterprise Companies were re-named in March 2000 to develop a more coherent corporate image for the Scottish Enterprise Network. Thus, for example, Lanarkshire Development Agency became Scottish Enterprise Lanarkshire. Organisational names are those which were in place at the time of the interviews.

David Quinn, Lanarkshire Development Agency
Frank Stewart, Glasgow Development Agency
Irene Taylor, Glasgow North Enterprise Trust
Jackie McAllister, Govan Initiative
Lesley Green, Clydebank Economic Development Council
Liz McCarthy, Ayrshire Enterprise
Liz Bogie, Co-ordinator for Sustainable Development Network in Scottish Enterprise.
Pat McKeowan, Scottish Enterprise Tayside
Peter Nicholl, Glasgow Development Agency
Thomas Moan, Dunbartonshire Enterprise
Neil Downie, Highlands and Islands Enterprise
John Crawford, Scottish Enterprise Glasgow

## Environmental consultants

Derek McGregor, ACS Environmental
Allan Marshall, Bell Innovations
Tom Fulton, Bell Innovations
Diana Maslin, ETSU
Claire McQueenie, CORDAH
George Paschke, Wren & Bell
Rosalyn Shields, QCS Training
Fiona Ross, Business Environmental Partnership, Lothian

## Higher and Further Education

Jennifer McQuaide Cook, Centre for Environment and Waste, University of Paisley
Jim Menzies, Angus Environment Forum, Angus College
Kevin Sinclair, Bell College of Higher Education.
Walter Douglas, Anniesland College

## SEPA

Callum Blackburn,
Jim Devon, Pollution Prevention and Control Officer, Glasgow
Yvonne Irvine, Pollution Prevention and Control Officer, Ayrshire
Lynda Gairns, Waste Minimisation Unit

## Utility Companies

Ross Marshall, Scottish Power
Gillian Bruce, East of Scotland Water
Allan Mowatt, West of Scotland Water

# Appendix B – Summary of Environmental Regulations

**IPC / LAPC**
The system of Integrated Pollution Control deals with the regulation of all emissions from certain prescribed industrial processes. During the period of the research, this system was replaced by the more inclusive system of Integrated Pollution Prevention and Control (IPPC), applying to installations rather than processes. The IPC system was introduced in Part 1 of the Environmental Protection Act 1990. The Local Air Pollution Control regime covers less severe atmospheric pollution.

**Packaging Waste**
Regulation of packaging waste in Scotland stems from European Directive 94/62/EC on Packaging and Packaging Waste which were implemented in Scotland by the Producer Responsibility Obligations (Packaging Waste) Regulations 1997. The stated intention of the directive is to reduce the impact of packaging on the environment, harmonise regulations across the community and ensure free movement of goods. Member states are required to establish return, collection and recovery systems and set targets for recycling and recovery of packaging waste. The effect of the regulations is to require obligated companies (with annual turnover exceeding £2million and handling in excess of 50 tonnes of packaging per annum) to provide information to prove that recovery and recycling targets are achieved. The means of achieving such targets is left to market forces, through the system of Packaging Waste Recovery Notes (PRNs). In practice, the majority of obligated companies join compliance schemes, leaving the details of compliance with the scheme operators. An obligated firm has to collect and register data on the amount (by weight and type) of packaging material it handles each year and obtain sufficient PRNs to prove that the required proportion of that has been recovered or recycled.

**Waste Disposal**
Under Part II of the Environmental Protection Act 1990, there is a general 'duty of care' on all those involved in the waste chain from production to disposal to take reasonable steps to ensure that waste is handled safely by an authorised person. For a small business this means that they must ensure that waste is properly stored and packaged, that it is clearly described and that they dispose of it to authorised carriers. This carries implications for workplace waste management to ensure that hazardous waste is appropriately identified.

**WEEE Directive (2002/96/EC of 27 January 2003 on Waste Electrical and Electronic Equipment)**

The WEEE directive aims to prevent the production and disposal of WEEE largely through the introduction of reuse and recycling targets. It also aims to improve the environmental performance of all operations involved in the life cycle of electrical and electronic equipment. In particular, considerable obligations will be imposed on producers, those businesses who manufacture electrical and electronic equipment, rebrand equipment produced by other manufacturers or who import such equipment into the EU. At the time of the research, the directive had not been transposed into law, but the detail of such transposition was of some concern to producers of electrical and electronic equipment and to remanufacturers such as Toner.

# Appendix C – German Friendship Cake

Ingredients:

Starter :

280g plain flour
15g. Fresh yeast

For Day 1 and Day 5:

200g sugar
140g plain flour
230ml milk

For finishing the loaf:

200g sugar
85g sultanas
280g plain flour
110ml vegetable oil
60g chopped walnuts
½ teaspoon salt
2 teaspoons ground cinnamon
2 teaspoons baking powder
few drops vanilla essence
2 eggs, beaten
2 Bramley apples, peeled, cored and diced

Starter:

Place flour in large non-metallic bowl and make a well in the centre. Crumble the fresh yeast into the well then pour in 455ml water and stir, using a wooden spoon, until the liquid is smooth. Stir in the flour to make a sticky batter.

Cover with a damp tea-towel and leave on the kitchen table, so that the batter absorbs the yeasts naturally present in the air. Stir once a day for each of the next 3 days, re-dampening the towel each day. The starter will then be ready to use.

Day 1: Add the sugar, flour and milk to the starter. Stir well, cover with a damp tea-towel and leave overnight.
Day 2: Stir well and re-cover with damp towel
Days 3 & 4: Do nothing, but re-dampen the towel each day
Day 5: Stir well and add the same quantities of sufar, flour and milk. Stir well again, cover with damp towel and leave overnight.
Day 6: Stir well and re-cover with damp towel
Days 7, 8 &9: Do nothing, but re-dampen the towel each day
Day 10: Stir well and divide the mixture into 4 portions. Give 2 portions to friends, with instructions, keep 1 portion for your next batch and use 1 portion to make the loaf.

To make the loaf, preheat the oven to 180°C. Put one portion of starter mixture in a large mixing bowl and add the sugar, sultanas, flour, vegetable oil, nuts, salt, cinnamon, baking powder, vanilla essence, eggs and apples. Thoroughly combine, put into two greased 455g loaf tins and level the surface. Sprinkle over 100g of muscovado sugar, then drizzle over 110g. Of melted butter. Bake for 30-40 minutes. Turn out and cool on rack.

To keep the starter, add 1 teaspoon of sugar to the portion of starter you are going to keep for your next loaf. Stir well, then store in a covered container in the fridge for up to 1 week. To make a fresh loaf, begin at Day 1, using this starter.

'The important thing to remember is that the dough is alive. The baker performs the alchemy, and if she is successful the yeast becomes exuberant and more lively. If the baker does not supply the yeast's needs, it will be crippled'

Recipe taken from *'The Bread Book'*, Linda Collister and Anthony Blake (1993), Conran Octopus Ltd, London.