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Introducing integrated performance measurement into small and medium sized enterprises

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Introducing Integrated Performance Measurement into Small and Medium Sized Enterprises

by

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Introducing Integrated Performance Measurement into Small and Medium Sized Enterprises

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Abstract

The thesis extends current knowledge and understanding of integrated performance measurement (PM) development into the context of small and medium sized enterprises (SMEs). The research builds on existing knowledge of integrated PM development approaches and identifies the context-specific factors which affect its introduction into SMEs. These are used to design, develop and validate a new, continuous improvement based approach for the development of integrated PM systems, which is specifically designed for use in SMEs.

First, a conceptual model of criteria for integrated PM development is synthesised from the literature and the characteristics of SMEs are established. An evaluation of current approaches for the development of integrated PM is undertaken and an approach which conforms to the conceptual model is selected for an empirical study in a SME. Along with a set of interviews examining the state of PM in SMEs, this study identifies several factors which affect integrated PM introduction in this environment. These factors enhance the conceptual model and indicate the need for a more effective development approach for SMEs. Design theory is used to inform and structure the design of the new approach, which is developed and refined for practical use through a SME case study. Two further cases are carried out to validate the new approach, in which cross-case comparisons are made. The results indicate the validity of both the new approach and the enhanced conceptual model.

The formulation of an enhanced conceptual model of integrated PM development, detailing the context specific criteria for effective in use in SMEs, together with the validation of a new, continuous improvement based, approach for integrated PM system development in SMEs that conforms to the conceptual model, represents a significant contribution to both theory and practice from this research.

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Relevant conferences and workshops were regularly attended and a number of external establishments were visited for guidance and consultation. Publications resulting from the research can be found in the appendices and are as follows:

Hudson, M. Smart, P.A. and Bourne, M. (2001) "Theory and Practice in SME Performance Measurement Systems," *International Journal of Operations and Production Management*, Vol 21, No 8, pp1096-1115.

Hudson, M. Lean J. and Smart, P.A. (2001) "Improving Control Through Effective Performance Measurement in SMEs," *Production Planning and Control*, Vol 12, No 8.

Hudson, M. and Lean, J. (2001) "Developing a Continuous Strategic Improvement Capability in SMEs," *Proceedings of the 16th International Conference on Production Research (CD-ROM),* Czech Ass. Scientific and Technical Societies, Prague.

Hudson, M. and Smith, D. (2001) "Little and Often Works Best: Developing Integrated Performance Measurement in SMEs," *What Really Matters in Operations Management (EurOMA Conference Proceedings),* Vol 2, University of Bath, Bath, pp1015-1023.

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Hudson, M. Bennett, J. Smart, P.A. and Bourne, M. (1999) "Performance Measurement for Planning and Control in SMEs," *Global Production Management (IFIP WG5.7 APMS Conference Proceedings),* Kluwer Academic Publishers, Berlin, pp219-225.

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Chapter 1: Introduction

1.0 Overview

This thesis documents the work undertaken on a three year research project, which aimed to extend current knowledge and understanding of integrated performance measurement development into the context of small and medium sized enterprises.

This chapter begins by providing an explanation of the rationale for the research. This underpins the gap in current knowledge which this project fills and also establishes the context and timeliness of the research. A description of the research questions and a summary of the contribution to knowledge provided by the research follows. The chapter concludes with a description of the thesis, providing a chapter-by-chapter overview, which explains how the research progressed through the three phases of *Investigation*, *Innovation* and *Application*.

1.1 Background to the Research

Small businesses are big news. Current figures show that companies with fewer than 250 employees (commonly termed 'small and medium sized enterprises' or SMEs) account for 99.8% of all businesses within the UK (Small Business Service, 2000). This equates to 3.75 million UK SMEs, which employ 55.5% of the private sector workforce and account for 44.7% of business turnover and 40% of GDP (CBI, 2001). Even removing micro businesses, including sole traders and partnerships, from the equation, SMEs still account for 96.5% of British companies employing 10 people or more. The increasing importance on SMEs was highlighted in April 2000 with the launch of the Government's Small Business Service. This has an explicit *"think small first"* strategy, aimed at persuading

governmental decision-makers to consider the implications of new policies and regulations for SMEs.

With SMEs forming such a critical part of the economy, it is unsurprising that more and more investment is being ploughed into this area through research and development programmes. However, the outputs of research programmes do not always easily translate into useful solutions for SMEs. As Childe (2000) points out

> *For example, production planning and control is not the same for SMEs as in larger companies. Although the principles of good delivery, high quality, low cost and low inventory are still applicable in theory, the practice of operating the small company is in many ways different. The same kind of difference exists in other areas such as manufacturing strategy, the management of change and the relationship with other companies in supply chains or supply networks.*

The reason for this is that business research generally provides solutions that have been developed both in and for large companies. This means that effective use in SMEs often requires a fundamental rethink of the way the research is presented. This has led Nelder and Willcock (2000) to assert that:

> *A key requirement for the research community is translation of their investigations and work into a format that is not only acceptable to, but seen as helpful by the SME. Issues here include:*
> 1. *The problem of raising awareness and gaining SME commitment to implement the knowledge and best practice that already exists and is available in a SME context.*
> 2. *The problem of converting or scaling knowledge and best practice that already exists in contexts other than SMEs, so that is adapted to the SME contexts.*
> 3. *Adapting outputs into off-the-shelf formats to support the SME at the point of change.*
> 4. *Finally there is the problem of supporting innovation in SMEs by the creation of new knowledge and solutions to SME problems for which there is no prior knowledge or best practice.*

A key improvement initiative which received much attention throughout the 1990's and continues to do so today, is in the area of performance measurement (PM). According to

Neely (1999) the interest in PM has been stimulated by the recognition that the changing nature of work and the competitive environment make traditional, financially-based performance measures alone hopelessly inadequate. This was highlighted initially by authors such as Eccles (1991), who talked of a 'revolution' in PM that was due to the decision to

> *shift from treating financial figures as the foundation for performance measurement to treating them as one among a broader set of measures.*

This shift led to the term *integrated* (or *strategic) PM* being introduced into the vocabulary of researchers as they began to identify frameworks and methodologies for developing a more balanced set of measurements for businesses. However, this effort was typically focused towards the needs of large companies, with various approaches being developed successfully by Lynch and Cross (1991), Kaplan and Norton (1992), Neely et al (1996a) and Bititci et al (1997), amongst others.

Unfortunately, despite success in large companies the majority of these approaches have been, at best, only theoretically evaluated for use in SMEs (e.g. Hvolby and Thorstenson, 2000; Andersen et al, 2001). There appears to be a dearth of empirical studies exploring how these approaches actually work in a SME context. Therefore, despite a thorough understanding of the field of integrated PM, there is a need for more research to investigate appropriate methods of translating the outputs of PM research into useful and usable approaches for SMEs.

1.2 Aims of the Research

The overall aim of this research is to extend current knowledge and understanding of integrated PM development into a SME context. Initially, this will involve defining, in

detail, what is meant by the terms *integrated PM* and *SMEs*. The way that PM is currently used in SMEs will then be established, along with the appropriateness of current approaches for introducing integrated PM in SMEs. A set of requirements for a SME focused integrated PM development approach will be identified and a new approach developed to conform to these requirements. The new approach will be applied in SMEs to establish its usefulness and to allow a more detailed understanding of how integrated PM can be introduced effectively in SMEs.

1.3 The Research Questions

Two key research questions were identified to guide the research. The first asked:

Are current integrated PM development approaches appropriate for use in SMEs?

Four initial research sub-questions helped to investigate this question, by providing a clear understanding of the problem area:

What is integrated PM?

What SME characteristics affect the introduction of integrated PM?

How do SMEs use and understand integrated PM?

Are there barriers to integrated PM development in SMEs?

The findings from investigations addressing the first research question prompted the development of the second question, which asked:

How can integrated PM be introduced effectively into SMEs?

The rest of this chapter will focus on demonstrating how the research undertaken to address these questions make a contribution to knowledge. It will also explain the structure of the thesis.

1.4 Contribution to Knowledge

Existing research has established methods for developing and implementing integrated PM in larger organisations. However, very little research has focused on its introduction into SMEs. The major contribution of this research is the identification of the context-specific factors that affect integrated PM development in SMEs. Along with a number of criteria derived from existing literature, these factors provide a conceptual model of integrated PM development for SMEs.

The new conceptual model is developed from both theory and practice. First, theory is used to establish a general conceptual model, representing a consensus of academic opinion on integrated PM development. This model is then supplemented by practical investigations in SMEs, which identify the context-specific requirements for the effective introduction of integrated PM in this environment. These additional requirements enhance the conceptual model and are used as the basis for the design, development and validation of a new, continuous improvement approach to introducing integrated PM systems in SMEs. Applying the new approach in SMEs enables the enhanced conceptual model for integrated PM development in SMEs to be validated.

In summary, the research presented in this thesis contributes to knowledge through:

- establishing a set of context-specific requirements for the introduction of integrated PM into SMEs;
- adding these requirements to criteria identified from existing academic literature, to form a conceptual model of integrated PM development specifically aimed at SMEs;
- designing and validating a new, continuous improvement approach to the development integrated PM systems in SMEs, which conforms to the conceptual model;
- providing new insights into how SMEs understand and use PM.

1.5 Thesis Structure

The research was conducted in three distinct phases; *Investigation, Innovation* and *Application*. The first research question was addressed through the Investigation Phase of the research, with the second research question being investigated through the Innovation and Application phases.

1.5.1 Research Design

Chapter 2 describes how the research was conducted. This chapter identifies an appropriate research paradigm which takes into account the nature of the research and the epistemological perspective of the researcher. It then describes the specific research methods used throughout the project and provides an explanation of their relevance. Finally, the overall research framework is described, showing a logical progression through the study and illustrating how each phase builds on its predecessors to create a cohesive understanding of the research project as a whole.

1.5.2 Investigation Phase

The Investigation Phase of the research is presented in Chapters 3, 4, 5 and 6, with each chapter corresponding to one of the four initial research questions.

Chapter 3 explores the question *What is integrated PM?* It introduces the concept of integrated PM and provides a brief history of the subject area, to illustrate its evolution. A conceptual model is developed from the literature which details the criteria for effective development of integrated PM. The conceptual model is used as a basis for reviewing a number of current approaches for designing and implementing integrated PM. This review

identifies a comprehensive development approach, based on its adherence to the conceptual model.

Chapter 4 examines the literature on SMEs, considering the question *What SME characteristics affect the introduction of integrated PM?* A comprehensive overview of SME characteristics is gained. This is used to establish a set of SME characteristics for the purposes of this research project. An evaluation of the appropriateness of integrated PM in these companies is then given.

Chapter 5 illustrates how SMEs understand and use PM. A broad picture of the way PM is used in SMEs is gained through available literature, which is then supplemented by an empirical study. This provides the data to enable the development of a model, which describes the PM systems that might be found in SMEs. A gap analysis reveals that SME PM development differs significantly from that advocated in the conceptual model developed in Chapter 3.

Chapter 6 investigates the barriers to integrated PM development in SMEs. It builds on Chapter 5 and attempts to introduce integrated PM into a SME, using a comprehensive development approach. Previous research is examined to identify existing knowledge in this area and then an in-depth case study is carried out to investigate the implications of developing and implementing integrated PM systems in SMEs using a structured approach.

1.5.3 Innovation Phase

The Investigation Phase of the research provided a clear and detailed understanding of the problem area. The Innovation Phase builds on this foundation to consider the second

research question. Chapter 7 describes the design of a new approach for introducing integrated PM more effectively in SMEs. An appropriate design process is identified and, using the knowledge of integrated PM and SMEs from chapters 3, 4, 5 and 6, a set of requirements are established. The requirements form the basis for a new development approach and are used to formulate an enhanced conceptual model of SME focused integrated PM development.

Chapter 8 details the practical development of the new integrated PM development approach in a SME environment. The purpose of this is to ensure that it is relevant and usable in a SME context. This is the final stage of the design process, where practical refinements are made to ensure that the each stage of the new approach is usable and flows logically into the next stage.

1.5.4 Application Phase

Having designed and developed the new approach, the Application Phase details the results of its validation in SMEs. Chapter 9 identifies appropriate validation criteria and assesses two practical applications of the process. Each application is analysed individually and assessed against the validation criteria. In addition, cross-case analysis is carried out to establish the similarities and differences between each application, from which some conclusions are drawn. The results of the case analyses enable the validation of the new conceptual model from which the new approach was developed.

Chapter 10 draws the thesis together, formulating appropriate conclusions and highlighting the key elements of the research. The contribution to both knowledge and practice is then clearly explained. The thesis ends with a brief discussion of the difficulties

encountered throughout the research and the identification of a number of areas for future research.

1.6 Summary

This chapter has provided a brief background of the need for research into PM development in SMEs. It has given an overview of the aims of the research and identified the research questions to be investigated. The contribution to knowledge has been clearly explained and a chapter-by-chapter breakdown of the thesis has highlighted the key elements of the research process. The rest of this thesis describes the research undertaken starting, in Chapter 2, with a detailed account of the research design and the explicit research methods used throughout this project.

Chapter 2: Research Design

2.0 Introduction

This chapter will explain the approach adopted in undertaking the research presented in the thesis. First, an overview of the research is given. This comprises setting the research in context, identifying an appropriate research paradigm and developing the research questions. The specific methods adopted throughout the project are then described and the rationale for their use is given. Finally, the overall research framework is described, showing a logical progression through the study and illustrating how each phase builds to create a cohesive understanding of the research project as a whole.

2.1 Purpose, Scope and Context of the Research

Before undertaking a research project, a researcher makes a number of assumptions from their personal and academic experiences to establish the potential value of the research. This is known as the *"preunderstanding"* of the researcher (Gummesson, 1991). In this case, the preunderstanding of the researcher included a basic knowledge of the benefits of introducing integrated PM into large companies and that the characteristics of SMEs differ from those of large companies.

2.1.1 Purpose

The purpose of the research is to extend current knowledge and understanding of integrated PM development into a SME context. This is novel because there appears to be a dearth of information regarding the development of integrated PM in SMEs, despite the numerous studies investigating it in larger companies (e.g. Kaplan and Norton, 1993; Letza, 1996).

2.1.2 Scope

To ensure focus throughout the project, the scope of the research was specifically limited to investigating integrated PM development in SMEs. Therefore, two areas were investigated in detail; integrated PM and SMEs. Chapter 3 provides a comprehensive overview of integrated PM, which results in the development of a conceptual model. This conceptual model characterises effective integrated PM development from the literature. Similarly, the characteristics of SMEs are identified in Chapter 4. In addition, recognising their heterogeneous nature, the type of SMEs which are the specific target of this research are also described. These research boundaries limit the scope of the research to ensure that the findings will be both coherent and of practical value to the target audience.

2.2 The Research Paradigm

The work reported in this thesis falls into the domain of management research. In this field, both qualitative and quantitative studies are common. Therefore, the research paradigm selected is based both on the nature of the study itself and on the epistemological perspective of the researcher.

2.2.1 The Epistemological Perspective of the Researcher

Epistemology refers to the grounds of knowledge (Hassard, 1991). According to Meredith et al (1989) there is an epistemological continuum which has at each of its extremes pure existentialism and pure rational logic:

> *At one extreme is rationalism, which uses a formal structure and pure logic as the ultimate measure of truth. At the other extreme is existentialism, the stance that knowledge is acquired through the human process of interacting with the environment. Thus, in existentialism an individual's unique capabilities, in concert with the environment, are regarded as the basis of*

knowledge. The former conforms to the traditional deductive approach to research, the latter to an inductive approach.

The researcher's own perspective is that knowledge is acquired through interaction with the environment, although there is also some sympathy with the notion of objective truth, derived from logic. Therefore, the researcher's epistemological perspective would be towards the middle of the continuum, but tending towards the existential perspective.

Meredith et al (1989) suggest that research carried out from this perspective is typically more inductive, less structured, more subjective and requires more interaction with the environment than that carried out from the rational pole. In addition, they find that the researchers are more likely to be concerned about linking their findings to the real world than with existing theories or laws.

2.2.2 The Nature of the Study

The research paradigm associated with an existentialist philosophical stance is labelled the interpretative, or hermeneutic, paradigm by Gummesson (1991), derived from the Greek word 'hermeneuein,' – to interpret. It differs from the rational, positivist paradigm associated with the natural sciences because it accepts the possibility of researcher bias and, instead of trying to find objective cause and effect relationships, looks to interpret the available evidence in order to gain an understanding of a given situation (Gummesson, 1991). The philosopher Dilthey (1976) described the process of hermeneutic investigation as a circle, whereby understanding a phenomenon in its natural context is considered an iterative process through which enhanced understanding is gained incrementally.

The nature of hermeneutics means that conventional, positivist research methods are inappropriate, as Checkland (1981) notes;

> *Clearly in this tradition it is believed that special methods, not simply those of natural science, are required to understand such uniquely human processes.*

For this reason, the hermeneutic paradigm is closely associated with case-based research methods, whereby a relatively small number of in-depth studies are carried out to gain a deep understanding of the problem area in specific contexts. This makes it well suited to exploratory research, or where there is a lack of a theoretical base for the study (Creswell, 1994).

2.3 Research Questions

Before embarking on the research, appropriate research questions needed to be developed in order to focus the work. Initial research sub-questions were aimed at understanding the problem area and asked:

What is integrated PM?

What SME characteristics affect the introduction of integrated PM?

How do SMEs use and understand integrated PM?

Are there barriers to integrated PM development in SMEs?

These provided a focus for the investigation of the first main research question:

Research question 1: Are current Integrated PM development approaches appropriate for use in SMEs?

The investigation into question 1 developed the necessary knowledge and understanding of the subject area, which prompted the development and investigation of the second research question:

Research question 2: How can Integrated PM be introduced effectively into SMEs?

The rest of this chapter explains the research methods used, along with the way the research was structured, to explore these questions effectively.

2.4 Research Methods

The literature reveals that there is a lack of existing knowledge in the area of integrated PM introduction into SMEs. However, to understand how integrated PM can be introduced effectively into SMEs requires an in-depth understanding of the SME context in which it will be applied. As Meredith (1998) points out, in all research

> *qualitative understanding is required for drawing research conclusions and communicating the importance of the results.*

Therefore, for this research project, the case-based research methods associated with the hermeneutic paradigm are appropriate. This is because qualitative research focuses on gaining a deep contextual understanding of the selected environment, which is necessary for the development of practical and relevant management research. This is highlighted by Meredith et al (1989) who note

> *In general, the newer, more interrelated, more situation or people-dependent topics in operations require the additional perspective afforded through the natural and existential methodologies.*

2.4.1 Case Studies

The rationale for using a case study approach is given by Yin (1984), who states:

> *A case study is an empirical enquiry that:*
> - *investigates a contemporary phenomenon within its real-life context; when*
> - *the boundaries between phenomenon and context are not clearly evident; and in which*
> - *multiple sources of evidence are used.*

As the empirical studies in this research project are primarily concerned with introducing integrated PM systems into SMEs, it is essential that they are conducted within these boundaries if a true image of SME PM is to be identified.

The role of the researcher in case studies can take several forms. Gummesson (1991) identifies two primary roles for researchers in case study situations; *participant*

observation and *action research.* Both of these roles involve some form of active intervention on behalf of the researcher, which is upheld as being the only way of gaining access to the relevant information:

> *A thorough analysis of a particular process will require the use of the researchers' personal observations that result from their presence, participation, or even intervention in the actual process to be examined (Gummesson, 1991).*

Participant observation and action research are used, along with interview techniques, as the primary methods of data collection for this research project. Therefore, each of these will now be discussed.

2.4.1.1 Participant Observation

One method of conducting a case study is to become a 'participant observer' of the phenomenon under investigation. According to Flick (1998), this should be viewed as a process whereby the researcher first simply describes everything that is noticed about the environment. This gradually becomes more focused on the specific phenomenon under investigation until, eventually, the researcher becomes selective in what is described, aiming to find further examples of specific aspects of the phenomenon.

The main advantage of this approach is that first-hand interaction with the object of the research in a natural environment is prolonged, which facilitates a greatly increased understanding of complex phenomena. In addition, observations can easily be complemented by the collection of other appropriate evidence to support the case, providing a valid method of triangulation. This evidence might include interviews, either informal or formal, physical artefacts and formal documents and records (Gillham, 2000b). Overall, this method is particularly applicable when there is an emphasis on describing and interpreting complex phenomena, making it highly appropriate for investigating PM development in a SME context.

2.4.1.2 Action Research

The term 'action research' was coined by Lewin (1946). It represents a radical way of carrying out research, which is aimed at generating new knowledge through the researcher actively changing the system under investigation (Warmington, 1980). This differs from participant observation in that it entails the researcher taking a more active role in bringing about specific changes in the environment. As Raimond (1993) states:

> *Action research holds that it is possible for the researcher to take an active part in the organisation and, at the same time, observe the organisation.*

The primary benefits of action research are that it enables the development of practical techniques for improvement, where the researcher provides the basis for the development of competencies in others (Susman and Evered, 1978). It is this collaborative relationship, whereby the researcher investigates the change situation whilst the participants in the research learn new methods for change, which makes action research appropriate for transferring new methods of introducing PM into SMEs.

2.4.1.3 Interviews

Face-to-face interviews are considered appropriate methods of investigation when the researcher is attempting to gain insights and depth of meaning and understanding about specific phenomena (Gillham, 2000a). They can range from highly formalised questionnaire-style interviews, to totally unstructured discussions, depending on the type of data required. Semi-structured interviews are interviews that are characterised by having a relatively small number of key, open-ended, questions which interviewees are encouraged to expand upon through the use of probes from the interviewer. As Ackroyd and Hughes (1992) note, in semi-structured interviews

> *the interviewer is normally required to ask specific questions but is free to probe beyond them if necessary.*

This technique was considered the most appropriate for the purposes of this research, where interviews were used to gain a detailed understanding of the problem area. This is because it combines the advantages of unstructured interviews in collecting all seemingly relevant data without restriction, with an overall structure that helps to ensure that all relevant areas of investigation are covered in the interview situation.

2.5 Research Structure

This section will explain how the foundations of the research, along with the research methods used, link together to develop into a logical, coherent structure for the research.

Addressing the research questions fell into three distinct phases; *Investigation, Innovation* and *Application.* The first phase aimed to investigate research question 1, whilst the other phases attempted to address research question 2. Figure 2a illustrates the overall research structure and depicts the relationship between the research questions and each phase of the research.

2.5.1 Phase 1: Investigation

This was the largest and most complex phase of the research. This was because, in order to address research question 1, the four initial research sub-questions needed to be studied. Each initial question was investigated through an iterative cycle of exploration, understanding, interpretation and explanation. This enabled the synthesis of the knowledge and understanding gained from each question into a detailed description of the current situation regarding the introduction of integrated PM into SMEs. From this, the appropriateness of existing integrated PM development approaches for use in SMEs was assessed. A set of requirements for a SME focused integrated PM development approach were then identified, which fed into Phase 2 of the research (see figure 2a).

Initially, a thorough review of the literature concerning integrated PM and SMEs was carried out. This provided a definition of what is meant by these terms for the purposes of this research. This led to the development of a conceptual model of integrated PM development, which embodied the findings of previous research. The integrated PM development approaches identified in the literature were then reviewed against the conceptual model in order to establish a comprehensive approach. This review resulted in the selection of a comprehensive process, which was then used as the basis for an investigative case study.

A review of the literature on SMEs was then undertaken to establish a set of defining characteristics for the SMEs which were the target of this study. These characteristics formed the basis of an assessment of the appropriateness of integrated PM in a SME context. However, a lack of information regarding integrated PM in SMEs meant that an exploratory empirical study was also required. This consisted of a set of semi-structured interviews (cases A-H) being carried out with SME managers, to establish the nature and extent of integrated PM in a SME context. Each interview was taped, transcribed and summarised. The summaries were then verified and validated by the interviewees and an additional manager, enabling multiple source triangulation (Denzin, 1978). Interview analysis was carried out using thematic coding (Flick, 1998) and then a gap analysis highlighted the differences between the conceptual model of PM systems and SME PM. A complete description of this investigation can be found in Chapter 5.

A case study (case I) was also undertaken, which examined how a comprehensive integrated PM development process worked within a SME context (see Chapter 6 for full details). Data collection was based on participant observation and face-to-face interviews, along with the collection of documentation arising from the process. This enabled the

accumulation of both processual and behavioural data from the study. The study was analysed using Creswell's (1998) case study procedures and data triangulation was achieved through multiple methods, multiple data sources and multiple researcher involvement (Denzin, 1978).

2.5.2 Phase 2: Innovation

The investigative phase of the research illustrated the difficulties involved in introducing integrated PM into SMEs using current methods. The Innovation Phase of the research focused on addressing the second research question. This was achieved through the design and development of a new approach, aimed specifically at the target SMEs, for the effective introduction of integrated PM in this context.

Phase 1 of the research provided the knowledge and understanding of SMEs and integrated PM, from which a number of specific requirements were developed to make PM systems more appropriate for SMEs. These requirements were used to enhance the conceptual model of integrated PM development, which was then used as the basis for designing a new SME focused development approach. Design literature was consulted to gain an understanding of the process of design and a suitable process was identified, comprising three phases; *analysis, synthesis* and *evaluation.* This process was used to develop the new approach for introducing integrated PM into SMEs. An integral stage in developing the new approach was to apply it in a practical SME setting. Therefore a developmental case study (case J) was undertaken, in order to examine how it worked in the real world and to identify improvements.

The case study was carried out using action research, enabling the researcher to get actively involved in the application of the new integrated PM development approach for

SMEs, to gain an in-depth understanding of the contextual issues surrounding its application in a SME. For triangulation purposes, active data collection was supplemented by observations, documentation and informal discussions. To further strengthen the validity of the data, an additional researcher observed the intervention. The data was analysed to establish how closely the approach conformed to the enhanced conceptual model and a number of improvements were identified. These improvements contributed to the production of an updated version of the SME integrated PM development approach. Chapter 8 provides the full details of this case study.

2.5.3 Phase 3: Application

Having refined the SME integrated PM development approach, it was necessary to apply it in SMEs to gain an in-depth understanding of how it worked in this environment. This would help to validate the conceptual model and the new approach and would also facilitate further insights into how SMEs understand and use PM. Therefore, two validation case studies (cases K and L) were conducted in SMEs (see Chapter 9 for full details). In these studies the researcher again used action research to facilitate and participate in the development of the new integrated PM system, using the new approach. As in the developmental case study, first-hand experience was supplemented by observations, documentation and discussions, to build a rich picture of each application. Within-case and cross-case analysis (Eisenhardt, 1989) was carried out on the data. This involved assessing individual case data against predetermined validation criteria and then analysing the similarities and differences between each case. The results from the validation cases were used to inform theory and draw some conclusions about integrated PM usage in SMEs.

2.6 Sampling Strategy

The applied nature of the research meant that it was necessary to identify an appropriate sample of SMEs that were willing to participate in the research. This required an overall sampling strategy to be developed, which was used for all the empirical work undertaken throughout the research project.

2.6.1 Initial Sample Constraints

The heterogeneity of SMEs meant that general constraints regarding case selection were required throughout the research project. Therefore, all the case companies had to fall within the definition of a SME, as described and explained in Chapter 4. This meant that all the case companies employed less than 250 staff and all exhibited similar characteristics in terms of management and operating practices. Due to the subjective and often sensitive nature of some of the characteristics, it was not possible to fully assess the eligibility of each company in advance. Therefore, selected companies were assumed to have fulfilled all the criteria, unless evidence to the contrary emerged during observations and discussions throughout each intervention.

An additional sampling constraint was that, due to practical limitations on sample size, all the companies selected were manufacturers, based primarily in the South West of England. All the constraints were designed to give a strict focus to the research regarding target companies, to ensure that the outputs of the research are valid in terms of their usefulness to the target practitioners.

2.6.2 Types of sampling

There are three primary methods of sampling. These are: probability sampling, convenience sampling and purposeful sampling (Maxwell, 1996). Probability sampling

relies on all elements of the population having a known chance or probability of being selected as sample subjects, which makes it mathematically possible to generalise the results of the sample (Sekaran, 1992). For this reason, probability sampling is usually associated with quantitative studies.

Convenience sampling is a non-probability sampling technique. It is so called because it relies on conveniently available subjects, rather than those who would be most appropriate, to form the sample. This type of sampling has given non-probability sampling a bad reputation amongst quantitative researchers, since it is entirely non-scientific, very often inappropriate and certainly non-generalisable (Maxwell, 1996; Berg, 2001). However, the other non-probability sampling technique, purposive sampling, is very often the most appropriate method for qualitative studies and it is this method which was used in this research project.

There are a number of different methods of identifying a purposeful sample. According to Flick (1998), the important aspect in choosing an appropriate purposive sampling strategy is to identify cases which are rich in relevant information. As he notes

> *Sampling decisions always fluctuate between the aims of covering as wide a field as possible and of doing analyses which are as deep as possible. The former strategy seeks to represent the field in its diversity by using as many different cases as possible in order to be able to present evidence on the distribution of ways of seeing or experiencing certain things. The latter strategy, on the other hand, seeks to further permeate the field and its structure by concentrating on single examples or certain sectors of the field. Considering limited resources (manpower, money, time etc) these aims should be seen as alternatives rather than projects to combine.*

For the purposes of this research, where a high proportion of the cases were each studied over several months, it was appropriate to concentrate on a purposive sample which selected fewer cases, with the aim of gaining deeper insights into the issues, rather than aiming for maximum diversity. Information about the selection of specific cases are given in the chapters in which they appear.

2.7 Generalisability and Relevance

As the research reported in this thesis is of an applied nature, there is a need to ensure that the outputs of the research are relevant to management practitioners. This requires that any tools and techniques developed or modified throughout this research project, are generalisable across the SMEs which are the target of this research. Thomas and Tymon (1982) provide a framework which specifically focuses on ensuring that the outputs of management research are useful to practitioners. This is achieved through; *descriptive relevance, goal relevance, operational validity, non-obviousness* and *timeliness*. A description of how each aspect of the framework is used to ensure the relevance of the research and facilitate generalisability will now be given.

2.7.1 Descriptive Relevance

Descriptive Relevance is concerned with establishing the accuracy of the research findings in capturing the phenomenon under investigation. Good descriptive relevance forms the basis for generalising the research findings and is concerned with ensuring both methodological rigour and contextual relevance. The balance between these aims is found by using research methods that are able to capture important contextual information, whilst also providing a strong theoretical argument regarding their validity. The theoretical validity of the case-based approach to this study has already been described, along with the relevance of the data collection techniques for enabling the assimilation of contextual data. In addition, the validity of the data at each stage of the empirical investigation has been ensured through the use of thorough and reliable methods of data collection, triangulation and analysis.

2.7.2 Goal Relevance

Goal relevance aims to establish whether the outputs of the research are useful to practitioners. This aspect is addressed initially through a thorough investigation into the characteristics and needs of SMEs regarding integrated PM. The results of this investigation are used as the foundations for the formulation of a new SME integrated PM development approach. Specific validation criteria, focusing on the usefulness of the new approach in a SME environment, are then identified to evaluate the usefulness of the final outputs of the research to practitioners.

2.7.3 Operational Validity

Operational validity complements goal relevance by seeking to ensure that the outputs of the research are usable by practitioners. This affects both generalisability and practitioner relevance, as it requires the scope of any claimed usability to be determined in terms of the type of practitioners at whom it is targeted. The purpose of the research is to establish an effective method of introducing integrated PM into SMEs. Therefore, a conscious effort has been made throughout the research project to ensure that the outputs will be usable by the targeted practitioners. Specifically, this occurred throughout the development and validation of the new integrated PM development approach for SMEs. For this reason, the usability of the new approach is sought only for practitioners in the target SMEs.

2.7.4 Non-obviousness

Non-obviousness aims to identify the degree to which the outputs of the research really say anything new and original. The research specifically set out to fill a gap in current knowledge and practice, regarding the use of integrated PM in SMEs. Although this gap was initially identified from published research, interviews and case studies confirmed that the research being carried out was novel. The results of the validation cases also confirmed

that the new approach by which integrated PM could now be introduced to SMEs was both new and appropriate.

2.7.5 Timeliness

Timeliness establishes whether the outputs of the research are timely and relevant to practitioners. SMEs currently account for 55.4% of employment and 50.9% of total business turnover in the UK (DTI, 2000), highlighting their economic importance to the country as a whole. To help ensure the sustained competitiveness of SMEs, it is vital that they have access to the same innovative management techniques, such as integrated PM, as their larger counterparts. However, despite the benefits of integrated PM identified in larger organisations, there appears to be a distinct lack of research investigating how it can be effectively introduced into SMEs. Therefore filling this gap in knowledge and management practice would appear to be both timely and relevant to UK SMEs.

2.8 Conclusion

This chapter has explained the rationale for the research and described the philosophical stance of the researcher, noting how this affected the project in terms of the research methods used. The research structure has been described and each phase of the research has been explained in detail, to provide a comprehensive and coherent picture of the scope of the research and the research activities undertaken. The rest of the thesis will provide a full explanation of each phase of the research, providing further detail on the specific research methods used as they arise.

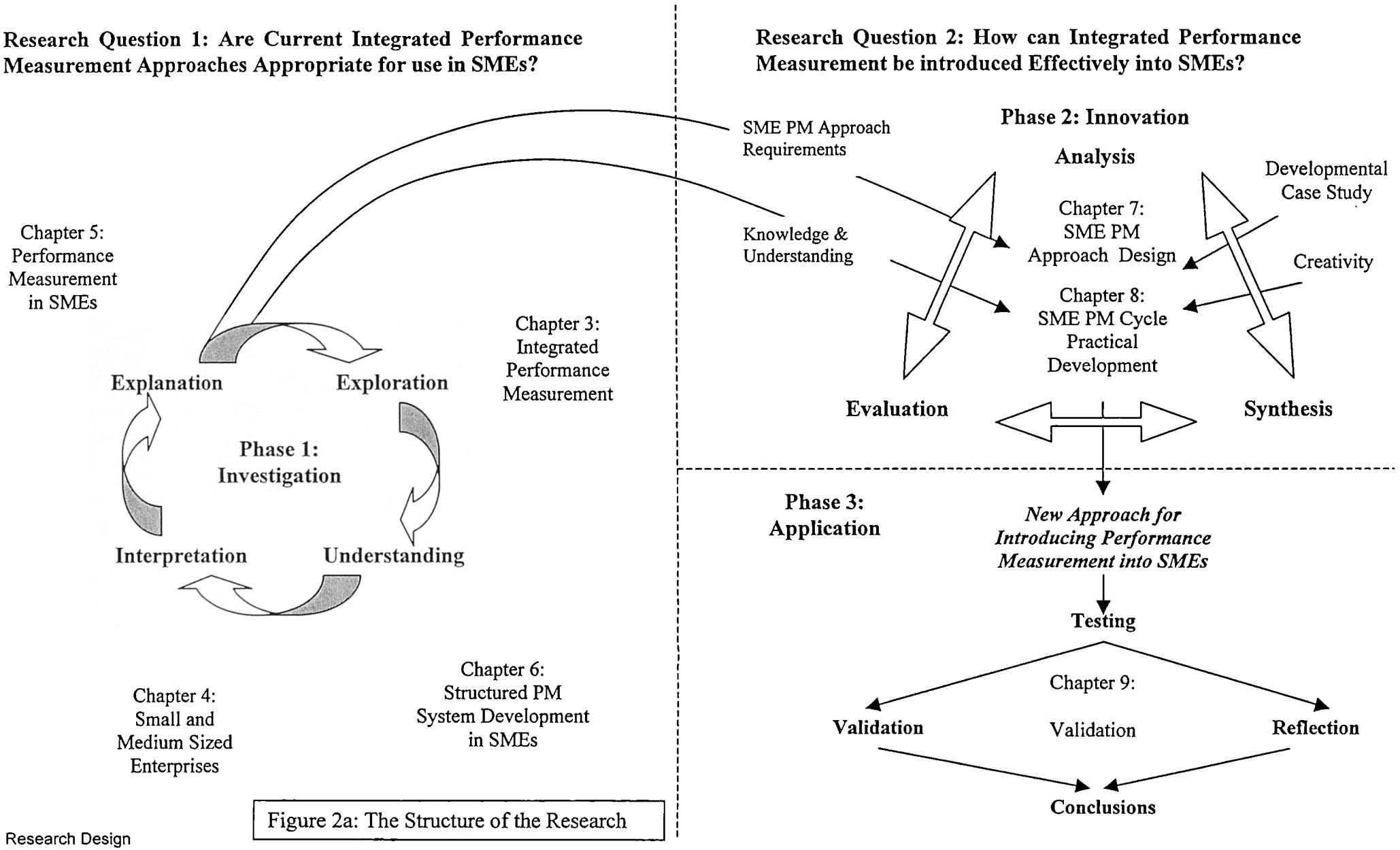


Figure 2a: The Structure of the Research

Chapter 3: Integrated Performance Measurement

3.0 Introduction

This chapter introduces the concept of integrated PM. A brief history of the subject area illustrates its evolution. A conceptual model is then developed from the literature illustrating the criteria for effective integrated PM development. The conceptual model is used as a basis for evaluating existing approaches for designing and implementing integrated PM systems. Finally, a comprehensive PM development approach is identified, based on its adherence to the conceptual model.

3.1 The Need for Integrated Performance Measurement

Assessing the performance of business has traditionally been accomplished using a variety of cost accounting techniques developed well before the second world war (Bititci, 1994). These tended to focus on direct labour as the primary cost (Hayes and Jaikumar, 1988), which was appropriate in the 1950's when it typically accounted for around 50% of total costs. However, in today's environment, direct labour costs might account for just 5% of total costs (Miller and Vollman, 1985). Therefore, costings based primarily on direct labour might now produce erroneous results and lead managers to make wrong decisions (Neely, 1999). This problem was recognised in the late 1980's, with the development of Activity Based Costing (ABC) (Cooper, 1988). ABC works by identifying the activities within the production process that cause indirect costs to be incurred. The primary cost drivers can then be highlighted and eliminated, thereby increasing efficiency (Frey and Gordon, 1999).

In order to remain viable in the ever-more competitive modern environment, businesses have had to refine not only their cost accounting systems, but also the way they run their operations (Wheelwright, 1981). This has led to many companies striving to be 'world class' and adopting management techniques and philosophies such as total quality management (TQM), just-in-time (JIT), flexible manufacturing systems (FMS), business process reengineering (BPR) and lean manufacturing (Hayes and Pisano, 1994). According to Barker (1995) these innovations require more detailed measurement information than can be provided by even the most sophisticated cost accounting techniques. This is attributed to the constraints inherent in measurement systems with a purely financial focus (Kaplan, 1983; Hayes et al, 1988).

Although this view was not universally held (Bromwich and Bhimani, 1989), a notable body of research developed throughout the late 1980's and 1990's highlighting the limitations of financially-focused measurement systems. Eccles (1991) argues that financial measurements encourage short-term thinking, thereby opposing strategic development. He also points out that they are historically oriented, focusing on past performance, rather than predicting future performance. These shortcomings are echoed by Chakravarthy (1995) and Ghalayini and Noble (1996), the latter adding that financial measures are also often irrelevant, due to the difficulty in quantifying many aspects of operational performance (e.g. quality or delivery performance) in financial terms. In addition, Johnson and Kaplan (1987) suggest that financial measures are too insular, ignoring both the competition and customer needs.

The growing number of criticisms of pure financial measurement led to the concept of integrated PM being developed to alleviate the problems (Gregory, 1993). The purpose of integrated PM is to identify the critical measures, whether these are financial, operational or

'soft' measures such as customer satisfaction, which are critical to enable the company to reach its strategic goals. This represents a significant shift in the emphasis of PM, from being oriented towards the end results, towards being a proactive tool to facilitate the identification of opportunities for future business improvement. According to Neely (1999) this change in emphasis represents a revolution in the field of PM, evidenced by the increasing body of research which has been developed over the last decade. This plethora of information has included many different proposals and guidelines that attempt to explain the characteristics of integrated PM. These may be divided into two broad categories: the dimensions of performance for which measures should be developed, and the characteristics that measures in an integrated PM system should display.

3.2 Integrated PM Characteristics

To understand the complex nature of integrated PM development, a conceptual model has been developed from the literature. The model examines what performance measures should look like (the characteristics of performance measures) and what should be measured (the dimensions of performance). In addition, criteria for effective development are established.

3.2.1 Characteristics of Performance measures

Globerson (1985) and Maskell (1989) presented sets of guidelines detailing the characteristics of performance measures, which have often been reiterated, developed and added to in more recent studies (e.g. Dixon et al, 1990; Lynch & Cross, 1991; Wisner & Fawcett, 1991; Neely et al, 1996a). Neely et al (1997) then undertook a study in this area, drawing together the literature from eleven different authors to identify and verify a set of thirteen performance

measure characteristics. However, to ensure that the conceptual model provides a consensus of academic opinion on the characteristics of performance measures, only those characteristics which have been cited by two or more authors are included. In addition characteristics have been linked, where appropriate, to retain clarity. This resulted in the development of the following set of performance measure characteristics (Table 3.1).

Performance Measure Characteristics	**Reference**
Measures should be derived from strategy	Globerson, 1985; Maskell, 1989; Dixon et al, 1990; Lynch & Cross, 1991; Wisner & Fawcett, 1991; Neely et al, 1996a;
Measures should be clearly defined, with an explicit purpose	Globerson, 1985; Neely et al, 1996a;
Measures should be relevant and easy to maintain	Maskell, 1989; Lynch and Cross, 1991;
Measures should be simple to understand and use	Maskell, 1989; Lynch & Cross, 1991; Neely et al, 1996a;
Measures should provide fast and accurate feedback	Globerson, 1985; Dixon et al, 1990; Maskell, 1989; Neely et al, 1996a;
Measures should link operations to strategic goals	Lynch & Cross, 1991; Wisner & Fawcett, 1991;
Measures should stimulate continuous improvement	Lynch & Cross, 1991; Maskell, 1989; Wisner & Fawcett, 1991; Neely et al, 1996a;

Table 3.1: Critical Characteristics of Performance Measures

These characteristics provide a generic overview of the performance measures that an integrated PM system should be comprised of, in terms of how they should be derived, how they should work and what they should achieve. However, they are insufficient for specifying what should be measured. Therefore, the appropriate dimensions of performance for which measures in an integrated PM system should be developed, will now be identified.

3.2.2 Dimensions of Performance

Dimensions of performance have been defined in various terms in the literature. Time, Cost, Quality and Flexibility are repeatedly cited as the primary operational dimensions (Kaplan, 1983; Lynch and Cross, 1991; Meyer, 1994; Neely et al, 1995; Collier, 1995; White, 1996; Laitinen, 1996; Slack et al, 1998; Medori, 1998), whilst Finance and Customer Satisfaction are also considered to be critical measurement areas (Keegan et al, 1989; Eccles, 1991; Jones et al, 1993; Schmenner and Vollmann, 1994; Bititci, 1994; Ghalayini et al, 1997). In addition, Stakeholders, including Employees, Investors and Suppliers, along with wider societal considerations such as the Community and the Environment, are increasingly being recognised as important dimensions of performance (Sink and Tuttle, 1989; Kaplan and Norton, 1992; Fitzgerald and Moon, 1996; EFQM, 1999; Waggoner et al, 1999; Neely and Adams, 2000).

The plethora of performance dimensions identified from the literature were categorised to establish potential links between them. The result of this was to establish a hierarchy of performance dimensions, sub-dimensions and measurements, with a number of horizontal relationships between each. A matrix depicting these relationships can be seen in Figure 3a, illustrating the four overall dimensions of performance under which the sub-dimensions and measures sit:

1. Stakeholder Satisfaction
2. Customer Satisfaction
3. Operational Effectiveness
4. Supplier Effectiveness

These four primary dimensions of performance are shown to allow the holistic consideration of both the internal and external aspects of business, ensuring smooth operations and production internally, whilst making the goodwill and loyalty of all the people who have an interest in the company, both internally and externally, a high priority. It is important to note, however, that these dimensions are not intended to be prescriptive. Instead, their purpose is to encourage consideration of all these areas when developing performance measures that support company strategy.

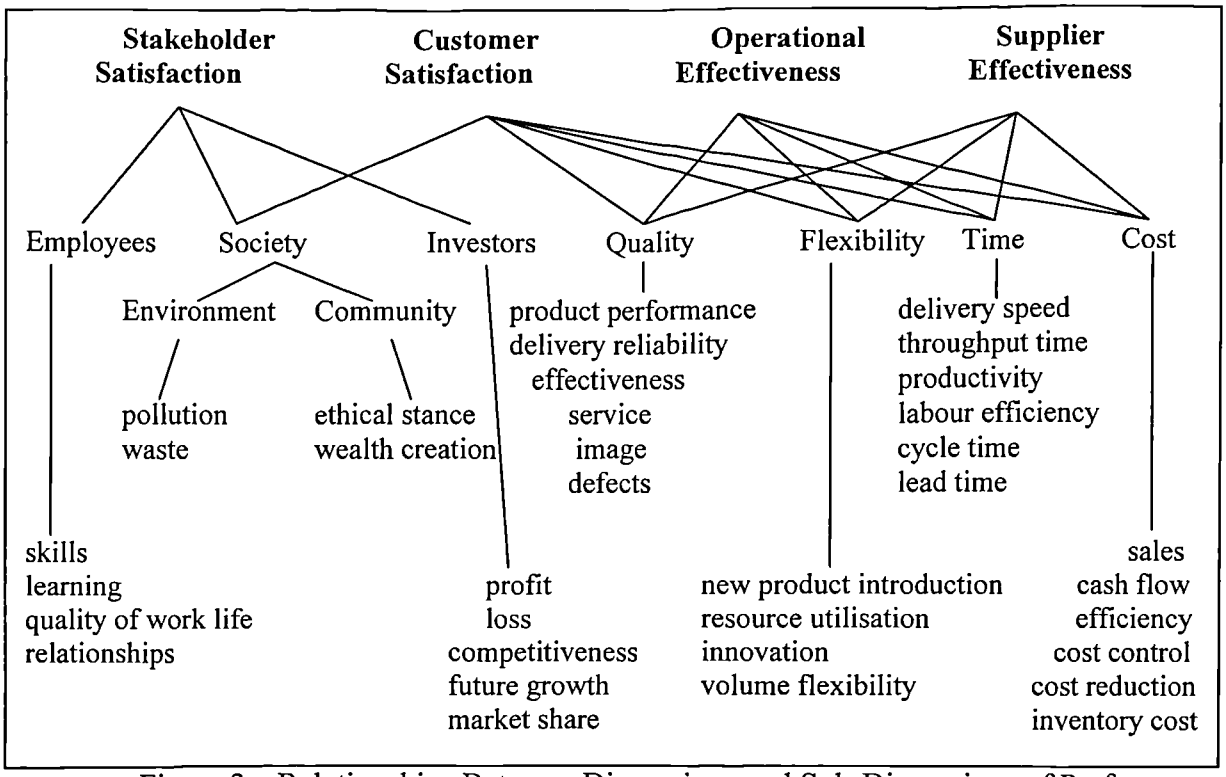


Figure 3a: Relationships Between Dimensions and Sub-Dimensions of Performance

3.3 PM Development Process Characteristics

The previous section focused solely on the content of integrated PM systems, rather than identifying the requirements of effective processes for developing them. From the available

literature, it appears that previous research has largely failed to address explicitly the process of how integrated PM should be introduced into companies. However, as this research is specifically concerned with integrated PM development into SMEs, a knowledge of potential development processes is critically important. This problem has been addressed by the identification of features of process methodologies, which can be applied to the PM development process.

3.3.1 Development process requirements

Without an effective development process for introducing an integrated PM system, there can be no practical value for businesses from the concept of integrated PM. As the PM literature is deficient in addressing this issue, a wider review was undertaken looking at process methodologies. The objective of this review was to identify general principles of effective development and implementation, which could be applied to integrated PM system development processes.

Mills et al (1995) suggest that

> *To be useful, a process should specify how an organisation might be attracted to implement the process; who should participate in the process and how the project of implementing the process should be managed.*

Their subsequent examination of the manufacturing strategy development process used the generic process components identified by Platts (1990; 1994):

- *point of entry* – the method of ensuring the participants understand and agree with the purpose of the process;
- *participation* – identifying who should be involved with the process;

- *procedure* – establishing how the process will work;
- *project management* – ensuring that the process is implemented smoothly.

Applying this framework to PM development, an effective point of entry would involve the identification of the need for improvements to the existing system. Participation in the process, according to the PM literature, should include the staff who will be the key users of the performance measures developed (Globerson, 1985; Lynch & Cross, 1991; Neely et al, 1996a). The identification of procedures for developing integrated PM systems is rather more problematic, as these will vary between companies. However, to ensure that the measures are derived from strategy, a procedure for identifying strategic objectives should be included. In addition, a method for developing the measures is necessary, along with a procedure for maintaining the new PM system.

The application of the Platts (1994) framework to the process of developing integrated PM has identified the following requirements for PM development processes:

- Need evaluation / rationale – assessing the need for developing an integrated PM system helps promote buy-in from the key players;
- Key user involvement – those people who will be directly affected by the introduction of new measures should be involved in their development;
- Strategic objective identification – to ensure that any measures developed are aligned to strategic objectives, it is necessary to establish a unified understanding of what they are;
- Performance measure development – the purpose of the process is to develop appropriate measures;

- Periodic maintenance structure – to ensure measures remain useful and relevant, regular updating is required.

In addition to these elements, however, the project management of the process also needs to be considered. This entailed the identification of a generic set of process management guidelines, which could be applied to the management of a PM development process. Two sets of guidelines were identified; Slack et al (1998) identify nine rules for the effective project management of strategy implementation. In addition, Smith & Tranfield (1989) present a similar set of guidelines for the effective implementation of Advanced Manufacturing technology (AMT). The overlaps between the two sets were considered to be the generic process management guidelines, which could be applied to the management of a PM development process. These were as follows:

- Top management support – to ensure ongoing commitment to the process;
- Full employee support – to ensure buy-in at all levels of the company;
- Clear and explicit objectives – so everyone knows what needs to be achieved;
- Set time-scales – to keep the process on course and ensure timely completion.

3.3.2 A Conceptual Model of an Integrated PM System Development Process

Table 3.1 illustrated the contributions of previous researchers to the development of the key characteristics of performance measures. In addition, Section 3.2.2 identified the various dimensions of performance from the literature, along with how they link together in a hierarchical relationship. This information, together with the characteristics of effective development processes, just discussed, can be synthesised into a conceptual model of

integrated PM development (Table 3.2). As all the criteria for this model have been derived directly from the academic literature, it may be said to represent a consensus of academic opinion on the key criteria for integrated PM development. An evaluation of existing approaches for the development of integrated PM systems against the conceptual model will now be undertaken, to identify one approach which conforms to this benchmark.

Performance Measure Characteristics	**Dimensions of performance**	**Development process requirements**
Derived from strategy	Customer Satisfaction	Need evaluation / rationale
Clearly defined / explicit purpose	Operational	Key user involvement
Relevant and easy to maintain	Effectiveness	Strategic objective identification
Simple to understand and use	Stakeholder	Performance measure development
Provide fast, accurate feedback	Satisfaction	Periodic maintenance structure
Link operations to strategic goals	Supplier Effectiveness	Top management support
Stimulate continuous improvement		Full employee support
		Clear and explicit objectives
		Set time-scales

Table 3.2 – Conceptual Model for the Evaluation of Integrated PM Development Approaches

3.4 Evaluation of Current Frameworks and Methodologies

Using the conceptual model as a basis for analysis, existing approaches for developing integrated PM systems, which were identified in the literature, were evaluated. The objective of this analysis was to identify an existing approach which was considered 'complete' with respect to the conceptual model. The evaluation was carried out from the literature available for each approach. Ten approaches were identified which were sufficiently detailed in the literature to evaluate them against the elements of the conceptual model. Table 3.3 illustrates the outcomes of this process and shows that while the majority of the approaches evaluated covered all the dimensions of performance, few exhibited properties that also mapped to the

characteristics of performance measures and to the characteristics of an effective development process.

3.4.1 The Balanced Scorecard and The Performance Pyramid

The Balanced Scorecard was developed by Kaplan & Norton (1992) to improve PM by focusing on four performance perspectives; customers, finance, internal business processes and learning and future growth. This approach has good coverage of dimensions of performance, but provides no mechanism for maintaining the relevance of defined measures. An additional deficiency of this approach is the lack of integration between the top level, strategic scorecard, and operational-level measures (Ballantine and Brignall, 1994), potentially making execution of strategy problematic. Furthermore, it fails to specify a user-centred development process.

In contrast, the Performance Pyramid (Lynch & Cross, 1991) provides an explicit link between strategy and operations, and also encourages a user-centred design. This approach illustrates the hierarchical relationships between key internal and external business objectives as a pyramid, thereby demonstrating how operational measures can link to corporate vision. The key problem with this approach, however, is that it fails to specify, in any detail, either the form of the measures or the process for developing them.

3.4.2 The Results and Determinants Matrix, Integrated Dynamic PM and Integrated PM Framework

The Results and Determinants Matrix (Fitzgerald et al, 1991) is a framework which explicitly distinguishes measures which can only report results from those which are capable of driving performance. The main strength of the Results and Determinants Matrix is that it specifies, in reasonable detail, what the measures should look like and provides a useful development process. However, it does not include customers or a complete set of stakeholders as dimensions of performance and cannot, therefore, give a truly balanced view of performance. Ghalayini and Noble (1997), in their framework for Integrated Dynamic PM, build on several different concepts to develop a system which has an explicit mechanism for maintenance and for ensuring fast and accurate feedback. The use of a PM Questionnaire, as an initial audit tool, also ensures that the dimensions of performance are adequately covered. However, as this approach consists of several different tools it is potentially complicated to understand and use. In addition, it fails to give explicit guidance on how the PM system should be developed. This is also the main failing of the Integrated PM Framework (Medori, 1998) which views PM from the perspective of six competitive priorities: quality / customer satisfaction, time, cost, delivery, flexibility and future growth. Although it provides a step-by-step guide to the development of individual performance measures, it specifically omits any mention of the people who should, or could be involved in the development of the new system.

3.4.3 The Integrated PM System and The Cambridge PM Process

The Integrated PM System methodology (Bititci et al, 1997) divides the organisation into four levels; the business, business units, business processes and activities. At each level, stakeholder requirements are identified, along with appropriate objectives and performance measures, and an external monitor. This model covers many of the required criteria for a

comprehensive PM system. However, the method fails to provide a structured process that specifies objectives and time-scales for development and implementation.

Conceptual Model	BSC	PP	R& DM	ID PMS	IP MF	IP MS	CP MP	IM M	CP MS	FSB PM
A PM system should measure:										
Customer Satisfaction	✓	✓		✓	✓	✓	✓	✓		✓
Operational Effectiveness	✓	✓	✓	✓	✓	✓	✓	✓		✓
Stakeholder Satisfaction	✓	✓		✓		✓	✓	✓		✓
Supplier Effectiveness	✓	✓	✓	✓	✓	✓	✓	✓		✓
Measures in a PM system should be:										
Derived from strategy	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Clearly defined & have an explicit purpose	✓		✓	✓	✓	✓	✓	✓	✓	✓
Relevant & easy to maintain				✓	✓	✓	✓	✓	✓	
Simple to understand & use	✓	✓	✓		✓	✓	✓	✓	✓	✓
Give fast, accurate feedback			✓	✓	✓	✓	✓	✓		✓
Link ops to strategic goals		✓	✓	✓	✓	✓	✓	✓	✓	
Stimulate continuous improvement	✓		✓	✓	✓	✓	✓	✓	✓	✓
The development process should:										
Provide a need evaluation		✓		✓	✓	✓	✓	✓		
Enable strategic objective identification	✓		✓	✓	✓	✓	✓	✓		
Facilitate performance measure development	✓		✓	✓	✓	✓	✓	✓	✓	
Provide a maintenance structure				✓	✓	✓	✓	✓	✓	
Involve key users		✓				✓	✓	✓	✓	✓
Have top management support	✓	✓	✓			✓	✓	✓	✓	✓
Have full employee support	✓	✓	✓			✓	✓	✓	✓	✓
Have clear and explicit objectives	✓		✓	✓	✓	✓	✓			
Have set timescales	✓			✓			✓			

KEY: BSC = Balanced Scorecard (Kaplan & Norton, 1992; 1993; 1996)
PP = Performance Pyramid (Lynch & Cross, 1991)
R+DM = Results and Determinants Matrix (Fitzgerald et al, 1991; Fitzgerald & Moon, 1996)
IDPMS = Integrated Dynamic Performance Measurement Systems (Ghalayini et al, 1997)
IPMF = Integrated Performance Measurement Framework (Medori, 1998a+b, Medori & Steeple, 2000)
IPMS = Integrated PM Systems (Bititci, 1994; 1995; Bititci et al, 1997; 1998)
CPMP = Cambridge PM Process (Neely et al, 1996a+b, 1997; Bourne et al, 1998a+b)
IMM = Integrated Measurement Model (Oliver & Palmer, 1998)
CPMS = Consistent PM Systems (Flapper et al, 1996)
FSBPM = Framework for Small Business Performance Measurement (Laitinen, 1996)

Table 3.3: Analysis of Current PM Approaches

The Cambridge PM Process (Neely et al, 1996a) is based on the Balanced Scorecard, but provides a comprehensive structure for developing the Scorecard measures at both the strategic and operational levels of the business. Therefore, this process fulfils all the criteria in the conceptual model and may be classified as a comprehensive process for the development of integrated PM systems. The development of operational measures, however, is described as an optional process. For it to be comprehensive, both strategic and operational measures need to be developed.

3.4.4 The Integrated Measurement Model, Consistent PM System and Framework for Small Business PM

Oliver & Palmer's (1998) Integrated Measurement Model is also a comprehensive approach, defining the dimensions of performance in terms of cost, quality, flexibility, delivery and service, whilst also providing a mechanism for developing the measures. The unsatisfactory aspect of this approach is the lack of a structured development process. In contrast to this, the Consistent PM System (Flapper et al, 1996) gives a very detailed description of the stages involved in developing and implementing an integrated PM system, but fails to specify a balanced approach for critical dimensions of performance. Finally, the Framework for Small Business PM (Laitinen, 1996), differs from all the other frameworks in that it is based on Activity Based Costing (ABC) and adopts a purely bottom-up perspective on performance. This means that, although the framework is useful for measuring and improving performance, there is no requirement for them to be strategically derived.

3.5 A Comprehensive Integrated PM Development Approach

Most of the frameworks and processes analysed against the conceptual model provide explicit guidance about what to measure, along with varying amounts of information about how to design the measures. The Cambridge PM Process (Neely et al, 1996a), along with the Integrated PM System (Bititci et al, 1997) and the Integrated Measurement Model (Oliver and Palmer, 1998), conformed to all the elements of the conceptual model regarding the description of what to measure and what the measures should look like. However, conformance to the development process characteristics in the conceptual model was less consistent. From the literature on each approach which was used for the assessment, only the Cambridge PM Process clearly fulfilled all the criteria identified in the conceptual model for the development process. Therefore, from the information available, this is the only process which offers explicit guidance on both what to measure and how to develop and implement an integrated PM system effectively.

3.6 Conclusion

This chapter has briefly charted the history of PM, illustrating why and how it has changed over the years, from its roots in financial accounting to its current, more holistic and integrated format. A conceptual model of integrated PM development has been formulated, which represents the consensus of current academic theory. 10 existing approaches for developing integrated PM systems have been reviewed against the conceptual model, from the available literature. This enabled the identification of a comprehensive integrated PM development approach. The following chapters will evaluate how PM is used in SMEs and whether integrated PM is appropriate for use in this environment.

Chapter 4: Small and Medium Sized Enterprises

4.0 Introduction

The comprehensive approach, identified in Chapter 3, for developing integrated PM systems was originally designed and tested for use in large organisations. This chapter will, therefore, evaluate the appropriateness of introducing integrated PM in a SME environment. This will be achieved through a review of the relevant literature, focusing on establishing the characteristics of SMEs. Then an evaluation of how these characteristics might inhibit or promote integrated PM introduction will be carried out. The purpose of this is to give an overview of how SMEs function, in order to evaluate how appropriate the introduction of integrated PM systems would be in such companies.

4.1 What is a SME?

Small and medium sized enterprises are notoriously difficult to define, due to their disparate nature and the numerous factors that are involved. The complexity of such a definition was illustrated in the Bolton Report (1971), which attempted to classify small firms in a number of different sectors. This involved using employees, turnover, or assets to define size, depending on business type. Therefore, small manufacturing firms had fewer than 200 employees, whereas retailers had a turnover of £50,000 or less. However, several criticisms have been levelled at this form of classification, primarily because it is difficult to make comparisons when different units of measurement are being used. In addition, the use of monetary units makes time-based comparisons difficult due to differences in real-term value (Storey, 1994).

Medium sized companies have been defined by the UK government for the purposes of the 1989 Companies Act. This identified three criteria, of which qualifying companies had to meet at least two. These were that the company employed less than 250 people, had a turnover not exceeding £8 million and a balance sheet of under £3.8 million. Burns (1996) transposed these figures, taking into account inflation, to levels appropriate for the mid 1990s, giving figures of £12 million maximum turnover and £5 million balance sheet totals, with the maximum number of employees remaining constant at 250.

The European Commission also attempted to define 'smallness', in order to establish the qualifying terms for the provision of aid to companies. To achieve this, the Commission coined the term Small and Medium sized Enterprise (SME), which was split into three components: micro companies, small companies and medium companies. Until 1995 the definitions for each were based solely on number of employees, with 9 or less comprising a micro enterprise, small companies being 10-99 employees and medium enterprises comprising 100-499 employees (European Network for SME Research, 1995). This definition was commonly adopted by researchers (Hyvarinen, 1990; Storey, 1994; The CIM Institute, 1995) although additional constraints were also often adopted for the particular purposes of the research.

In 1996 the European Commission updated its definition of what constituted a SME, bringing the upper limit down from 499 employees to 249 employees. The new structure saw no change for micro enterprises, but small companies were now defined as having 10-49 employees, with medium sized companies having 50-249 employees (European Network for SME Research, 1996). In addition, to be classified as a SME, one of two financial criteria had to be satisfied; a balance sheet total of less than €27 million, or a turnover of under €40

million and the company also had to be independently owned. Revisions to the financial data were set to occur approximately every four years, to take account of changing economic needs (European Commission, 1996).

Despite the effort that has been put into identifying an appropriate definition of SMEs, researchers still continue to adopt their own frameworks. These are generally based on an amalgamation of various definitions that satisfy their particular research needs (e.g. Miller and Askey, 1997). The reason for this is that the definitions so far described in this chapter have been developed either for legal reasons (as in the Companies Act, 1989), or as methods of limiting access to funding and aid packages (as in the EC definition). Therefore, the definitions are simply arbitrary cut-off points in company size, whereas in reality *"such clear 'breaks' are rare, and size appears to be a continuous rather than a discrete variable"* (Storey, 1994). This has led to the idea that a more qualitative approach to defining SMEs, through characteristics rather than statistics, should be adopted for research purposes:

> *In short, 'size' measured in terms of number of employees, turnover level, market share or whatever, does not provide a sufficiently robust criterion to isolate 'small firms' for the purpose of theory and analysis. What is needed, therefore, is an alternative approach to identifying what small business research is concerned with which will rescue it from an arid search for magic numbers (Curran and Burrows, 1993).*

Therefore, although numeric values may broadly be used to identify whether a company is relatively small or medium in size, this should be supplemented by a set of characteristics which enable a fuller definition of the term SME. The following section will attempt to identify such a set of characteristics, in order to provide a definition of what constitutes a SME for the purposes of this research project.

4.2 SME Characteristics

Much of the research that has been carried out in SMEs has described certain characteristics of these companies which either affected the research design, or were deemed to have been a causal factor in the results. Despite the recognised heterogeneity of SMEs, there appears to be a consensus from researchers in this field that many SMEs share a number of general characteristics. There have been several attempts to categorise these characteristics into broad themes (Vianen, 1993; Yusof and Aspinwall, 2000; Ghobadian and Gallear, 1997; Gunesekaran et al, 1999). However, these are different in each case, reflecting the particular interests of the researchers and the fact that there appears to be no commonly accepted framework for such categorisation. Therefore, the framework used here consists of the categories which were considered to cover all the relevant perspectives for this research, namely: *Competitive Environment*; *Organisational Environment* and *Management Practices*.

4.2.1 Competitive Environment

SMEs are considered to be flexible and adaptable to market changes (Ghobadian and Gallear, 2000; Yusof and Aspinwall, 2000). This responsiveness is generally viewed as a positive characteristic. However, the root cause of this attribute is that many SMEs have no control over the markets in which they operate. They are unable to drive the market but, instead, must react and adapt to the changes that occur over which they have no influence (Burns, 1996; Storey and Sykes, 1996; Hyvarinen, 1990). This problem is exacerbated by the fact that few SMEs have more than a limited overview of their target market (Wiklund and Wiklund, 1999; Huang and Brown, 1999; Pelham, 1999).

SMEs' relationships with their customers are also highly uncertain. There is an acknowledged advantage in that small firms are closer to the customer, enabling more personal relationships to develop (McAdam, 2000). However, this is tempered by the danger that having a limited customer base (Ghobadian and Gallear, 1997; Yusof and Aspinwall, 2000) facilitates the development of deferential supplier-customer relationships. Rainnie (1991) categorised SMEs into groups, according to their relationships with larger companies:

- *Dependent* firms –existing only to serve their larger counterparts;
- *Dominated* firms –competing with large firms, but only through sheer hard work and effort;
- *Staid* firms –finding a safe market niche from which to operate; and
- *Innovative* firms – pioneering new opportunities, but vulnerable to take-overs if successful.

It is interesting to note that, with the exception of Staid firms which operate only in very low profit or niche markets, SMEs are consistently viewed as being subservient to their larger counterparts. This view is supported by Oakes and Lee (1999) who suggest that SMEs have a lack of control over their futures because of demands made by stronger customers throughout the supply chain. An additional burden for SMEs is a lack of power to leverage payment of debts from these customers, as noted by McCulloch and Lewis (1986), who point out that many smaller firms are *"afraid to press customers too hard for payment for fear of loss of future business."* It is this scenario which most severely affects SMEs as their limited resources cannot cope with the fluctuations in cash flow that late payment inevitably brings.

The overall effect of the fiercely competitive environment in which SMEs operate is that, very often, strategic planning becomes a seemingly pointless exercise. Pelham (1999) points out

that unless the internal structures and the external competitive environment of the SME are effectively aligned with its strategy, it is unlikely that it will ever be implemented successfully. The difficulties associated with aligning strategy to the external competitive environment led Argument et al (1997) to conclude that the majority of SMEs in the automotive sector are not concerned about future strategic developments, as survival in the supply chain requires them only to maintain a reactive strategy. In addition, Harris and Ogbonna (1999) found that it is not unusual to find firms which have never updated their strategy since it was originally developed by the founder, thereby leading to a *"strategic hangover,"* which, if the competitive environment or the company structure have changed, may be detrimental to future business success.

There is also evidence to suggest that many established SMEs rely solely on internal or financial planning as their main approach to preparing for the future (Waalewijn and Segar, 1993; O'Regan et al, 1998). This might be due to the fact that accountancy information has been shown to be the most important factor in determining survival or failure in SMEs (O'Neill and Duker, 1986). However, financial information alone is limited as it fails to give a true overview of the competitive environment in which the SME operates. Furthermore there is evidence to show that companies which make strategic, rather than just financial, business plans perform significantly better, financially, than those which do not (Smith, 1998).

4.2.2 Organisational Environment

The most widely acknowledged factor that distinguishes SMEs from larger companies is the organisational environment in which they operate. They are considered to have flat structures with few management layers, to be flexible and adaptable to changing market needs and to have a high potential for innovation (Ghobadian and Gallear, 1997; McAdam, 2000; Yusof

and Aspinwall, 2000; Wiklund and Wiklund, 1999; DTI, 1994; Jennings and Beaver, 1997; Burns, 1996; Gunesekaran et al, 2000). However, they are also seen as suffering from "*resource poverty*" (Welsh and White, 1981), both in terms of human resources and financial stability and security (Abdul-Nour et al, 1998; Pelham, 1999).

It is commonly noted that SMEs are loosely structured, with informal operating practices and a lack of bureaucracy (Jennings and Beaver, 1997; Hyvarinen, 1990). This facilitates a high degree of personal authority among staff and management who are visible and involved in the operations of the company (Storey and Sykes, 1996; Jennings and Beaver, 1997). Conversely, there are also recognised skills shortages amongst staff, along with a deficit in management expertise (McAdam, 2000; Curran, 1987; Huang and Brown, 1999) and with highly personalised management styles common (Storey and Sykes, 1996).

4.2.3 Management Practices

The organisational environment in which many SMEs operate can have a profound effect on the way that they are managed. A key factor in this is the personalised management styles which are a feature of firms where control rests primarily with one person, usually either the owner-manager or a managing director.

According to Hannon and Atherton (2000) there are four types of owner-manager, with each type likely to have a distinct effect on the business. The first type have low strategic awareness and low planning capabilities. Companies managed by such people are termed *'un-navigated ships'* and are likely to be poor performers. Where the owner-manager has good planning capabilities, but little strategic awareness, the company is seen as a *'myopic innovator'*, having potential but remaining vulnerable to unforeseen events. The *'visionary*

under-achiever' is the term given to firms where the owner-manager has a high level of strategic awareness, but fails to plan well enough to see good ideas thrive. Finally, some firms are driven by people with good strategic awareness and effective planning capabilities. These firms are likely to be successful due to their ability to identify potential threats and act upon appropriate opportunities, they are therefore known *as 'successful orienteers'*. Although this study focuses only on owner-managers, it seems likely that in any firm where the centre of control rests primarily with one person, this framework would be appropriate.

The idea that the driving force in a company significantly affects a company's strategic success is echoed by Berry (1998). Her study of high tech firms concluded that

> *the technical entrepreneur's strategic awareness will determine the nature of planning used within the firm.*

In addition, Brouthers et al (1998) suggest that planning in SMEs is typically less political, less controlled, less rational and more intuitive than in large companies.

Frese et al (2000) take the link between managerial capabilities and business success one stage further. Their study investigates the link between the personal strategies of the managing director and the success or failure of the business strategy. They identify five personal strategic approaches:

- *Complete Planning* – where a comprehensive set of plans are produced which actively structure given situations;
- *Critical Point Planning* – which concentrates on one goal at a time, aiming to solve the most difficult problem first, thereby making strategy an iterative process (Zempel, 1994 cf. Frese et al, 2000);

- *Opportunistic Strategy* – where strategy is largely dictated by the new opportunities which arise and basic planning is easily sacrificed to them;
- *Reactive Strategy* – where no forward planning is undertaken, but the person simply reacts to current demands;
- *Routine / habit* – this is not actually a strategy at all, but simply a standard approach to problems, which has been used before and is therefore both familiar and undemanding.

From this typology, the Frese et al study illustrates that a combination of Critical Point and Opportunistic Strategies is most likely to bring business success, whereas Reactive / Opportunistic is the least successful combination. Interestingly, although the Reactive strategy was negatively correlated with business success, there was no evidence to support the idea that complete planners were any more likely to succeed.

In terms of management practice, a key feature of many SMEs is that they have fewer senior managers, meaning that the capabilities of just one person can have a profound effect. Perhaps it is due to a lack of management expertise that strategic business planning in SMEs appears to be generally limited and short term in focus, with strategies tending to follow a fire-fighting 'react and adapt' philosophy (Ghobadian and Gallear, 1997; McAdam, 2000; Yusof and Aspinwall, 2000; Burns, 1996; Oakes and Lee, 1999). This is summed up by Jennings and Beaver (1997):

> *[In SMEs]...strategic management becomes primarily an adaptive process concerned with manipulating a limited amount of resources, usually, in order to gain the maximum immediate and short term advantage.*

4.2.4 SME Defining Characteristics: A Summary

From this review of the literature, it can be seen that there are a number of key characteristics of SMEs which are not directly related to size. In conjunction with basic numeric definitions, these are able to provide a more accurate view of the particular group of firms that are termed SMEs and are the focus of this research. Therefore, for the purposes of this research project, a SME is classified as a company with fewer than 250 employees, which exhibits the characteristics identified in table 4.1.

Competitive Environment	**References**
Reliance on a small number of customers;	Ghobadian & Gallear, 1997; Yusof & Aspinwall, 2000.
Lack of market influence;	Storey & Sykes, 1996; Burns, 1996; Pelham, 1999, Wiklund & Wiklund, 1999; Huang & Brown, 1999; Hyvarinen, 1990.
Reactive, fire-fighting mentality;	Argument et al, 1997; Harris & Obgonna, 1999.
Organisational Environment	
Flat, flexible organisational structures with a high potential for innovation;	Ghobadian & Gallear, 1997; Burns, 1996; DTI, 1994; Wiklund & Wiklund, 1999; McAdam, 2000; Yusof & Aspinwall, 2000; Gunesekaran et al, 2000; Jennings & Beaver, 1997.
Severe resource limitations in terms of manpower and finance;	Welsh & White, 1981; Abdul-Nour et al, 1998; Pelham, 1999.
Skills shortages and lack of training;	McAdam, 2000; Huang & Brown, 1999; Curran, 1997.
Management Practices	
Highly personalised management styles;	Storey & Sykes, 1996; Hannon & Atherton, 2000; Frese et al, 2000.
Lack of management expertise;	Brouthers et al, 1998; Curran, 1987; Huang & Brown, 1999.
Informal, reactive strategies;	Ghobadian & Gallear, 1997; Burns, 1996; McAdam, 2000; Yusof & Aspinwall, 2000; Oakes & Lee, 1999; Jennings & Beaver, 1997.

Table 4.1: SME Characteristics as Defined for this Research Project

4.3 Is Integrated PM Appropriate for SMEs?

This section assesses whether the characteristics of SMEs, identified above, make the introduction of integrated PM appropriate in this environment. The assessment is carried out by analysing the criteria from the conceptual model of integrated PM development (as developed in Chapter 3), against the characteristics of SMEs already identified. The analysis is focused around establishing the characteristics that will either inhibit or promote the

development of integrated PM into SMEs. In addition, the importance of integrated PM for SMEs will be discussed. This will theoretically establish the appropriateness of integrated PM for use in SMEs, whilst also highlighting the key areas which should be taken into consideration when implementing integrated PM in SMEs.

4.3.1 SME Characteristics that Promote the Introduction of Integrated PM

The potential advantages of introducing integrated PM in a SME environment are that both management and process visibility is likely to be high, due to having fewer employees and generally flat structures within the company. These characteristics should simplify the communication process, helping to ensure that every employee is aware of what is happening and why. They also make it more likely that decisions will be made quickly and with less bureaucracy.

4.3.2 SME Characteristics that Inhibit the Introduction of Integrated PM

If the introduction of integrated PM is compared against other examples of change in SMEs, from the literature, there appears to be a common set of issues which are important in this process. As Wiele and Brown (1998) note:

> *TQM [Total Quality Management] implementation has everything to do with organisational change. And every change in a SME is difficult because of the obstacles to be overcome [...] These obstacles are not only related to the implementation of a quality philosophy, but are difficulties encountered in any change a SME has to go through.*

Therefore, although the structure of SMEs potentially makes some aspects of implementing integrated PM easier, previous researcher's experiences of implementing change in SMEs

indicate that that there are also likely to considerable disadvantages to contend with Ghobadian and Gallear (1996, 1997).

The characteristics that are likely to inhibit the introduction of integrated PM into SMEs are principally caused by the lack of resources which SMEs experience (for example management time, appropriate skills and money). Interestingly, one of the main findings from a case-based study of TQM implementation in SMEs described in Ghobadian and Gallear (1997) is that resource paucity – particularly that of management time – means that the implementation process is markedly more taxing for SMEs than larger companies, a view that is supported by other studies (Elmuti and Kathawala, 1999). An additional disadvantage is when customers or stakeholders apply pressure for internal improvements. This can lead SMEs to treat such initiatives as paper-based exercises, precluding them from gaining any real benefits. Careful management is seen as the key to ensuring this problem does not occur (Boon and Ram, 1998).

Findings from another study (Gulbro et al, 2000) show that there appears to be a direct link between the rate of change and the amount of effort and enthusiasm people are willing to put in to the change. This can be explained by Chapman and Sloan (1999), who conclude that there is a:

> *... greater degree of frustration in the smaller firms between the knowledge of CI (continuous improvement) mechanisms and the reality of their implementation. The greater pressure on all personnel in smaller firms to meet the 'bottom line' requirements probably accounts for this finding, at least in part.*

In addition, Yusof and Aspinwall (2000a; 2000b) highlight the importance of first improving tangibles, rather than intangibles, in a change project to counteract this resource deficit. As they put it:

> *Small businesses must be presented with a TQM approach which is attractive to them in the sense that it must not promise to improve anything or to solve every problem, but rather, it must be seen to help them to be better in a short time span, say three to six months, with a view to long-term sustainability.*

The implication here is that unless tangible benefits can be gained initially, enthusiasm for introducing integrated PM is likely to wane and resources redirected elsewhere. This view is echoed by McAdam (2000), who comments that it is difficult to convince SME managers about the long term benefits of change, when they live in constantly changing environments. His proposed solution to this problem is to ensure that improvement projects have adequate short-term benefits as well as long-term potential, and that they are capable of adapting to the rapidly changing environments which are a feature of SMEs.

4.3.4 Implications for Introducing Integrated PM into SMEs

The severe resource limitations facing SMEs, along with a general lack of skills and training, means that the introduction and use of any integrated PM system would have to be extremely well managed. According to the conceptual model of integrated PM development, this means that an appropriate approach would require a well designed development process, with a clear focus and effective project management. In addition, the measures produced would need to be clearly defined, have an explicit purpose, be relevant and easy to maintain, provide fast and accurate feedback and be simple to understand and use. These characteristics would ensure the efficiency of the PM system and increase the likelihood of successful implementation and use.

The informality and often reactive nature of SME strategies, along with their potential for fire-fighting, also means that it is likely to be considerably more difficult to develop a strategically oriented integrated PM system in SMEs than in large companies. However, several elements in the conceptual model of integrated PM might help alleviate this problem. For example, enabling strategic objective identification during the development phase would help to ensure that the performance measures would be derived from strategy and would help to link operations to strategic goals. An advantage of adopting this approach would be that the PM system would provide data that could input directly into the strategy formulation process. In addition, a periodic maintenance structure would ensure that the measurement system keeps track of changes in strategy and that measures remain relevant and appropriate.

4.3.3 The Importance of Integrated PM for SMEs

The reliance of SMEs on a small customer base suggests that, to remain competitive, SMEs must ensure that customer satisfaction remains high and that they can be flexible enough to respond rapidly to changes in the market. This can only happen effectively if the company is supplied with the right materials at the right time and if it is operationally effective. In addition, stakeholders, particularly those who have a financial interest in the firm, are critical to the success of both large and small companies. However, given the lack of any other monetary safety net to absorb the impact of short term fluctuations resulting from change, stakeholder satisfaction is of paramount importance in SMEs. Finally, effective operations are essential for all firms, particularly when resources are scarce. Therefore, measuring operational effectiveness is a key method of facilitating long term success.

4.4 Conclusion

This chapter set out to establish a definition of what constitutes a SME, in terms of their size and characteristics, for the purposes of this research. This working definition was necessary due to the heterogeneity of small firms in general, which would have made a more concrete definition impossible. An assessment has shown that the SME characteristics identified would, potentially, have a profound effect on the introduction of integrated PM systems in this environment. However, little empirical evidence currently exists which describes current PM practice in SMEs or which evaluates the appropriateness of current development approaches within this context. The following chapters focus explicitly on these issues. In Chapter 5, a survey of eight companies is described to establish how SMEs currently measure performance. Then, Chapter 6 presents a case study which describes, in detail, the application of the Cambridge PM Process in a SME.

Chapter 5: Performance Measurement in SMEs

5.0 Introduction

In Chapter 4, the distinctive characteristics of SMEs were identified and discussed. These characteristics were then mapped to the conceptual model of integrated PM development and a number of issues concerning the use of such a system in a SME environment were highlighted. This chapter begins by looking at the literature concerning the way SMEs use performance measures. An empirical study is then described which aims to widen current knowledge in this area. The data is then used to develop a model of the sort of PM systems that might be found in SMEs.

5.1 How SMEs Use Performance Measures

Although there has been a significant amount of research carried out into the needs and use of PM in large organisations, this is not reflected in the case of SMEs, where there is a distinct lack of published research on these issues. From the literature that is available, however, a broad picture of the way PM is used in SMEs can be gained.

5.1.1 Previous Research on PM in SMEs

According to Jarvis et al (2000) SMEs tend to adopt financially based performance measures, particularly focusing on cash, be it how much is in the bank, or how it flows through the company. This view is supported by Webb et al (1999), who carried out a study on the type of measures typically in use in manufacturing SMEs. This contrasts with the accepted wisdom in larger firms that the primary performance indicators should be focused on profit maximisation. However, a study carried out by CIMA (1993) found that

there were no significant differences between the way large and small companies measure performance. In addition, Masalla (1994) concluded that Italian SMEs paid little attention to management accounting information, instead confining their measurements almost exclusively to financial figures about income and sales. This leaves a confused picture about how SMEs typically measure business performance. However, all firms must provide standard financial figures for tax purposes and many are also encouraged to provide financial measurements for their external stakeholders (Walley et al, 1994).

Although business level PM in SMEs often seems to be minimal and financially focused, Hynes (1998) points out that SMEs cannot effectively manage performance on this basis. CIMA (1993) states that there is an increasing realisation of the importance of non-financial measurement among SMEs, although it concedes that there is still a disparity between practice and theory – which emphasises the use of non-financial measures – in this area. This disparity can be explained by the indistinct understanding of the importance of performance indicators in general, particularly operational indicators (Walley et al, 1994; Webb et al, 1999). As a result, it is not surprising to find that studies on the use of PM typically indicate that operational measures are ad-hoc and informal (Addy et al, 1994), with no real understanding of which measures drive performance (Greatbanks and Boaden, 1998). This might explain why SME PM systems are rarely structured to help them achieve their strategic goals (CIMA, 1993; Barnes et al, 1998; Veitch and Smith, 2000).

In cases where PM is used to drive performance, problems can also occur. Studies have shown that output volume is a very common operational measure in SMEs (Close et al, 1998; Webb et al, 1999). In some companies, this measure is perceived as being the primary performance measure amongst both staff and managers. However, having one

overriding measure driving performance can induce extremely strong behavioural responses in staff, which can inhibit the ability of a company to change (Close et al, 1998). This is because many firms do not change their performance measures when they change their strategies (Walley et al, 1994). This type of unstructured PM could not only make achieving strategic objectives difficult, but could also prevent any strategic development occurring within the company.

5.2 PM practice in SMEs

Although the literature highlighted a number of characteristics of SME PM systems, the paucity of in-depth studies on the way PM is used in SMEs indicated the need for an empirical study, which could be used to identify the characteristics of SME measurement systems. This took the form of a set of interviews with SME managers, which are examined in detail in this section.

5.2.1 Research Method

As the purpose of the interviews was to gain an understanding of the way PM is used in SMEs, semi-structured interviews appeared to be the most useful method of gaining access to this information. Therefore, a small number of exploratory questions were formulated, based on aspects of the conceptual model of integrated PM development. These questions were designed to ensure that all relevant areas were covered, but the interviewer and interviewee were free to explore and discuss beyond these boundaries wherever appropriate (see appendix 1 for a copy of the exploratory questions). Additionally, to help ensure that all the companies fitted the sampling criteria, a number of standard questions gathering basic information about the company were also required.

A sample of 8 SMEs were selected within the constraints identified, using a purposive sampling strategy (see Chapter 2, section 2.6 for details of sample selection and constraints). Patton (1990) describes various different types of purposeful sample, including critical case sampling, which enables the selection of cases that are critical to the understanding of a phenomenon. This appeared to be the most appropriate method for use in this situation. Saunders et al (1997) provide three exploratory questions which help identify critical cases:

- *If it happens here, will it happen everywhere?*
- *If they are having problems, can you be sure that everyone will have problems?*
- *If they cannot understand the process is it likely that no one will be able to understand the process?*

Answering 'yes' to these questions was achieved by selecting companies that had recently undertaken strategic improvement programmes. The rationale for the selection of this sample was that companies actively seeking strategic improvements would be most likely to be using integrated PM, or at least view it as a useful improvement tool. From the initial literature review on SMEs, there was a strong assumption that integrated PM would not be in use and that difficulties would be encountered when attempting to implement it in SMEs. Therefore, by selecting companies that were considered most likely to either already be using integrated PM, or be interested in implementing it, the results from a few cases would be significantly more generalisable than by selecting a representative sample of the same size.

An appropriate manager was contacted in each firm and invited to take part in an on-site interview. Each interview lasted approximately 1 hour. To ensure accurate data collection, permission was sought, and given, from all interviewees to have the interviews taped. To ensure that the interviewer had an accurate understanding of the issues covered, a summary of each interview was produced from the transcripts and verified by the

interviewee (see appendix 1 for copies of the interview summaries). Additionally, to eliminate the effects of interviewer bias, the summaries were validated by another manager, facilitating data triangulation.

5.2.2 Interview Analysis

Transcripts from the interviews were analysed using thematic coding (Flick, 1998). The themes were derived from the conceptual model of integrated PM development. An example of the coding procedure is given in Figure 5a. The analysis involved examining the data against the three primary headings: PM dimensions, PM characteristics and the PM development process. The purpose of this was to enable the identification of the performance measures that were used in each company, the characteristics of those measures and why and how the measures were developed.

Codes	*Transcript (excerpt from Company G)*
lead times *delivery date* *effectiveness* *feedback*	"When we receive an order we quote a delivery date. The customer gives a date that they would like it by and we give a realistic date that might be better or it might be worse. Then when we don't reach that delivery date we have statistics that tell us how efficient we have been. So we can say "well 10% of what we have done has been delivered late". Then we can look back and see what the cause was. Design new processes so it doesn't happen again. That works best and that is as and when – that is not taken every month."

Figure 5a: Example of Coding

The analysis highlighted a number of common characteristics of the SME PM systems, which provided a model of the type of PM systems in use. This model was compared against the conceptual model and a gap analysis was used to facilitate the identification of discrepancies between the empirical and theoretical data. The results of this analysis will now be illustrated and discussed in detail.

5.2.3 Results

The results of the analysis provided some interesting insights into the way that SMEs use performance measures. In terms of what is measured, all interviewees reported a plethora of financial measurements in their respective companies, for example;

> *We formally measure mainly financial indicators and really that is it as far as consistent measures are concerned. (Company D)*

This lack of appropriate, non-financial, measures was reflected across all the participant companies, with one company commenting;

> *we are struggling because we don't record the right, or sufficient, or even the right kind of data to make the right decisions. (Company D)*

This was the case in all but the smallest company, where there was a feeling that, with just 12 employees and £1 million turnover per annum, detailed financial data was sufficient for monitoring their performance:

> *...production issues in terms of production efficiency are resolved very quickly because we cannot afford to waste time on the shop floor. Time is money. We have this specific recovery programme and if any job appears not to be making the appropriate amount it is monitored very, very quickly. It is noticed very, very quickly. (Company E)*

Despite the heavy emphasis on financial measurement, the company did recognise that it was very reliant on external suppliers to survive. Therefore, non-financial indicators were still seen as a requirement to reduce their external vulnerability.

> *We have minimum standards of quality and some things that we can measure are consistency and quality of supplied product. Because we work just in time as much as possible we have to be sure of our suppliers. We make sure that they are flexible or their quality is outstanding. (Company E)*

The other, larger companies in the sample were more generous in their use of non-financial measures, with all of them having at least one measure in each principal measurement area (Stakeholder Satisfaction, Customer Satisfaction, Operational Effectiveness and Supplier Effectiveness).

Supplier measures were generally well developed, particularly in companies where quality was of paramount importance. One such company had established a relatively sophisticated system for ranking its suppliers against a number of criteria:

> *Each supplier is coded so if they are low down the scale then every time a product comes in we check it thoroughly – if they are high up the scale we do it occasionally or not at all, depending on what procedures they have in place or if they have ISO.(Company A)*

Suppliers were also monitored retrospectively. One company included its suppliers in the feedback loop which was activated by product returns;

> *We measure returns on whether we have a problem or the supplier does. (Company B)*

This arrangement demonstrates that feedback on performance measures is used, albeit in a fairly rudimentary way. It is interesting to note that the majority of measures with an explicit feedback loop focused primarily on reacting to problems that had already occurred, such as returns or late delivery, with very few companies having appropriate measures in place to pre-empt these issues.

> *So we can say – "well 10% of what we've done has been delivered late" – then we can look back and see what the cause of that was. Design new processes so it doesn't happen again. (Company G)*

However, even this basic feedback was something of a luxury in some of the companies, where information appeared difficult to come by;

> *I don't think there is formal feedback"(Company A)* or again *"Its all very closed and the information only gets passed to those who actually ask for it. (Company C)*

This somewhat ambivalent attitude is explained to some extent by the perceptions of the employees and even managers towards measurement in these companies. There was a distinct impression that it was low on the list of priorities for many people, with many comments such as;

Its all right designing the measures, its getting people to provide you with the information...(Company A

A lot of the measures aren't relevant to us (Company B)

Its just left up to the managers to provide the information that indicates what is produced in that department. (Company F)

It is not surprising, given these comments, that none of the companies had any strategy for measurement and that measures were generally developed by and for individual managers. Even where it was recognised that measures were obsolete, there seemed to be a lot of inertia in the system which prevented improvements taking place.

Monitoring the generation of leads, the conversion rates, that sort of thing, they are very important to the business – and I suspect that some of the other things that we do like measuring the productivity of the factory in terms of units per man really don't do a lot for us. (Company H)

It seemed that the primary impetus for developing new performance measures was through explicit demands from either customers or higher management;

Demand from the managers for a clearer picture of what is going on. For customers as well – we get customers asking – monitoring our deliveries – checking things tally. (Company C)

However, despite the lack of internally devised measures to monitor performance, there was a genuine concern for customer satisfaction which was apparent in all the companies studied,

I think that for a lot of the people, fulfilment of the customers' requirements is the thing they focus on. (Company A)

The perceptions of the interviewees seemed to be that this could be best achieved by getting on with the job of making good quality products, rather than wasting time measuring them. However, standard operational measures were in use, many of which were acknowledged to be very useful. It is interesting to note that the most useful of these measures were invariably described as informal or ad hoc, and typically covered areas

such as lead times or delivery performance, along with a number of quality measures. Again, all of the measures described were reactive, rather than proactive, showing only a rudimentary knowledge of how performance measures can be used. Table 5.1 provides a description of the type of measures found in these SMEs, along with the way they are developed and used.

	PM development approach	Performance measure characteristics	What is measured
Codes & Categories	**How** -through brainstorming -through experience **Who** -managers, some staff and customers design measures -staff action measures **Issues** -lack of understanding of new measures -blame culture -explanation essential to ensure support -management support essential **Internal Triggers** -problem recurrence prevention -for visibility -to gain control -for planning purposes **External Triggers** -customer requirements -government legislation -national standards / awards requirements	**Scope** -department specific -lack of company-wide measures -not strategic **Type** -historically focused -some out-of-date measures **Format** -simple -small number -practical -flexible measurement -too much info -complex data -untimely data -unclear data **Use** -managerial use -no formal feedback -non-specific informal feedback -reviews to act on data	**Operational Effectiveness** -product quality -process quality -defects -scrap -work in progress -output -lead times -delivery time -inventory -orders / receipts -costs -cash flow -quotes converted -productivity **Supplier Effectiveness** -supplier quality -delivery times -delivery flexibility **Customer satisfaction** -user problems -product usage -service -returns -complaints **Stakeholder Satisfaction** -income -profit -turnover -sales / value added -expenditure -safety -staff turnover -personnel -pollution levels

Table 5.1: Results of Coding and Categorising the Interview Data

5.2.4 Discussion

All the companies in the sample, except the smallest, had at least one measure in each of the overall dimensions of performance. However, it was interesting that the scope of measurement was limited in all the companies. An example of this is that none of the companies measured internal flexibility, although supplier flexibility was measured. Also, while three of the companies had employee measures, these were very rudimentary, covering only staff turnover and health and safety. In addition, societal measures were limited entirely to government environmental legislation. This lack of appropriate measures may be attributed to the perception that performance measures prevent people from carrying out their everyday tasks efficiently, adding another layer of paperwork and bureaucracy to already hectic daily routines.

Another factor might be that many of the measures in use in the companies were acknowledged to have significant flaws by all the interviewees. Analysis has shown that the most significant of these flaws was a lack of reference to strategy. The measures differed from company to company, with some maintaining a small number of simple and practical measures, and others having a majority of measures which were either obsolete, or designed essentially for monitoring historical data. This illustrates the heterogeneity of SMEs, even within a heavily constrained sample. Interestingly, however, all the interviewees complained that the measures produced an overload of data which was either too complex or outdated and therefore unusable. Even where the data was usable, only one SME reported a formal feedback system, via monthly review meetings, although informal feedback occurred in several companies.

The introduction of new performance measures in these companies was initiated both internally and externally. The main internal trigger was as a reaction to problems that had occurred. This supports the reactive management style found in the majority of SMEs

(Oakes and Lee, 1999). Other internal triggers focused on attaining a greater level of control, particularly for resource planning. External triggers mainly originated from customers that requested or imposed specific measures. This coincides with the emergence of a number of supplier development programmes on the managerial agenda of large companies. A consequence of this has been the development of a limited number of measures imposed by the SMEs on their own suppliers.

Measures were usually developed in an ad hoc fashion, and difficulties were identified when staff were asked to start collecting data for which they could see no use. This would lead to poor quality data or, in certain circumstances, a culture of blame would develop in an attempt to rationalise poor performance. All the interviewees who experienced these problems advocated better communication as a potential method for resolution.

5.2.5 Gap Analysis

A gap analysis was carried out to compare the identified SME PM characteristics against those identified in the conceptual model. This analysis clearly illustrated a lack of congruence between the two models (Table 5.2). Discrepancies between theory and practice were identified in the development approaches employed. These included a lack of strategic forethought, a lack of communication between managers and the lack of a structured process for development. However, the majority of measures were developed by the people who would be expected to use them.

The characteristics of the measures in use in the SMEs were also dramatically different from those specified in the theoretical model. The only commonalties were that the useful measures were both simple and practical. However, in every other respect they failed to find any congruence with the conceptual model. Finally, the main gap identified in the

'Dimensions of Performance' category was Stakeholder Satisfaction. Although there were measures identified in this area, they were extremely limited, particularly when looking at non-financial aspects of performance. In addition, none of the Operational measures in use were pre-emptive. Instead, they were developed to highlight problems after they had occurred, to enable the company to react and improve. This was also a feature of Customer and Supplier measures, which were limited by their rudimentary and reactive nature.

Theoretical Model	**SME PM System Characteristics**	**Gaps**
The strategic PM development process should:	*Performance measures in SMEs are developed:*	
Evaluate existing PM system	With little reference to any existing measures in place	x
Enable strategic objective identification	With no reference to strategy	x
Enable performance measure development	In an ad hoc fashion by individual managers / staff	x
Provide a maintenance structure	Without deleting obsolete measures	x
Involve key users	By Managers, occasionally staff & customers	
Have top management support	With management support	
Have full employee support	With a lack of employee understanding of measures	x
Have clear and explicit objectives		x
Have set time-scales		x
Measures in a strategic PM system should be:	*SME performance measures are:*	
Derived from strategy	Not strategic	x
Clearly defined / explicit purpose	Often unclear with complex or obsolete data produced	x
Relevant and easy to maintain	Historically focused with some outdated measures	x
Simple to understand and use	Small numbers of simple practical measures	
Provide fast, accurate feedback	No formal feedback / non-specific informal feedback	x
Link operations to strategic goals		x
Stimulate continuous improvement		x
A strategic PM system should measure:	*SME PM Systems measure:*	
Operational Effectiveness	Operational Effectiveness (reactive)	
Supplier Effectiveness	Supplier Effectiveness (reactive)	
Customer Satisfaction	Customer Satisfaction (reactive)	
Stakeholder Satisfaction	Stakeholder Satisfaction (limited non-financial info)	x

Table 5.2: Gap Analysis of SME PM against the Conceptual Model

5.3 Conclusion

In this chapter, the characteristics of performance measures commonly used in SMEs have been identified through the literature and an empirical study. The results show that SME PM differs significantly from the criteria established in the conceptual model of integrated

PM development. The primary reason for this is that SME managers have failed to co-ordinate the development performance measures in a structured and coherent way. The ad hoc introduction of new measures has only served to increase the number of irrelevant and complex measures in use. This has exacerbated the feeling that PM is a waste of precious time and resources. Chapter 6 will now investigate whether this situation can be improved through the use of a structured process for introducing integrated PM into SMEs. This will be achieved through examining the literature in this area and through a further empirical study.

Chapter 6: Structured PM System Development In SMEs

6.0 Introduction

This Chapter builds on Chapter 5 to establish whether SME PM systems might be improved by structuring PM system development. Previous research is examined to identify existing knowledge in this area and then an in-depth case study is described, the aim of which is to investigate the implications of developing and implementing integrated PM in a structured way in SMEs. From the evidence presented, a set of SME-specific requirements to enhance the conceptual model for PM development are identified.

6.1 Structured PM Approaches for SMEs

The gap analysis carried out in the previous Chapter identified that the PM systems in use in SMEs are very different to that advocated in the conceptual model. The evidence from the interviews showed that SME PM is often heavily financially focused, informal and unstructured. This approach is considered to have several drawbacks, the most important of which is that these performance measures are likely to inhibit, rather than to facilitate, the achievement of strategic objectives. To overcome this problem, a number of approaches for assessing and designing SME PM systems in a more structured way have been developed. A review will identify the strengths and weaknesses of each approach, and a set of requirements to enhance the conceptual model will be developed.

6.1.1 Single Perspective Measurement

Several studies have focused on a single measurement perspective in the SME sector. One such study presents a framework for auditing PM usage in small, growing firms (Hynes, 1998). The findings from this study show that firms with an explicit growth strategy are still likely to plan in an ad hoc and informal fashion, whilst relying primarily on financial measurements required by external stakeholders as their key measures of success. Other studies have examined the implications of customer orientation on performance (Appiah-Adu and Singh, 1998) and identified the types of quality models that are suitable for a number of different SME environments (Noci, 1995). Although none of these studies present integrated PM in SMEs, they do provide some useful guidelines for managing these specific issues in smaller firms. These guidelines include highlighting the importance of regular measurement and feedback to managers (Hynes, 1998) and introducing company changes on a gradual, incremental basis (Appiah-Adu and Singh, 1998).

6.1.2 SME PM Frameworks

There are also a number of studies which investigate appropriate methods of developing PM in SMEs. Barnes et al (1998) present the results of a number of PM audits carried out in SMEs. The key recommendations from this study were that structured PM and more formal business planning would increase managerial understanding and control of the business. A number of specific recommendations on developing such a system were also presented. These have been developed into a new PM framework (Chennell et al, 2000). However, although this framework has been tested successfully in the private and public

sectors, none of these tests appear to have been carried out in SMEs, making an evaluation of the framework in a SME context impossible.

Two studies evaluate the use of the Balanced Scorecard (BSC) for use in a SME context (Hvolby and Thorstenson 2000, McAdam 2000). The BSC was developed by Kaplan and Norton (1992) to improve measurement by focusing on four performance perspectives; customers, finance, internal business processes and learning and future growth. Both studies suggest the likelihood of significant difficulties implementing such a resource-intensive system in SMEs, which are recognised for their resource poverty. McAdam (2000) also comments on the fact that the BSC has a long-term focus, which conflicts with the need for many SMEs to remain flexible and adaptable to rapid market changes over which they have little control. Hvolby and Thorstenson (2000) advocate the adoption of Quick Response Manufacturing (QRM) as an alternative to the BSC. The advantage of this approach is that it is much simpler than the BSC, focusing on lead-time reduction as the only indicator of performance. The rationale for such an approach is that lead-times can be used to facilitate agility and lean production, whilst retaining a customer orientation. In addition, it can help to focus priorities and efforts for improvement. However, as discussed in the previous Chapter, there are significant behavioural drawbacks in implementing one overriding measure of performance, which makes it difficult to justify the focus on lead-time reduction as the only performance indicator.

Laitinen (1996) presents a framework specifically designed for developing structured PM systems in small companies. This framework is designed for the exclusive use of the Managing Director, implying that it is designed only for companies where the MD has complete control. The approach utilises Activity Based Costing (ABC) information to

improve the quality and usefulness of management accounting information. ABC has been advocated as a useful improvement tool in small companies in other studies (Gunesekaran et al, 2000). However, because it is primarily a cost-based decision making tool, the system has no flexibility in strategic orientation. Therefore, ABC cannot be used to introduce integrated PM, as it is unable to facilitate the achievement of non cost-based strategic goals.

6.1.3 A Process for PM Development

The Cambridge PM Process (Neely et al, 1996a) was found to be comprehensive when it was evaluated against the conceptual model of integrated PM development in Chapter 3. This Process, which was developed and tested originally in large companies, has also been applied in SMEs. Seven SMEs were studied (Bourne and Neely, 1998), with one company failing to complete the process, and a further three companies failing to implement the measures they had developed. The three successful companies took between nine and thirteen months to implement the measures they had developed (Bourne et al, 1998). This was identified as a potential reason why the implementation rate was so low (Bourne et al, 2000). According to Neely et al (2000), such implementation problems are the key reason why companies fail to use integrated PM effectively.

6.2 Testing a PM Development Process in a SME

Having examined the literature, it is clear that introducing integrated PM into SMEs is a complex process. Therefore, in order to build a rich picture of how the Cambridge PM Process works in a SME environment, a case study was undertaken. The purpose of the

study was to examine the benefits and drawbacks of integrated PM development when applied in a SME context.

The Cambridge PM Process differed from the other approaches described in the literature for three reasons: it is comprehensive – as defined by its congruence to the conceptual model of integrated PM; it provides a detailed and structured method for developing performance measures and it has already been applied in SMEs. Therefore, despite its recognised implementation problems, this process appeared to be the most appropriate method of examining the development of integrated PM in SMEs.

6.2.1 The Case Study

The Cambridge PM Process is presented as a structured workbook and is designed to be a facilitated process. The process has two distinct phases, with five stages in each phase. Phase One is concerned with the development of a set of top level, strategic performance measures, whilst Phase Two seeks to cascade the top-level measures down through the company to ensure that operational measures are strategically aligned.

The case study application focused specifically on the development of a set of top-level, strategically aligned performance measures. This correlates to Phase One of the Cambridge PM Process and was planned as a series of five workshops. To ensure that the process was applied accurately, a member of the original team who developed the process was contacted and agreed to act as process facilitator.

The case company was selected using the same critical case sampling criteria as for the interviews (see chapter 5). However, it was also considered important to secure commitment to the process from the company before undertaking the study, adding an additional criterion to the selection process. Hence, the company which was finally selected was a small manufacturer, based in the South West of the UK, where there was both the need and the management commitment required for improving their current measurement system (Company I).

6.2.2 Research Method

The study utilised a case study approach that focused on the accumulation and interpretation of qualitative data. As Gummesson (1991) states:

> *The general reason for doing case study research is to better understand complex phenomena such as change processes. Innumerable factors, and entangled interconnections between them, do not allow simple unambiguous research designs and quantifications.*

Data collection was primarily based on participant observation, supplemented by various forms of documentation and by face-to-face interviews. These techniques were identified as appropriate methods of collecting both the processual and behavioural data that would emerge from the application of the process. The interviews were undertaken in an attempt to overcome any observer bias. This included structured interviews with each of the participants at the beginning of the intervention, followed by a set of semi-structured interviews at the end of the intervention. Throughout the case study, efforts were made to ensure the validity of data through appropriate triangulation, which included multiple sources, multiple methods and multiple researcher involvement. As Sekaran (1992) states:

Because almost all data-collection methods have some biases associated with them, collecting data through multimethods and from multisources lends rigor to research.

6.2.3 Data Analysis

Data analysis was undertaken using the case study analysis techniques described in Creswell (1998). This was undertaken from two perspectives, with the initial focus on identifying the results of the process and then a further analysis of the behaviour of the participants. This approach facilitated the identification of a set of issues that were verified and validated with workshop participants and with the process facilitator.

Three broad patterns were developed to encompass the categories identified from the analysis of the process: the performance measures that were developed, their characteristics and the planned / actual development process. These patterns were derived from the conceptual model of integrated PM development. The distinction between what was planned and what was actually completed is important because, whereas the former highlights the dynamics of the methodology, its appropriateness for use in SMEs can only be assessed by the final output of the development process.

Further coding and categorisation was then carried out on the data to identify the assumptions that had been made by the participants at the beginning of the process and to establish how their perceptions and behaviour changed over the duration of the intervention. Once all the data had been analysed, the results were used to identify the benefits and drawbacks of the Cambridge PM Process from a SME perspective.

6.2.4 Results

The perception of PM as an under-utilised management tool was the driving force behind Company I's participation in the development of an integrated PM system. However, this was not enough to prevent the eventual abandonment of the process.

Performance Measure Development Process		Performance Measures	Performance Measure Characteristics
Planned	**Achieved**		
Workshop 1 -introduction to the process -business needs for a new PM system identified **Interviews** -general manager -operations manager -marketing manager -manufacturing manager -production manager -quality assurance manager -finance manager **Workshop 2** -ID product groups -customer/ stakeholder needs analysis carried out **Workshop 3** -ID strategic objectives -ID measure developers **Performance Measure Development sessions** **Workshop 4** -agree measures -conflict analysis on new measures **Workshop 5** -sign off measures -implement review mechanism **Interviews** -final interviews with all managers	-Workshop 1 completed 100% -All interviews completed successfully -Workshop 2 completed 100% -Workshop 3 completed 100% -Only 5 development sessions completed -Workshop 4 cancelled -Workshop 5 cancelled -Final development sessions held -Four final interviews held with available managers	**Operational Effectiveness** -scrap levels -actual vs planned performance -fixed cost expenditure -production volume responsiveness -production capability -actual vs promised delivery times -pre-emptive product development **Customer Satisfaction** -products delivered on spec + on time -contacts with outside companies -service satisfaction **Stakeholder Satisfaction** -sales growth -return on sales -return on capital -employee/ manager satisfaction -group contacts	**Strategic** -developed from strategic objectives -not operational **Balanced** -finances -customers -internal / ops -innovation **Practical** -explicit purpose -set targets -explicit formula -feedback mechanism

Table 6.1: Results of the Processual Analysis

The application of the Cambridge PM Process was observed over a period of 6 months, during which the managers attended the workshops, identified a set of strategic objectives and developed a draft set of top-level performance measures. However, at this point,

Company I withdrew from the process without having validated or implemented the new PM system. Although the process was not completed, enough data was collected to enable the case study analysis to be undertaken effectively. The results of the processual analysis are presented in Table 6.1.

The patterns identified for the behavioural analysis revealed four distinct phases throughout the process: the initial interviews which were held with each of the seven managers involved; observational data from each workshop session; observational data from the performance measure development sessions and the final interviews which were held with the four available managers. Table 6.2 illustrates these phases, along with some of the observational and verbal evidence expressed by the managers throughout each phase. This clearly illustrates the progressive loss of enthusiasm for the Process from the company participants, which was apparent at each phase.

Phase	Behaviour	Comments and Observations
Initial Interviews	Enthusiastic Pre-process Assumptions	"Cambridge Process is simple and straightforward" "Performance measures will help gain control of operations" "Will deliver predictive capability to company" "Practical, usable process"
Workshops (To identify strategic objectives)	Initial Enthusiasm	High level of co-operation for organising workshops Lively discussions about current PM shortcomings High expectations about the value of new performance measures Good participation from most managers Serious debates to resolve conflicting opinions Willingness to take responsibility for tasks
PM Development Sessions	Waning Enthusiasm	Less co-operation to arrange sessions Lack of communication between managers to arrange sessions High enthusiasm from some individual managers Difficulty gaining access to some managers All sessions delayed at least once Low level of enthusiasm for the task Unwillingness to do preparation work outside sessions
Final Interviews	Collapse of Process	Some managers unsure why the process had stopped Too resource intensive – particularly individual tasks Company unable to cope with implications of new measures Too strategically oriented – need practical performance measures now Company fire-fighting was always the top priority

Table 6.2: Tracking Behaviour throughout the Intervention

6.2.4.1 Observations on the Processual Aspects of the Intervention

The results of the case study analysis show that, although the Process was not completed, the draft measures that were produced were strategically aligned. However, only three of the four dimensions of performance identified by the conceptual model were covered. This was because, at the strategic objective setting stage, supplier issues were not considered as there were no immediate changes required in this area. A further reason was that the process used the Balanced Scorecard (Kaplan and Norton, 1992) to ensure a balanced set of measures was developed. As the Balanced Scorecard does not explicitly identify supplier effectiveness as a dimension of performance, it is easy to see how it might be missed. However, this is an important dimension, particularly for SMEs. Supply chains are becoming substantially more competitive (Oakes and Lee, 1999) and it is therefore increasingly necessary to ensure the smooth supply of materials into companies in order for them to maintain a smooth supply of goods to their customers.

6.2.4.2 Observations on the Behavioural Aspects of the Intervention

The Process used for developing the PM system led to some interesting observations about the way that it worked in a SME environment. The behavioural data illustrates how the reactions of the management team appeared to change over the course of the intervention. Although Company I was initially full of enthusiasm about what the Cambridge PM Process could help them achieve, interest levels dropped dramatically when it came to actually developing the measures.

The use of workshops for group consensus building and debate was new for Company I, but was regarded as an invaluable exercise because it got the entire management team together to think about their strategy for the future. This was clearly seen as a useful experience for the company, with one manager commenting:

> *The meetings were great – but as soon as people get out, the fire-fighting begins again and everything is forgotten until next time.*

In the early stages of the Process it was the managers' enthusiasm for the workshops that contributed to their success, with the key outcome being the identification of a set of strategic objectives that provided a foundation for the development of top-level performance measures. However, when individual managers were allocated responsibility for developing a preliminary set of performance measures difficulties were encountered. This was partially due to problems associated with establishing specific, defined targets for objectives that were often broad in scope. This situation was exacerbated by the fact that no detailed operational measures were developed, which might have helped to break the objectives down into more manageable, specific measures. However, the main issue seemed to be that the managers were allocated the task of developing the performance measures individually, outside the workshops. It was at this point that the downturn in enthusiasm became apparent. The explanation for this was that the managers felt that they did not have enough time to complete any of the tasks outside the workshops, due to their already hectic, day-to-day schedules. Severe resource constraints, combined with a reactive management style, left little room for additional developmental activities. One manager commented:

> *We have a group of very experienced managers who get involved in everything due to our fire-fighting approach – which works well, but doesn't allow us to get involved in anything else. We don't spend enough time looking to the future*

The difficulties in getting people to develop the performance measures slowed the Process down and led to waning enthusiasm amongst the managers. This became particularly apparent among the senior managers. The underlying reason for this became apparent during the final interviews. It seemed that after the managers had developed the strategic objectives and were trying to develop performance measures to support them, they realised that the Process was unsuitable to address the company's immediate needs. The Operations Manager, who had initially championed the Process, commented in his interview that it:

> *needs customising to include day-to-day operations, rather than just the strategic stuff. We need to focus our attention on basics – how we can improve customer perceptions is the main one at the moment – we aren't quite at the stage for top-level performance measures yet.*

The Process had been attempting to develop strategically aligned performance measures in a company where there was no explicit strategy. This eventually led to a discrepancy between the strategic outputs of the workshops and the reactive fire-fighting that marked the everyday reality in the Company, helping to explain why the process faltered directly after the identification of the top-level objectives. It was only at this stage that the Company came to regard the process as unsuitable to address its immediate priority, which was to complete the restructuring programme that had been running concurrently with the PM workshops. This programme resulted in job losses and the re-allocation of management to new roles, which not only provided an unstable environment for the development of the PM system, but was also given a higher priority than the PM development process by all the managers concerned.

6.2.5 Summary

The main benefit of using the Cambridge PM Process in Company I was that it highlighted an imbalance in the Company's current PM system, which was based, almost entirely, on financial measures. However, because the Process was not completed, the Company did not achieve the implementation of a more balanced system. The analysis of the Company's strategic position and the identification of strategic objectives were acknowledged by the participants to have fostered consensus and focused their improvement efforts. However, the main drawbacks of the Process from a SME perspective were that it was both resource-intensive and time-consuming, requiring resources which were not readily available. Furthermore, the emphasis on strategic measures and the exclusion of the development of operational measures led to a perception that the approach was a future planning activity rather than one which facilitated improvements in current performance.

6.3 Recommendations

Several of the characteristics of SMEs, identified in Chapter 4, helped contribute to the failure of Company I to introduce integrated PM using the Cambridge PM Process. The key inhibiting characteristics were as follows:

- a reactive mentality;
- severe resource limitations;
- informal, reactive strategies.

The effects of these characteristics were exacerbated by a lack of management expertise, as this increased the time required to complete each activity. In addition, the strategic objectives and measures advocated by the Cambridge PM Process were incompatible with

the reactive mentality and lack of formal strategy found in Company I. According to the literature review in Chapter 4, these characteristics are common in SMEs. Therefore, it is likely that a combination of these characteristics contributed to the low implementation rate identified in the Bourne and Neely (1998) study. It is also likely that they would affect future attempts to introduce integrated PM into SMEs using any approach which relies on the availability of a formal strategy from which to develop the measures. Therefore, the requirements of integrated PM development approaches, as identified in the conceptual model, need to be supplemented as follows to make them effective for use in SMEs:

1. The development approach needs to be very resource efficient to ensure viability;
2. The approach should produce notable short term, as well as long term benefits, to help maintain the momentum and enthusiasm of the development team over time;
3. The development approach should facilitate the surfacing of informal strategies;
4. The development approach should be *dynamic and flexible enough to accommodate* strategic changes and to ensure continued strategic relevance over time.

6.4 Conclusion

In this Chapter, the structured development of integrated PM systems in SMEs has been investigated through a review of existing studies in this area and an empirical study undertaken to develop an integrated PM system in a SME. This builds on the previous chapters and illustrates the difficulties associated with integrated PM development in a SME context. The following Chapter will use the requirements identified, along with information from the previous chapters, to specify a new approach for developing integrated PM, which will be designed in conjunction with, and on behalf of, SMEs.

Chapter 7: Designing a SME PM Development Approach

7.0 Introduction

Chapters 3 and 4 highlighted the key characteristics of PM and SMEs and an examination of current PM practice in SMEs was undertaken in Chapter 5. Chapter 6 then illustrated how SME characteristics make integrated PM development difficult using existing approaches. This Chapter will describe the design and development of a new approach for introducing integrated PM more effectively in SMEs. An evaluation of a number of design processes is carried out and an appropriate process is adopted. The requirements identified in the previous Chapters (3-6) are then used to form the basis of a new SME integrated PM development approach.

7.1 Design Theory

Before embarking on designing a new SME integrated PM development approach, it was first necessary to understand the fundamentals of design theory. This entailed identifying a design strategy and an appropriate design process, to ensure the overall coherence of the design. Unfortunately, the creative process of design is not described in the process design literature, which is aimed more at the management of design / redesign (e.g. Davenport, 1993). Therefore, a wider review of the design literature has been undertaken, covering a broad range of disciplines, from engineering and IT, to architecture and the arts. This will be used to identify an appropriate design strategy and process from which to formulate the new SME integrated PM development approach.

7.1.1 Design Strategies

A number of explicit strategies for design have been proposed by Jones (1992). These fall into two categories: pre-planned strategies and search pattern strategies. These are not completely separate categories. Rather they represent two ends of a continuum on which each of the strategies fit (see figure 7a).

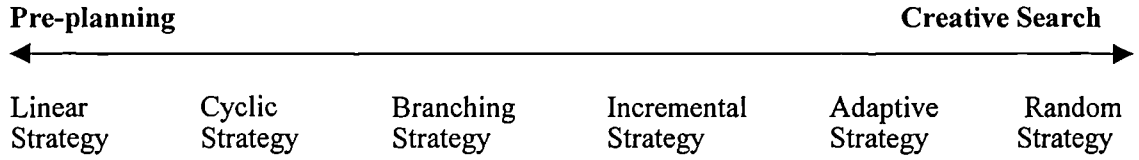


Figure 7a: The Design Strategy Continuum (Developed from Jones 1992)

The strategy with the highest level of pre-planning is called a *Linear Strategy*. This is the most straightforward strategy, designed for use in familiar situations where novelty is unnecessary and a definite end point can be reached, via a number of steps, without the need for feedback. This is closely followed by the *Cyclic Strategy*, which is basically linear, but has feedback loops at some or all of the stages. In addition, *Branching Strategies* are effectively either linear or cyclic strategies in which several strands of a design can be followed at the same time, independently of each other.

At the other end of the continuum are *Incremental Strategies*, which seek only to modify existing designs, but do so without a high degree of pre-planning, allowing creative ideas to be incorporated, albeit on a limited scale. *Adaptive Strategies* are similar, but less constrained in scope. The idea here is that a definite starting point is decided, but no other steps are pre-planned. Instead, this strategy relies on the results of the creative process to determine the pattern of the strategy. Finally, Random Strategies are completely unplanned and can be used when a high degree of novelty is required. Their main use is in

situations where all suggestions are potentially valuable and do not necessarily need to be linked in any apparently coherent way.

7.1.2 The Process of Design

Until the 1950's, design was considered almost mystical process, incapable of being described in a rational way. However, since then, many attempts have been made to explain the creative process in practical terms (Jones, 1992). One of the difficulties with this is that design takes place within the context of such disparate disciplines as engineering, architecture, IT and the arts. This has resulted in the creation and use of a number of similar approaches, each reflecting the nature and purpose of the discipline it was developed in.

One of the basic processes for product design in engineering has been put forward by French (1999). This is essentially linear and comprises the following phases, with feedback loops at each stage:

> *Analysis of Problem:*
> *Identifying the need to be satisfied as precisely as is possible or desirable.*
> *Conceptual Design:*
> *It takes the statement of the problem and generates broad solutions in the form of schemes*
> *Embodiment of Schemes:*
> *The schemes are worked up in greater detail and, if there is more than one, a final choice between them is made.*
> *Detail Design:*
> *This is the last phase, in which a number of small, but essential points remain to be decided.*

This is closely mirrored by Pahl and Beitz (1984), whose process comprises very similar basic phases; *Clarification of Task; Conceptual Design; Embodiment Design;* and *Detail Design.* However, this is rather more prescriptive, with very specific details included in each phase.

A more generalised design process, again from the engineering design literature, is proposed by Cross (1994). He conceptualises the creative process as *Exploration – Generation – Evaluation – Communication.* Again, the notion of feedback is included, this time between the *Generation* and *Evaluation* phases. The essential difference with this process is that it not only identifies the process of designing, but also includes a formal end point for the design in terms of communication. This is also a feature of Archer's (1984) process, which includes an *Executive Phase* to fulfil this function.

However, it is not only in engineering design that a formal end point is considered a practical necessity. RIBA (Royal Institute of British Architects) also include this feature in their design process, which is as follows:

> *Assimilation:*
> *The accumulation and ordering of general information and information specifically related to the problem in hand.*
> *General Study:*
> *The investigation of the nature of the problem. The investigation of possible solutions or means of solution.*
> *Development:*
> *The development and refinement of one or more of the tentative solutions isolated during phase 2.*
> *Communication:*
> *The communication of one or more solutions to people inside or outside the design team. (RIBA, 1965)*

Again, the process has feedback loops included at each stage. However, this process differs from the engineering design approaches by placing more emphasis on overall design and communication rather than on producing increasingly detailed designs, which is a notable feature of most design activities in engineering.

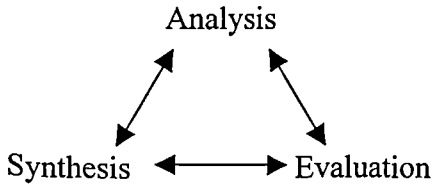


Figure 7b: Lawson's Representation of the Design Process.

A more generalised version of architectural design is presented by Rowe (1987). This process looks at design essentially as a series of

problems which need to be solved: the *Problem Representation Problem*; the *Solution Generation Problem*; and the *Solution Evaluation Problem*. This model has strong links to the generic design process postulated by Jones (1992), amongst others, which is defined as; *Analysis*, *Synthesis* and *Evaluation*. Both these processes are essentially sequential in format, with iterative feedback loops incorporated where necessary. However, Lawson, (1997) criticises linearity because, he suggests, although designers might go through each phase identified, in reality the process is much more confused than linear models can illustrate. Therefore, he adapts the Jones (1992) process into a triangle (Figure 7b), which is more representative of the *actual* process of designing.

Although each conceptualisation of the design process examined is subtly different, there are striking similarities between them. This was recognised by Gregory (1966) when the understanding of design was still in its infancy, when he claimed that all design is carried out using essentially the same process. Assuming this is correct, then the minor differences identified in each representation of the process are simply customisations, which make them more appropriate for the specific design contexts for which they were developed. Therefore, the model developed by Jones (1992) and modified by Lawson (1997) appears to be an appropriate representation of the design process as a generic entity.

7.2 SME PM Approach Design Qualities

According to Rowe (1987), there are three distinct types of design problem: *well-defined* problems, *ill-defined* problems and *wicked* problems. Well-defined problems are so called because they have straightforward solutions. Similarly, ill-defined problems have convoluted or awkward solutions.

However, wicked problems are so named because they are problems which do not have perfect solutions. Therefore, any solution put forward can only ever be partial and will always have room for improvements. The problem of designing a SME integrated PM development approach is one that falls into this category. Since every SME is different, there will never be a perfect approach which will work in all situations. Instead, the design will attempt to create a 'best fit' solution for the target SMEs, which fulfils the problem as it has been described in the preceding chapters. The aim of designing a new SME integrated PM development approach is, therefore, to enhance the current state of knowledge in the area of integrated PM development in SMEs, rather than attempt to create some kind of panacea.

As the problem of integrated PM development in SMEs is naturally complex and ill-defined, the most appropriate design strategy was the *Adaptive Strategy*, with an initial analysis of the problem acting as the starting point for the design. Using Lawson's (1997) model, the design process progressed through the stages of *Analysis, Synthesis* and *Evaluation*, with the freedom to move between each stage as appropriate. Once the initial design was developed, an incremental strategy was adopted in order to improve the design through empirical testing in a SME. The emphasis throughout the design process was to establish the three qualities described by Laseau (1989) of *Firmness*, in terms of valid construction, *Commodity*, by satisfying its functional needs and *Delight*, through aesthetic appeal.

7.3 Designing the SME PM Approach

The initial analysis of the problem focused on establishing the requirements for the SME focused integrated PM development approach. These were derived from the conceptual model of integrated PM development and the specific requirements to make integrated PM

more accessible to SMEs, which were identified in Chapter 6. A summary of these requirements is illustrated in table 7.1.

A SME PM Development Approach Should:	
Provide a need evaluation	Develop measures in the four key dimensions of performance:
Enable strategic objective identification	Customer satisfaction
Facilitate performance measure development	Stakeholder satisfaction
Include a periodic maintenance structure	Supplier effectiveness
Involve key users	Operational effectiveness
Have top management support	Develop measures which have the following characteristics:
Have full employee support	Derived from strategy
Have clear and explicit objectives	Clearly defined with an explicit purpose
Have set timescales	Relevant and easy to maintain
Be very resource efficient	Simple to understand and use
Provide short term as well as long term benefits	Able to provide fast, accurate feedback
Be able to surface informal strategies	Able to link operations to strategic goals
Be dynamic and flexible	Able to stimulate continuous improvement

Table 7.1: Requirements for a SME PM Approach

7.3.1 Designing the Structure of the New Approach

An analysis of the specific SME requirements, derived from the Company I case study, was carried out in an attempt to discover the design features of the Cambridge PM Process which contributed to its failure. This indicated that the root cause of the failure was due to the way the Process was structured. Its structure demanded that a complete set of top-level performance measures, each aligned to a strategic objective, be developed. Only once these measures were implemented could operational measures, which would drive performance towards the strategic objectives, be identified.

The broad scope and scale of each stage of the development process is indicative of a 'one-off' approach to integrated PM development, supplemented by a maintenance plan to ensure continued strategic relevance. However, such an approach demanded more resources than were available in Company I. In addition, there was a requirement for a definite and relatively stable strategy from which to develop the strategic level measures,

which was incompatible with the Company's informal and flexible approach to strategy. Therefore, alternative designs to the 'one-off' development process were investigated and assessed for appropriateness for the SME integrated PM development approach.

In the literature there are two commonly espoused approaches to change: the one-off, radical change advocated in the BPR (Business Process Re-engineering) literature (e.g. Hammer and Champy, 1993) and the incremental approach found in the Kaizen, or continuous improvement (Imai, 1986), literature. According to Imai (1986) there are 12 key differences between the two different approaches (Table 7.2), which illustrate their fundamentally distinct natures. Each approach has pros and cons that vary with the circumstances in which they are to be used.

	Incremental Change (Kaizen)	**Radical Change (e.g. BPR)**
Effect	Long-term and undramatic	Short term and dramatic
Pace	Small steps	Big steps
Timeframe	Continuous and incremental	Intermittent and non-incremental
Change	Gradual and constant	Abrupt and volatile
Involvement	Everybody	Select few 'champions'
Approach	Group effort / systems approach	Individual ideas and efforts
Mode	Maintenance and Improvement	Scrap and Rebuild
Spark	Conventional know-how and state of the art	Technological breakthrough, new inventions / new theories
Practical Requirements	Little investment / high effort	Large investment / little effort
Effort Orientation	People	Technology
Evaluation Criteria	Process / effort for better results	Results for profits
Advantage	Good in slow growth economies	Good in fast growth economies

Table 7.2: Differences between Incremental & Radical Change (adapted from Imai, 1986)

In terms of integrated PM development, the radical BPR approach is better suited to companies that have the skills and resources to be able to go back to the drawing board as far as PM is concerned and develop an entirely new system. This is the approach adopted in the Cambridge PM Process (Neely et al, 1996), which was developed in, and for, large companies that had these capabilities. However, SMEs would appear to be far better suited

to an incremental mode of change, as this requires less investment of time and resources and less organisational upheaval.

To give an integrated PM development approach an incremental structure would involve breaking it down into small and manageable stages. This could be achieved by only developing a performance measure for one strategic objective at a time, rather than for a complete set. A benefit of this would be that the measure could immediately be cascaded down to operational level, to help drive performance towards achieving the objective. This would help to reduce the time gap between strategic measure implementation and tangible benefits being gained. The trade-off in this approach is that an incremental method of introducing integrated PM would require more effort over a far greater period of time than the radical change model. Despite this, the potential benefits of an incremental approach make it better suited to integrated PM development in SMEs than the radical alternative, because;

- each increment would be fast and efficient by focusing on just one objective at a time;
- short term and long term benefits would be gained through the immediate linking of operational improvement efforts to achieving the identified strategic objective;
- performance measures would be revisited with each increment, ensuring that they were constantly updated and modified to reflect changes in strategic priorities.

A potential problem which arises from using an incremental structure is that there is always the possibility that SMEs will stop after the first increment, thereby losing the strategic balance that is sought in integrated PM. This is an important trade-off because, whilst risking imbalance in SMEs that do not continue past the first increment, this structure still appears to be the method of introducing integrated PM into SMEs most likely to succeed. Therefore, although it is a valid concern, it is important to note that the

structure is specifically designed to be continuous. If used appropriately, a comprehensive and balanced set of measures will be developed over time.

7.3.2 Populating the New Approach

Having proposed an incremental structure as an alternative design for the SME integrated PM development approach, it was necessary to populate it through the identification of appropriate stages. The requirements for the SME PM development approach state that it requires an explicit stage for identifying strategic objectives, developing appropriate performance measures and maintaining the measures. The benefit of identifying strategic objectives with each new iteration is that it will help to identify strategic changes, thereby ensuring that all the measures remain relevant and useful. However, there is also a need for prioritising the objectives because the nature of the approach is such that only one objective will be addressed at a time. In addition, although not explicitly stated in the requirements, the measures have to be implemented before they can be classified as being useful. Therefore, a key stage in the approach should be the implementation of the measures developed.

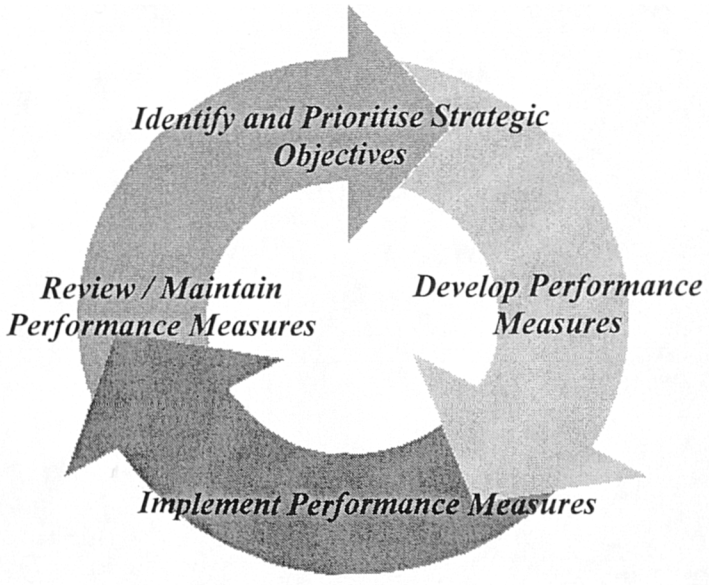


Figure 7c: The Preliminary SME PM Cycle

Taking these requirements into account, a preliminary model of the SME PM Cycle was produced. Figure 7c illustrates the four basic iterative stages of the Cycle. An additional requirement was to ensure that companies understand why integrated PM development is necessary, through identifying how it can be of benefit to individual companies. This is a prerequisite, so it should not be part of the Cycle but a one off stage carried out before the Cycle is used.

Other requirements for the development approach were focused around who should be involved and how it should be managed. These aspects were incorporated into the approach as the detail was added to each stage. However, two of the requirements were difficult to incorporate. Top management support is not something that could be built into the Cycle, but explicit advice was given to highlight its importance. Similarly, guidance is given for timescales to encourage companies to set target dates for the key tasks within the process.

Specific requirements regarding what should be measured and what the measures should look like demanded the careful development of appropriate sets of tools. The first stage of the Cycle, which incorporates strategic objective identification, needed tools to ensure that that a balanced set of measures is developed across the four primary dimensions of performance. In addition, the Performance Measure Record Sheet (Neely et al, 1997) was used to ensure that all performance measures developed conformed to the performance measure characteristics identified in the conceptual model. A brief explanation of all the tools used in the workbook is given in Table 7.3.

The SME PM Cycle was written up in workbook format, as a draft, to enable all the information and advice to be clear and easily accessible. In addition, it ensured that each of the tools which had been chosen or developed for each stage could be illustrated and

described in detail, for ease of use (the final version of this workbook is included in Appendix 2).

Cycle Stage	Tool Used	Purpose	Selection Rationale / Development
Stage 1: Name	Customer/ Stakeholder analysis chart	Identify current strategic needs	Used successfully in the Cambridge PM Process for the same purpose
Stage 1: Name	The Balanced Scorecard	To ensure balance across strategic objectives identified	Popular and simple framework for ensuring balance
Stage 1: Name	The Performance/ Importance matrix	To prioritise critical strategic objectives for immediate action	Tried and tested approach for establishing business priorities
Stage 2: Act	Staff Survey	To collect suggestions from staff to help achieve named objective	Developed to fulfil specific need by brainstorming with colleagues
Stage 2: Act	Activity Prioritisation chart	To help evaluate data from the staff surveys	Modified slightly from Cambridge PM Process evaluation method
Stage 2: Act	Benefits / Drawbacks chart	To evaluate practicality of implementing proposed changes	Developed to fulfil specific need by brainstorming with colleagues
Stage 2: Act	Performance Measure Record Sheet	To ensure development of well-designed measures	Tried and tested approach for developing useful measures
Stage 3: Use	PM Information point	To communicate measurement data across the company	Developed to fulfil specific need by brainstorming with colleagues
Stage 4: Learn	Review Sheet	To record summary PM data and actions arising from PM reviews	Developed to fulfil specific need by brainstorming with colleagues

Table 7.3: Rationale for Selection / Development of Tools Used at each Stage

The diagram in Figure 7d illustrates the draft SME PM Cycle. The planning stage involves identifying and naming the current top priority business objective, in order to focus improvement efforts and eliminate communication problems (*Name*). This is followed by the development of a small number of performance measures to drive progress towards the named objective (*Act*). Using the performance measures helps to evaluate the success of any improvement efforts and to monitor progress towards the named objective (*Use*). Reviewing the performance data regularly gives an early warning of potential problems

and ensures that the measures remain relevant. This may result in updating existing measures and removing inappropriate, or obsolete, measures (*Learn*).

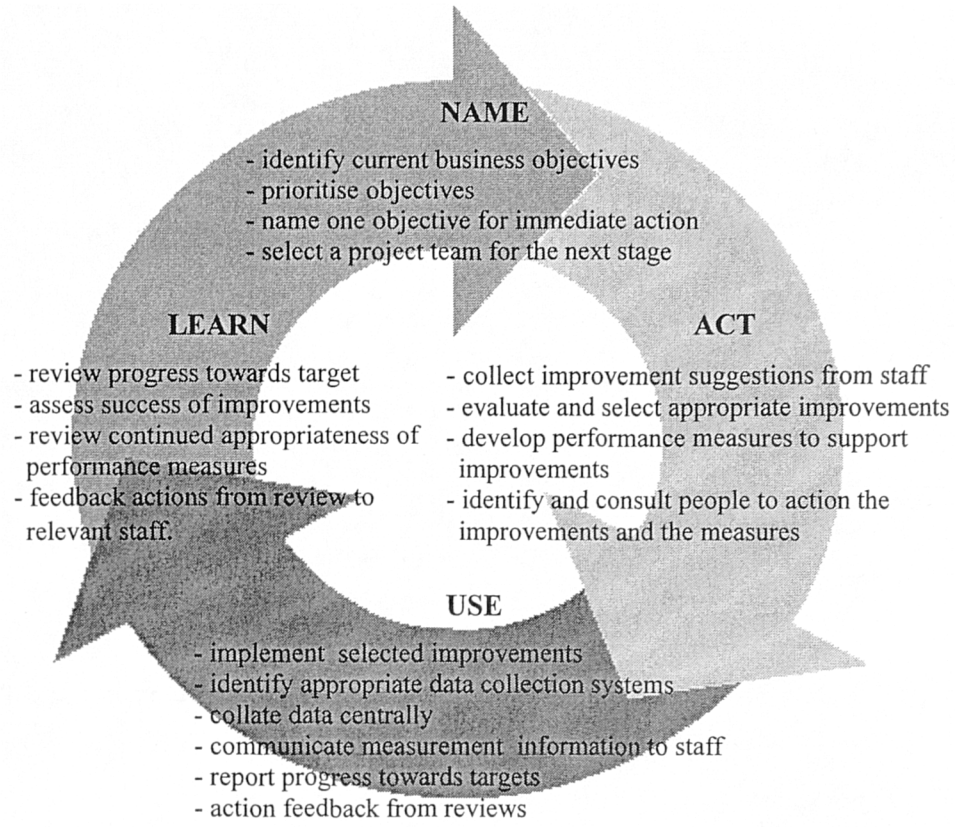


Figure 7d: The Draft SME PM Cycle

One of the primary concerns when designing the Cycle was that it should conform to the design precepts of *firmness*, *commodity* and *delight* postulated by Laseau (1989). Firmness of design was achieved by identifying design alternatives from theory and developing the new approach directly from the requirements established in the investigative phase of the research. Delight, in terms of aesthetic appeal, was achieved through the use of a simple, four stage cycle to illustrate the Cycle. This was expanded into a workbook, which provided clearly explained sections which mapped to the different stages of the cycle. Commodity, however, can only be achieved through applying the SME PM Cycle in a practical environment. This will ensure that it satisfies functional needs and verify the validity of its construction.

7.4 Conclusion

This Chapter has described the design of a new approach for introducing integrated PM into SMEs. The requirements for the SME PM Cycle were discussed and an incremental structure was adopted and populated with appropriate stages for effective integrated PM development. An explanation of the way that the Cycle fulfilled the theoretical requirements was also given. The following Chapter will describe how the Cycle was tested in a SME, to identify areas for enhancement and to establish its usefulness and usability in a practical SME environment.

Chapter 8: SME PM Cycle Practical Development

8.0 Introduction

The previous Chapter described the development of a new approach for introducing integrated PM into SMEs. The underlying rationale of this approach was for it to be practical and usable in a SME environment. Therefore, the paper-based and, so far, entirely theoretical SME PM Cycle needs to be applied in the environment for which it was designed in order to check that it is relevant and usable in this context. This will complete the design process by enabling practical refinements to be made to the Cycle and a final version to be developed.

8.1 Developmental Case Study

The draft of the SME PM Cycle contained a number of tools and techniques at each stage. These had been carefully selected, or newly developed, to facilitate the completion of each stage (as illustrated in Table 7.3). This completed the pure design phase, which utilised an adaptive design strategy. The next phase involves the adoption of an incremental design strategy to further develop and improve the Cycle. This will be achieved through a test application carried out in a practical SME environment. The purpose of the test is to ensure that the tools are appropriate and that the outputs of one tool flow logically into the next. For this reason, the test case has not been designed to be a validation of the Cycle, although this should be implied in the result, but rather a further development of it in a practical SME environment.

8.1.1 Selecting the Case Company

This case study required a different type of purposive sample from that used in the Investigation phase of the research. This is because it aims to develop and refine the SME PM Cycle for use in any of the target population, namely South West based manufacturing SMEs which conform to the characteristics defined in Chapter 4. Therefore, rather than identifying a purposive sample of critical cases, this case company was deliberately selected because it was perceived to be a 'typical case' (Patton, 1990). As Maxwell (1996) notes:

> *A small sample that has been systematically selected for typicality and relative homogeneity provides far more confidence that the conclusions adequately represent the average members of the population than does a sample of the same size that incorporates substantial random or accidental variation.*

An additional criterion of selection was also deemed necessary for the case. This was because the selected company would be required to use the new approach to implement integrated PM. Therefore, it was essential that the senior managers involved were willing to make this commitment.

Using these selection criteria, Company J was identified as an appropriate case company for the development of the SME PM Cycle. Company J is a SME based in the South West of the UK. It designs and manufactures electromechanical winches and gearboxes, primarily for use in the automotive recovery industry. The Company has been established for 25 years and currently employs 96 people.

In 1999 Company J went through a major period of change, initiated by its sister company in the United States. Pressure was exerted on the Company to reduce costs and to improve overall profitability. To help achieve this they employed a new Operations Director. One

of the major problems he found was that there was very little control over the manufacturing operation and staff were powerless to make even obvious improvements. Therefore, he felt that the SME PM Cycle could be used to help prioritise and focus improvement efforts across the Company.

8.1.2 Data Collection

An action research approach was adopted for the data collection (Lewin, 1946). This was appropriate because it allowed the researcher the freedom to get actively involved in applying the Cycle, in order to gain an in-depth understanding of the way it worked within the company. As Eden and Huxham (1996) note:

> *...interventions in organisations provide ideal opportunities for experimentation in the sense that they provide opportunities to try out complex theoretical frameworks that cannot be pulled apart for controlled evaluation of individual theories. This is important in management research where it is often the systemic nature of a uniquely interlocking set of theories from many management disciplines that makes the body of theory powerful and useful. Action research is, therefore, concerned with such systemic relationships, rather than with single theories – the aim is to understand conceptual and theoretical frameworks where each theory must be understood in the context of other related theories.*

Acting as the facilitator also enabled the researcher to ensure that the Cycle was applied appropriately in the case company. An added benefit was that it would provide a thorough understanding of any differences and similarities encountered in other companies, in the validation stage of the research.

The Cycle was applied through three workshops and two meetings involving managers, supervisors and shop floor employees. This enabled data to be collected about both the approach itself and the way it was received by the Company. The meetings were supplemented where appropriate with informal, unstructured, interviews with the various staff who were involved with the intervention. The function of these interviews was

invariably to gain a better understanding of, or a particular perspective on, how the activities that were being carried out as a part of the SME PM Cycle were affecting the company. All the workshop participants were also provided with feedback sheets, which asked them to evaluate each stage of the Cycle in terms of usability and usefulness. In addition to triangulating the data through multiple methods and multiple data sources, a further measure was also taken, to help reduce personal bias. This was achieved through the presence of an additional researcher at each meeting or workshop connected with the intervention.

8.2 Developing the SME PM Cycle in Company J

The Cycle was developed to be usable and useful in a SME context. As Company J was specifically selected for its conformance to the characteristics of SMEs identified in Chapter 4, the results from the case study provide a useful indication of how the new approach might work in a SME context.

The results of the case study may be divided into two distinct areas. Firstly, the extent to which the Cycle was a useful and practical approach for introducing integrated PM into SMEs. Second, the overall effect of the Cycle on Company J. The former may be established by assessing whether the Cycle adequately conformed to the requirements for a SME focused integrated PM development approach identified in Chapter 7. The latter may be established by evaluating the benefits and drawbacks the Cycle had on Company J.

8.2.1 Conformance to Requirements

In order to assess the usefulness and practicality of the SME PM Cycle, the case study data will be evaluated to establish whether or not each of the requirements identified in Table

7.1 were fulfilled in Company J. (Appendix 2 provides a detailed account and supplementary evidence of the case at Company J).

8.2.1.1 Requirement: Rationale for using the Cycle / Top management Support

These two requirements have been grouped together because they are both considered to be prerequisites for using the SME PM Cycle. In setting up the case study, two meetings were held with the management of Company J. The purpose of these meetings was to ensure that the company had a need for improved PM capabilities and to explain precisely what was involved in the SME PM Cycle. It was through these meetings, that top management support was gained and the need for the Cycle was recognised within the company. As the Manufacturing Director pointed out:

> *I've started thinking about so many improvements here – but what we really need first is some measures to understand what is happening here and help us focus and prioritise what we are doing.*

8.2.1.2 Requirement: Strategic Objective Identification / Develops Measures in the Four Key Dimensions of Performance

Company J worked through a number of tools which were provided for identifying and prioritising their strategic objectives in Stage 1 of the Cycle. These tools were modified during the workshops to make them more relevant to the business and reduce the scope for confusion, thereby making them more user-friendly. The set of strategic objectives identified were as follows:

- Reduce manufacturing and raw material costs;
- Introduce a global warranty service;
- Introduce modular design and standardise products;
- Increase manufacturing capacity;
- Deliver products on time;
- Improve flexibility;

- Improve reject rates and accuracy of reject data;
- Simplify / improve engineering design;
- Improve manufacturing processes and systems.

Two of these objectives were identified as being critically important to the Company at this time: increasing manufacturing capacity and on-time delivery. The Company decided to focus its efforts on the latter, as it was recognised that, until the production process had been made efficient enough to cope with current demands, there would be little point in increasing capacity.

The Manufacturing Director commented that the results of the strategic analysis were broadly in line with where he had felt the Company's priorities lay and was happy with the result. This was useful, as it gave the workshop participants more confidence in the Cycle when they realised that the tools they were using were able to give an accurate assessment of their strategic objectives. This made them more open to the selection of on-time delivery as their focus for improvements in the first iteration of the Cycle.

Although the prioritisation meant that only one strategic measure would be developed, it is important to recognise that the Cycle is designed to be iterative. Therefore, providing the Cycle is used continuously a set of strategic measures, balanced across the four key dimensions of performance, would be developed over time.

8.2.1.3 Requirement: Involves Key Users / Has Full Employee Support

At the end of Stage 1, supervisors and team leaders from across the company were selected to make up a project team. Five people were chosen because they were seen to be

pro-active and enthusiastic, whilst also enjoying the respect of the shop floor workers. The team was to be responsible for identifying appropriate improvements and performance measures to support the named objective. They were offered two possible methods of gaining input from the other members of staff: a survey or brainstorming sessions. Due to a lack of time and resources to devote to brainstorming sessions, it was decided that a survey of all staff was the best option. The survey was sent out to every employee with their payslips, and they were given just 3 days to respond. The response rate was 22%, which was considered acceptable given the limited time-scale.

Feedback from the survey was varied – the content of the responses showed the underlying enthusiasm for the job, but the tone was typically angry or despairing that anything would actually improve, for example:

> *I'm sad that this has to be asked by the management of [Company J]. We are always hearing that we are on stop with this or that company. Until we pay the bills life at [Company J] will remain hard. 9 months ago, we the workforce, were told by management "your[sic] the guys that know, we'll talk to you" – we never see management to be asked "any problems, how's it going" – we've had consultants, experts, others. And now you ask us. This leads to bad moral [sic].*
>
> *I understand that finances aren't always available...we are here to make the winches to sell to pay our wages for all of us. If we have not got the parts we can't make them. You can't sell, we don't make any money. You and I and the rest of us don't get paid. That's it.*

The issues identified from the surveys were prioritised to highlight the key issues and activities which were needed to achieve the named objective. A summary of the key issues and activities identified is given below:

- Kanban system needs to be completely revised and used properly;
- Stock information to be reviewed and updated;
- Better communication required – particularly between purchasing and manufacturing;
- Improved teamwork and training systems needed across the company;

- Reliable equipment needed;
- Better credit and debt control required;
- More production planning and control;
- Quality equipment to be made more accessible;
- IT system needs to be used fully and effectively;
- Implement feedback loop on corrective actions throughout company;
- Manage labour resources effectively.

The project team found the survey responses both useful and enlightening and they were keen to use surveys again to help them develop a more pro-active workforce and help improve employee morale.

8.2.1.4 Requirement: PM Development Guidelines / Develop Measures which Conform to Identified Characteristics

When it came to the development of performance measures, a gap in the Cycle was identified. This was highlighted when, after identifying the key improvements which would help drive performance towards achieving the on-time delivery target, a message from the Company was received, stating;

> *Could we please postpone the next visit for a couple of weeks? We have a couple of internal issues we are trying to resolve, which will mean that the team members involved will not be available until then.*

When the next meeting was finally held, it became apparent that these 'internal issues' had involved the implementation of a number of the immediately achievable improvements identified in the previous workshop. These improvements included setting up a group to co-ordinate IT usage across the Company and dedicating two members of staff to maintaining the kanban system and improving stock control. Although it was encouraging to see that the project team was keen to move forward on the improvements, the way they

chose to do this precluded any measures being developed to ensure that the improvements were having the desired effect.

Despite this setback, appropriate performance measures were eventually developed, using the Neely et al (1997) PM Record Sheet to ensure that they conformed to all the characteristics identified in the conceptual model. Due to a lack of understanding of where the specific production problems lay which affected delivery performance, the team decided to start measuring delays in the production process. This was achieved by developing a checklist to record the reasons for machine downtime in both production and assembly (Figure 8a). This was implemented immediately and is used by supervisors in both the machine shop and the assembly room to record reasons for machine downtime in each area.

Machine Downtime Record (G50) Monday						
M/C No	Setting Time	Machine Downtime	Reason for Downtime	Material I/D & Part No		Standard Hrs Available 45:00:00
S04		7:30:00	material shortage	H/Y		
S05		3:00:00	parts required	H/2		Overtime Worked 1:00:00
						Total hrs Worked 46:00:00
						Total Hrs Running Machines 31:00:00
						Total Downtime 15:00:00
						% of Downtime 32.61%
						07-Aug-00

Figure 8a: Downtime Checklist

Along with a measure to monitor delivery performance, this was seen as being a key way of identifying and monitoring improvements in Company J, facilitating a move towards continuous improvement.

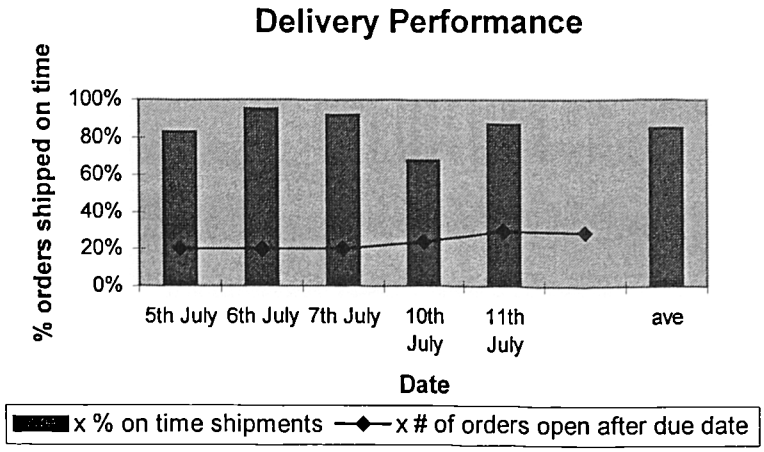


Figure 8b: Measuring Delivery Performance

In addition, Company J's sister company in America, which had more human resources available, developed the measures further, producing graphs to monitor both delivery performance and the reasons for missed deliveries (Figures 8b and 8c). These measures have now also been implemented in the UK Company.

Figure 8c: Monitoring the Reasons for Missed Deliveries

The measures have helped identify the main reasons for missing due date delivery. Each month, the reasons are collated and the primary problem becomes the focus for improvement actions. This has led to a number of improvements being made in the machine shop, where a major problem was that the assembly operation were not receiving parts on time. It has also highlighted a number of supplier – Company communication issues, which are now being investigated.

8.2.1.5 Requirement: Periodic Maintenance Structure / Clear and Explicit Objectives / Set Timescales

The iterative nature of the approach meant that maintenance was built in, since each iteration involves a re-evaluation of business priorities and the development of measures and improvements to support them. Similarly, it has 'designed in' objectives which Company J found straightforward and simple to understand. However, the Cycle was originally scheduled to be completed in one month, with meetings and workshops being held once a week. The lack of an explicit stage for implementing improvements meant that the company cancelled these workshops until they had made a number of improvements and the Cycle therefore took nearly three months to complete. Having modified it to accommodate this gap, the expected timescale has now been adjusted so that, depending on the scale of the improvements to be implemented, the Cycle should now take between three and six months per iteration.

8.2.1.6 Requirement: Very Resource Efficient / Dynamic and Flexible Development Approach

Throughout the intervention, Company J had a number of demands on management time and resources. Several visits were made by representatives from its sister company in America and a considerable amount of time was taken up by local staff in meetings with

their US colleagues. This undoubtedly slowed progress, particularly as it was at this time that the Company was trying to implement the improvements. However, despite these difficulties, the Cycle was completed in a timely fashion, with improvements having been made and useful measures having been implemented. Comments from the project team in the feedback session at the end of the first iteration of the Cycle included:

> *Its a useful process for any company – I would recommend it.*
>
> *We might implement a training program to teach other people how to use the cycle, to take the pressure off the managers.*

One key factor which ensured that the first iteration of the Cycle was completed was the enthusiasm of the project team. Without this, it is unlikely that the commitment to working through the Cycle could have been sustained when other, equally pressing, demands were being made on resources.

8.2.1.7 Requirement: Short Term as well as Long Term Benefits

The fact that the first iteration of the SME PM Cycle highlighted a number of immediately actionable improvements helped ensure that enthusiasm levels among staff remained high. This was because tangible benefits were identified early on, which were directly linked to the achievement of the long-term strategic objective of improving delivery performance. This feature of the Cycle was the key to ensuring that the Company completed the first iteration and, more importantly, went on to use the Cycle again.

8.2.1.8 Requirement: Able to Surface Informal Strategies

The Cycle was specifically designed to ensure that it could be used to help surface informal strategies within SMEs. The first stage of the Cycle (Name) explores current strategic needs in detail and then names the most important objective as the focus for that iteration. Company J freely admitted that they had so many seemingly important problems that needed attention that they did not know where to start. Therefore, they found the

identification and prioritisation of their strategic business objectives extremely useful and identified on-time delivery as being their priority strategic objective. If the strategic evaluation in Stage 1 is completed each time the Cycle is used, it provides a mechanism for constantly surfacing and re-evaluating strategic priorities. In Company J, a variety of objectives have been undertaken using the Cycle since the first iteration, illustrating the turbulent environment in which it operates and highlighting the importance of this constant evaluation and re-evaluation of strategic priorities.

8.2.2 Company Benefits

The feedback from the workshops, along with documentation and observational data collected, showed that the Cycle had a positive effect on Company J both in terms of physical outputs and helping to encourage a culture change. The tools used helped to gain consensus among staff about the improvements required to achieve the chosen objective. The survey identified a number of poorly performing operational factors which inhibited on-time delivery. The company was keen to use surveys again to help in the development of a more pro-active workforce and to improve employee morale. Management was also keen that they should be seen to act on the suggestions, as this would send out a positive message to the workforce, encouraging them to suggest further improvements in the future.

Two measures were identified: 'on-time delivery' and 'reasons for delivery failures'. These measures have proved to be essential for identifying the primary factors which contribute to poor delivery performance. These factors are being systematically eliminated through a programme of continuous operational improvement, monitoring and learning. As these improvements take place, delivery performance is improving.

The main drawback of the Cycle in Company J was that, although it was straightforward to use it to identify improvements, it was much more difficult to persuade the Company to measure the effect of those improvements on delivery performance. However, with some encouragement from the researcher, measures were developed and implemented. It was only after the managers had seen the potential use of the data that they realised the value of measurement as a key method of identifying and monitoring improvements. This has been instrumental in facilitating a move towards a culture of continuous improvement within the company.

8.2.3 Further Iterations of the SME PM Cycle in Company J

Since the delivery performance measures were implemented in Company J, the management team has revisited the Cycle several times. This has enabled the Company to start to build up a balanced portfolio of strategically aligned measures. Two of the subsequent iterations were triggered by the first. Since the Cycle appeared to have captured the imagination of the staff, leading to improved morale and a more pro-active work environment, the managers felt it was important to retain the initiative. Therefore, the second iteration focused upon the staff training and performance appraisal system. In the past, appraisals in particular had caused much bad feeling throughout the Company for being inaccurate and too subjective – and appraisal time was imminent. The results of this iteration of the cycle were immediate, with the number of complaints about training and appraisals dropping from over 40 in 1999 to just 3 in the year 2000.

The third iteration of the Cycle focused attention on customer satisfaction. As part of the original iteration, the Company had identified that when customers asked for winches to be supplied at very short notice, it was generally unable to supply them on-time. Company J had therefore started keeping small levels of safety stocks (5-6 of each standard winch)

which they could offer customers if a customised order would be impossible to make in the time requested.

The customer service iteration SME PM Cycle revealed that many customers, a significant proportion of whom are sole traders, were unhappy with the poor after-sales service provided by Company J. Firms in the automotive recovery industry cannot afford to lose a week's business waiting for a broken winch to be repaired. The Company have therefore established a 24/48 hr turnaround (depending on whether the winch is under warranty or not) for replacing failed winches with a loaned one for the duration of the repair. This has helped improve customer satisfaction, as none of the Company's competitors currently offers this service.

Company J is currently completing a fourth iteration of the Cycle, this time focusing on cost reduction across the Company. This has triggered a massive improvement initiative, as the specific target is to manage a 30% cost reduction year-on-year. To keep the scale of the improvements manageable, the Company has broken down the task into product groups. These are prioritised on a competitive basis, using benchmarking against competitors to establish which product group is in most need of improvement.

8.3 Discussion

When the SME PM Cycle was applied in Company J, it was regularly referred to by the project team as an improvement process, noting the similarity between it and the PDCA (plan-do-check-act) cycle (Deming, 1986). However, despite its similarity in structure and appearance, the PDCA cycle and the SME PM Cycle are fundamentally different. This is because whereas the PDCA cycle provides a basic structure for continuous improvement, there is no explicit requirement for strategy formulation, nor is there a method for

performance measure development, incorporated within it. The SME PM Cycle, on the other hand, is specifically concerned with presenting a method for the regular surfacing and updating of current strategy and the development of performance measures which can help stimulate strategically aligned continuous improvements. In addition, the PDCA cycle is generic, but the SME PM Cycle has been specifically designed to accommodate the specific needs and requirements of SMEs.

Despite these fundamental differences, the philosophy behind both cycles is similar. The SME PM Cycle aims to involve all employees in a process of continuous, strategically aligned, improvement through the use of effective performance measures. Similarly, the continuous improvement / TQM (Total Quality Management) philosophy behind the PDCA cycle has been described as

> *...the way of life of an organisation committed to customer satisfaction through continuous improvement (Kanji, 1990)*

This is because, as Oakland (1993) notes, *"quality is meeting the customer requirements"*. This similarity was recognised when the SME PM Cycle was updated to incorporate the changes identified through the case study (see Table 8.1).

Stage	Tool Used	Modification /Rationale
Name	Customer / Stakeholder Analysis	Modified to 'business needs analysis' due to confusion caused by business perspectives already including customers & stakeholders
Name	The Balanced Scorecard	Discarded because it duplicated the information from the business needs analysis chart
Name	The Performance/ Importance matrix	Modified to become internal / external importance, to improve continuity from the bus. needs analysis chart
Act	Staff Survey	Modified to be more specific and therefore improve responses
Act	Activity Prioritisation chart	Modified to become a wall chart, as post-it notes were the easiest way to deal with all the suggestions from staff
Act	Benefits / Drawbacks chart	Discarded as it duplicated the previous activity
Act	Improvement Action Sheet	Incorporated to make the implementation of focused improvements an explicit part of the cycle
Act	PM Record Sheet	No changes, used successfully
Use	PM Info. point	No changes required
Learn	Review Sheet	No changes required

Table 8.1: Modifications to the Tools in the Workbook Resulting from Case J

The changes included the modification of several of the tools in Stage 1, to make them more user friendly and the addition, in Stage 3, of an explicit section for the implementation of improvements. The purpose of this change was to encourage the development of performance measures before the implementation of improvements, rather than retrospectively. A full explanation of each change can be found in the Company J Case Study, which can be found in Appendix 2. The changes resulted in the workbook being rewritten and published under the name of *Continuous Strategic Improvement through Effective Performance Measurement: A Guide for SMEs* (see Appendix 2). This name was selected because it highlights the Cycle's ability to link ongoing strategy formulation to continuous improvement, through effective performance measures.

8.4 Conclusion

This Chapter has described how the new, theoretically derived, approach for introducing integrated PM into SMEs was applied and developed in a SME to provide practical insights about the way it worked in this environment. The resulting Cycle is iterative and has the potential to link PM to continuous improvement activities within companies. The following Chapter will present two further case studies, which will validate the new approach. These cases will focus on the strengths and weaknesses of the Cycle in this environment, with the aim of enhancing current knowledge about PM in SMEs. The results will be used to validate an enhanced version of the conceptual model of integrated PM development, specifically aimed at SMEs.

Chapter 9: Validation

9.0 Introduction

The design requirements identified in Chapter 7 form the basis for an enhanced version of the conceptual model of integrated PM development, specifically aimed at SMEs. The aim of this Chapter is to validate this SME focused version of the conceptual model. As the SME PM Cycle was designed to conform to this conceptual model, validation is achieved through the application of the Cycle in two further SMEs. The results of these case studies, along with those of the developmental case study carried out in Company J, are examined to identify the similarities and differences between the companies and how these may have affected the outcome of the applications. This data is then used to formulate some conclusions about the strengths and weaknesses of the SME PM Cycle, along with the validity of the SME focused conceptual model of integrated PM development.

9.1 The Purpose of Validation

In Chapter 2, the question of generalisability and relevance was explored and Thomas and Tymon's (1982) framework was selected to ensure that the outputs of the research are useful to practitioners. Validation is critical for fulfilling two aspects of this framework; Goal Relevance and Operational Validity. These aspects are specifically concerned with ensuring that the outputs of the research address the concerns of, and are usable by, practitioners. The purpose of undertaking the validation cases is to establish that the SME PM Cycle is useful and usable in the target SMEs. This will enable the validation of the conceptual model of integrated PM development for SMEs.

9.1.1 Validation Criteria

To ascertain the usefulness and usability of the SME PM Cycle, the validation cases are assessed against a number of criteria. These criteria have been derived from the design requirements established in Chapter 7 (see Table 9.1 - the ticks show which design requirements are covered by each validation criterion). From these requirements, three key criteria for establishing goal relevance have been identified. The criteria cover all the design requirements which are focused around the *content* and *outputs* of the Cycle, as these determine the overall usefulness of the Cycle. Therefore, the goal relevance criteria state that the SME PM Cycle should facilitate:

1. The development of a balanced set of strategically aligned performance measures;
2. The production of well-designed performance measures;
3. Continuous, strategically aligned, improvement.

Design Requirements	Goal Relevance Criteria			Operational Validity Criteria	
	1	2	3	1	2
Provide a need evaluation	✓		✓		
Enable strategic objective identification	✓		✓		
Facilitate performance measure development	✓	✓			
Include a periodic maintenance structure			✓		
Involve key users		✓			
Have top management support			✓		
Have full employee support			✓		
Have clear and explicit objectives				✓	
Have set timescales				✓	
Be very resource efficient					✓
Provide short term as well as long term benefits			✓		✓
Be able to surface informal strategies	✓				✓
Be dynamic and flexible					✓
Develop measures in:					
Customer satisfaction	✓				
Operational effectiveness	✓				
Stakeholder satisfaction	✓				
Supplier effectiveness	✓				
Develop measures with the following characteristics:					
Derived from strategy	✓		✓		
Clearly defined with an explicit purpose		✓		✓	
Relevant and easy to maintain		✓		✓	
Simple to understand and use		✓		✓	
Able to provide fast, accurate feedback		✓			
Able to link operations to strategic goals	✓		✓		
Able to stimulate continuous improvement			✓		

Table 9.1: Determining Validation Criteria from the Design Requirements

A further two criteria were identified to validate the structure of the Cycle, as this determines its usability, or operational validity. These criteria state that the Cycle must be:

1. Easy to use;
2. Able to work within SME constraints.

The SME PM Cycle will be deemed to have operational validity and goal relevance if it meets these criteria.

9.2 Research Method

According to Yin (1989) validation may be conducted in two ways, by *literal replication* and *theoretical replication.* Literal replication claims validation by predicting similar results from similar cases, whereas theoretical replication validates by predicting different results, for predictable reasons, in cases which differ from the original. For this study, literal replication was appropriate for validation, as the SME PM Cycle had been specifically designed to work in SMEs which exhibit certain characteristics. Theoretical replication was considered to be beyond the scope of this study. This is because, whilst the Cycle was designed specifically to work within set constraints (i.e. the specified characteristics of SMEs), this would not necessarily preclude it from working in other environments.

9.2.1 The Case Companies

The selection of the case companies for validation purposes used the same sampling strategy as the developmental case study (see chapter 8 for details). Therefore, companies were identified which appeared to exhibit the characteristics of SMEs, as identified in Chapter 4, and were willing to undertake the commitment to use the process to develop integrated PM in their company. These criteria resulted in the selection of two companies,

Company K and Company L, in which to undertake the validation cases. Both companies are manufacturers, based in the South West of the UK.

Company K manufactures boat propellers for the luxury powerboat industry, supplying to the top powerboat manufacturers in the UK. It has been established for 26 years and currently employs 170 people at its Devon location, with a further 40 at sites in Fareham (UK), Holland, Dubai and the US. The Company was keen to learn about PM, in particular, how it could help to improve efficiency and productivity in the main factory. In addition, the Production Director, who was to be the process 'champion', perceived the study to be good value, as he felt that the Company would benefit from free advice and consultancy throughout the project.

Company L manufactures a range of lubrication systems for plant vehicles and trucks. These are generally retrofitted to the vehicles, via a loosely structured distribution network. The Company now employs around 100 people, having gone through a management buy-out from its German parent firm in August 2000. The Managing Director of the Company, along with the other directors, had produced a business plan and were keen to use the SME PM Cycle to help operationalise it throughout the Company and to monitor its success.

9.2.2 Data Collection

The first test of the new Cycle, in the developmental case study, used action research as the vehicle for data collection. As Gummesson (1991) points out;

> *In action science, the researcher / consultant is expected to produce "usable research", defined as research that could be applied in real life situations and be helpful to the practitioner...Quality is assessed in relation to the way research results are perceived to facilitate the solution of an actual problem.*

Effective validation of the SME PM Cycle should also, therefore, be carried out in a 'real life situation,' because it must be able to work within the identified constraints affecting SMEs. This requires an in-depth examination of the practical application of the Cycle in SMEs. Action research provides the most appropriate method of data collection, as it enables the simultaneous evaluation of the Cycle itself and the context in which it is being applied. This helps to provide a rich picture of the strengths and weaknesses of each application.

The SME PM Cycle was applied in both companies through a combination of meetings and workshops. These were supplemented, where appropriate, by informal discussions with people involved in the intervention in order to gain a deeper understanding of various issues. The structure for the intervention was dictated primarily by the participants from each company. It was felt that, as long as each stage was accomplished, it would be more beneficial in terms of ownership and buy-in to the Cycle to allow the companies to dictate the pace and style of the application.

Data collection consisted primarily of first-hand experience, gained from being actively involved in each application of the Cycle, as well as observation, informal interviews and various forms of documentation from each company. These were used to build a rich picture of each application, from which to analyse the usefulness and usability of the Cycle. The different sources and methods of data collection enabled effective triangulation, which helped ensure the validity of the findings.

9.2.3 Data Analysis

Analysis of the case study data was carried out on two levels; *within-case analysis* and *cross-case analysis* (Eisenhardt, 1989). Within-case analysis occurred in parallel with data

collection, as the write-up of each case was done as soon as practically possible after each intervention in order to ensure the accuracy of the data (see Appendix 3 for copies of each case). Each stage of the write-up entailed the synthesis and reduction of all the accumulated data from each meeting into a structured and comprehensible format. Once each case was complete, it was coded and categorised into predetermined themes, to establish how closely the validation criteria were adhered to in each case.

When both studies were complete, cross-case analysis was carried out on the two validation cases and the developmental case study previously documented (see Chapter 8). The purpose of this phase of the analysis was investigate the similarities and differences between each case in order to gain a deeper understanding of the contextual issues surrounding the effective application of the SME PM Cycle.

9.3 Case Studies

This section will present the results of the within-case analysis of the studies carried out at Company K and Company L. This will provide the case-based assessment of the SME PM Cycle, against the specified validation criteria (Appendix 3 provides detailed accounts and supplementary evidence of the cases at companies K and L).

9.3.1 Case Company K

To determine whether the case study at Company K fulfilled the validation criteria, each will be assessed in turn. Initially the analysis will assess the usefulness of the SME PM Cycle at Company K, after which the overall usability of the Cycle will be evaluated.

9.3.1.1 Facilitate Development of a Balanced Set of Strategically Aligned Measures

The key to developing a balanced set of strategically aligned measures is the surfacing of appropriate strategic objectives, balanced across the dimensions of performance. In Company K, this was achieved during the first workshop. Two members of the Company were present; the Production Director and the Production Manager. Initially, a discussion took place to ensure that the Company participants knew what the Cycle was and understood how it could be used in Company K. Despite this, during the strategic objective identification phase, both participants were very focused towards improving production. Although this was unsurprising, due to their roles, it was important that a balanced set of objectives were identified. However, the tools provided in Stage 1 of the Cycle facilitated the assessment of their business needs across the primary dimensions of performance. This led to a reasonably well-balanced set of strategic objectives being identified, as follows:

- Improve resource utilisation;
- Improve delivery reliability;
- Rationalise products and customers;
- Implement a new performance appraisal system;
- Reduce overtime.

Having identified a balanced set of strategic objectives, it was necessary to prioritise one of them for immediate action. Using the tools provided, delivery performance was identified as the critical objective, although both Company participants insisted that resource utilisation was equally important. This meant that both objectives were initially selected for immediate action. However, when the Company started losing orders from one of their biggest customers through poor delivery performance, this quickly took over as the sole priority objective.

The tools provided in Stage 1 of the SME PM Cycle helped Company K to surface their immediate strategic priorities. This is critical for the development of balanced, strategically aligned, performance measures. However, only one strategic objective is prioritised in each iteration of the Cycle. Therefore, there is a reliance on the continued use of the Cycle to ensure the development of a balanced portfolio of measures. In Company K, although the participants were keen to use particular tools again, there was a unanimous reply that they would not work through the Cycle as a whole again. This means that, although they have one set of measures in place to monitor one strategic objective, Company K is unlikely to develop a complete, balanced set of measures.

9.3.1.2 Facilitate the Production of Well-Designed Performance Measures

One of the key features of well-designed performance measures is that they should help link operations to strategic goals. Stage 2 of the SME PM Cycle facilitates this by identifying and measuring operational improvements which drive performance towards operational goals. The initial focus for improvements was aimed at the propeller shop, as this is where the bulk of the work in the Company K is carried out. A survey was sent out in this area, asking for improvement suggestions. However, out of 40 staff, only 9 responses were received. As a recent brainstorming workshop had proved successful with workers in the foundry area, this was seen as a good way of supplementing the surveys in the propeller shop.

Before the brainstorming workshop could take place, the Production Director was headhunted by another company and left without warning. The workshop still went ahead, but it was now headed by two TCS Associates (working on two year graduate placement projects), one of whom was looking at improving the quality systems within the Company and the other of whom was implementing a new IT system across the Company.

Although the workers from the propeller shop seemed rather indifferent to improvement efforts, some useful outputs which would help to improve delivery performance were identified, as follows:

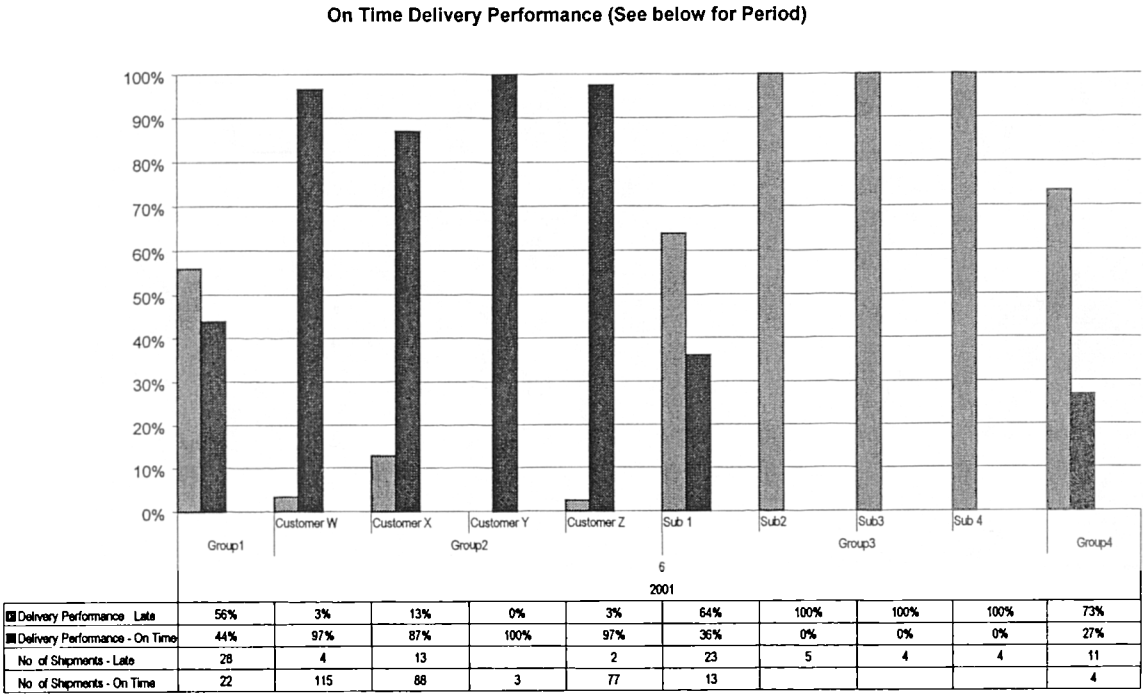
- improve production planning;
- reduce rework levels;
- improve communication between the foundry and the propeller shop;
- improve staff training so people get it 'right first time';
- improve fettling standards in foundry;
- remove customer returned goods for re-work from the standard production line.

After the brainstorming workshop, a meeting was held with the two TCS Associates (TCS-As) to identify appropriate measures of performance. One measure had already been identified by the participants: monitoring the amount of re-work on each propeller. Previously, scrap had been monitored, but the full-scale scrapping of a propeller is rarely required. Instead, it is usually re-worked by hand which is a highly skilled and labour-intensive process. The new measure required the re-design of the scrap reporting sheet, so that it encouraged the reporting of all rework, rather than simply scrap. The purpose of this was to enable an appraisal of how much rework was occurring in the propeller shop and to highlight the production and training problems which were causing it.

A further measure developed was concerned with ensuring the accuracy of data for the new IT system. The measure developed was aimed at levelling the production plan by updating the accuracy of the data on the IT system. This was achieved by monitoring the actual date that a propeller reached and left each machine, rather than relying on potentially inaccurate theoretical data. Jobs received late would indicate a problem further up the production process, whereas jobs leaving a machine late would indicate a problem

with that machine. The data could then be used to be investigate and eliminate these problems and also refine the IT system shop floor model, thereby enabling greater accuracy in production planning, which would ensure that orders are processed as quickly as possible.

A Consultant, brought into the Company through its investors, had now taken over most of the vacant role of Production Director. He redeveloped the delivery performance measure, to try to focus the Company's efforts on achieving on-time delivery for their biggest 4 customers. He also started displaying the results of these measures around the Company (See figure 9a).



Delivery Performance Late	56%	3%	13%	0%	3%	64%	100%	100%	100%	73%
Delivery Performance - On Time	44%	97%	87%	100%	97%	36%	0%	0%	0%	27%
No of Shipments - Late	28	4	13		2	23	5	4	4	11
No of Shipments - On Time	22	115	88	3	77	13				4

Figure 9a: Delivery Performance monitoring at Company K

In each case it was the person who had developed the measure who was responsible for collecting and analysing the data it produced. From an overall delivery perspective, this was achieved by splitting the delivery performance into groups, depending on the customer and the product (e.g. see Figure 9a – group 2 consists of propellers delivered to the 'Big 4' customers, which are individually monitored). The key delivery target was to

deliver 100% on-time to the 'Big 4' customers, which was achieved through a number of operational level improvements.

The IT measure is used on an 'as and when necessary' basis, to ensure that the IT system has the correct loading data for each machine. The measure is not used permanently because of the time required to regularly maintain it. The eventual outcome of this measure will be to prevent the IT system from overloading the shop floor, thereby making delivery promises more accurate and reliable.

Finally, the rework measure was implemented, but unfortunately, the data indicates a lack of enthusiasm for completing the forms. This is highlighted because virtually all the responses received came from one person and it is highly unlikely that he is the only person who had any problems over the first measurement period. It appears that the supervisors and shop floor managers are equally uninterested in the accurate reporting of rework, as despite several attempts, they have not persuaded their staff of the benefits of this procedure. As the data is incomplete, it is difficult to interpret trends and therefore unlikely that any significant improvements will result from it.

The measures developed in Company K conformed to all the criteria for well-designed performance measures. However, only two out of the three developed were used successfully. Although staff were assured that the measure was to establish the key reasons for rework, they were either afraid of the repercussions of such an exercise, or were simply indifferent to the problem.

9.3.1.3 Facilitate Continuous Strategically Aligned Improvement

Although the Company ran successfully through the Cycle once, when questioned, the unanimous reply was that they would be unlikely to go through it again. However, more brainstorming improvement workshops have been, or are planned to be, carried out in every section of the company. The fact that the Company continued with the workshops, but not with the Cycle as a whole, somewhat negates the comment made by one of the TCS-As, that they would not continue with the it because it was too "*time consuming*". However, this shows that, although there was no real understanding of the importance of running through the Cycle again, the idea of continuous improvement has made an impact. However, it is unlikely that, under these circumstances, the improvements will be strictly focused around strategic priorities.

9.3.1.4 SME PM Cycle Must be Easy to Use

To fulfil this criterion, it was essential that the objectives and timescales of the iteration of the Cycle were made explicit. This would ensure that the participants understood exactly what the Cycle aimed to achieve in the Company. Although the objectives were made clear and some general timescales were identified at the first meeting, the loss of the Production Director as the 'change champion', caused problems. After he had left, there was some confusion between the quality initiative, which had sparked the original interest in brainstorming workshops, and the SME PM Cycle. This was due to the fact that one of the TCS-As who had taken over the running of the Cycle was also heavily involved with the quality initiative. Therefore, the iteration of the Cycle in Company K was not as easy to manage as it should have been.

9.3.1.5 SME PM Cycle Must be Able to Work Within SMEs Constraints

One of the key aims of the Cycle was that it be fast and resource efficient to apply. Company K began the Cycle just before Christmas 2000 and the last measures were implemented by May 2001. This means that it took 5 months to complete the first iteration of the Cycle in the Company. During this time, four members of staff were actively involved in the Cycle; the Production Director, the Production Manager and, after the Production Director had left the Company, the two TCS-As. These people took part in three meetings in total, one to work through Stage One of the Cycle, one to assess the surveys and arrange the brainstorming workshop and one to develop the measures. In addition, the brainstorming session involved a number of staff from the propeller shop for most of the afternoon, which was an expensive exercise, but one for which the managers thought the outcomes would be worth the cost. There was also some work that was undertaken outside of the meetings, particularly when it came to implementing and then monitoring the results of the measures. Overall, the Cycle was as quick and resource efficient as was possible under the circumstances. However, the fact that the quality initiative was already underway before the Cycle began and the Company were implementing a new IT system, meant that it was always battling for time with the staff involved.

The requirement for flexibility was made in recognition of the fact that many SMEs live in a turbulent environment, in which environmental, strategic and structural changes may occur with dramatic effects. In Company K, the need for flexibility was essential, as the priorities actually changed during the course of the Cycle, from a focus on improving resource utilisation, to a full-scale assault on on-time delivery. This was coupled with the premature departure of the Production Director, who was the 'change champion', so that new people had to be brought onto the project team. In addition, the surveys produced inadequate results, which meant that a further consultation exercise had to be undertaken

in the form of a brainstorming session. The very fact that, amidst so many changes, the Cycle was seen through to completion is evidence of its ability to work within SME constraints.

9.3.2 Case Company L

The within-case analysis will now assess the case study carried out in Company L against the validation criteria. This will be achieved using the same methods as the case in Company K.

9.3.2.1 Facilitate Development of a Balanced Set of Strategically Aligned Measures

In the first meeting, Stage 1 of the Cycle was completed, which aims to surface and prioritise a balanced set of strategic objectives. The Company participants comprised the Manufacturing Director, the Manufacturing Controller and the Logistics Controller. Using the tools provided, a lively discussion took place to surface the Company's current strategic objectives. These were eventually established, as follows:

- Improve overall efficiency;
- Sort out lead times;
- Increase capacity;
- Improve on-time delivery;
- Increase volume flexibility.

Prioritisation was straightforward, as all participants agreed that improving on-time delivery was the key objective, as this would necessarily involve the need for adequate capacity, efficiency, flexibility and lead times, whilst also having a knock-on effect on both customer satisfaction and employee morale.

The identification of strategic priorities was a useful starting point for the development of a balanced set of strategically aligned performance measures. However, this is only achievable if the Company iterates around the Cycle regularly, building new measures as strategic priorities change. Company L has done this, revisiting the Cycle to identify a reduction in inventory as the next strategic priority. If the Company continue to use the Cycle, a balanced set of measures will be developed, in line with strategy, over time.

9.3.2.2 Facilitate the Production of Well-Designed Performance Measures

Although the Company already measured the value of manufacturing arrears, there was no specific measure of actual delivery performance – there was simply a 'gut feel' that it was poor. Therefore, the first measure developed was simply a straightforward delivery performance measure. The need to establish a delivery performance benchmark led to a mini-iteration of the Cycle being completed, whereby the delivery performance measure was implemented and the data analysed before any further measures or improvements were identified.

Having started to gather data on delivery performance, the Company participants used this information to help to identify some of the key improvements necessary to raise the delivery performance figures. This was achieved by analysing the data to identify trends, then brainstorming ideas between the project team and various other members of staff who were called in to meetings on an 'as and when needed' basis. Resource issues meant that it was difficult to get a group together for meetings. Therefore, the project team identified areas which appeared problematic and simply brought the relevant staff into the meetings to discuss potential improvements. The drawback of this approach was that it spread the identification of measures and improvements over a number of meetings. However, the

Company was always keen to implement the ideas from one meeting before the next was held, thereby helping to maintain the momentum of the project.

Overall, the improvements and measures that were established at these meetings were as follows:

- Run full batch sizes to reduce set-up time and increase machine efficiency;
- Monitor machine efficiency;
- Enable sales team to identify non-forecasted items so they can check availability before quoting a lead time;
- Increase forecasted items from 300 to 500 to reduce stock-outs on popular items;
- Improve sales-manufacturing communication to reduce number of impossible lead times due to front-loaded orders;
- Establish a make-to-stock agreement for key customers to reduce front-loaded orders.

The data from the overall delivery performance measure was used to identify a number of areas for potential improvements. Figure 9a illustrates one analysis, which was carried out to establish the quantity of forecasted and non-forecasted items which were late and on-time. The purpose of this was that the Company participants thought that forecasted item products should always be on time.

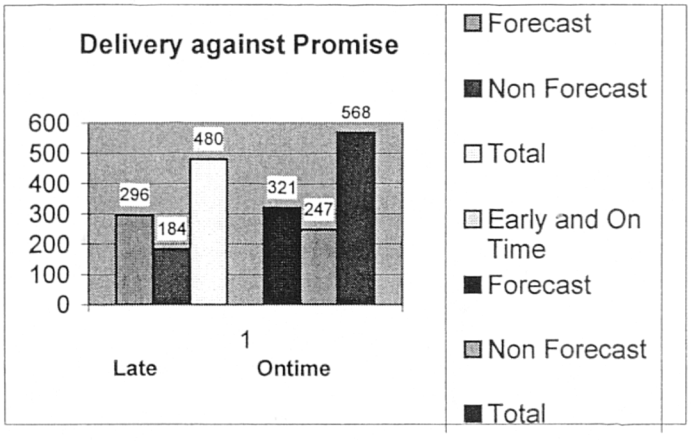


Figure 9b: Analysing the Delivery Data in Company L

The fact that so many of the forecasted items were being delivered late led to the suggestion that the forecast quantities might be set too low. The Financial Director was called in and the situation was discussed, after which he agreed to raise the number of forecasted items to help eliminate any standard items being delivered late. This type of process was used for each of the improvements and measures and the Company expect that, collectively, they will have a significant impact on delivery performance.

Company L successfully implemented the overall delivery performance measure and developed time cards for the machine shop, to measure machine efficiency. Improvements were also implemented, including running full batch sizes, increasing the number of forecasted items from 300 to 500 and revamping the sales data screens so that all products requiring non-forecasted items were highlighted and lead times could be individually identified. The measures developed conformed to the characteristics of well-designed performance measures and were used to identify operational improvements which would help drive performance towards achieving on-time delivery.

9.3.2.3 Facilitate Continuous Strategically Aligned Improvement

In the penultimate meeting, the participants were asked for feedback on the SME PM Cycle, including whether they would use it again. This provoked a positive response as the participants felt that the Cycle had been useful in helping to identify solutions to a number of problems which adversely affected delivery performance within the Company, as one manager commented

"it's a good problem solving approach – we will use it again".

They were, therefore, keen to continue using the Cycle as a method of troubleshooting other strategic priorities. In a follow-up meeting, the Company participants revealed that

they had already started another iteration of the Cycle. This time, the key strategic priority was inventory reduction, as inventory had begun to rise to unacceptable limits and was beginning to cause cash-flow problems within the company. A focus on inventory measurement has already seen stock holdings level out and The Company expects to hit their target over the coming months. This demonstrates that Company L is using the Cycle to facilitate continuous, strategically aligned, improvements.

9.3.2.4 The SME PM Cycle Must be Easy to Use

Clear objectives were a key aspect of making the SME PM Cycle easy to use. To facilitate this, initial meetings were held with the Managing Director and then the Manufacturing Director in order to explain the SME PM Cycle to them in detail. They were also given a copy of the workbook to read, which provides a step-by-step guide to what the Cycle is and how it works. The first project meeting began with more explanation of the Cycle for the benefit of the other company participants. It was clear at this point that the Manufacturing Director had both read and understood the workbook, as he was able to explain what it could do to the others and even gave some initial thoughts about how it might best be applied in Company L. All the Company participants were confident about what was happening at each stage and why. This demonstrates that the Cycle is easy to understand and use.

9.3.2.5 The SME PM Cycle Must be Able to Work Within SME Constraints

The first iteration of the Cycle was run over approximately 4 months. During this time, the Company held periodic meetings to identify improvements and monitor their effects on delivery performance. Sending out a survey to consult staff about potential improvements was not seen as appropriate but, due to time restrictions, full-scale brainstorming was not a viable alternative. Therefore, initial ideas for potential improvements were identified

directly from the available delivery performance data and specific staff were asked to attend meetings to discuss the viability and utility of these improvements. This approach worked well and ensured that critical staff were not away from their work for longer than absolutely necessary. Therefore, the Cycle was seen as being both time and resource efficient in Company L.

The flexibility of the Cycle in Company L was demonstrated when, despite severe resource constraints, a method of consultation which was both appropriate and useful was developed to enable the identification of measures and improvements. Although the chosen method was unconventional in that it had not been described in the workbook, it used the same principles of consulting the staff who would be directly affected by any of the changes proposed, in order to gain consensus and feedback on the suggestions. These findings show that the Cycle was flexible enough to be able to work within SMEs constraints.

9.4 Cross-Case Analysis

It is interesting to note that the two validation companies (K and L) and the developmental company (J) were very different, despite conforming to the identified SME characteristics. Hence, this section will focus on cross-case analysis of all three applications of the SME PM Cycle, to evaluate how it was received in these very different environments.

The focus for the cross-case analysis is the identification of similarities and differences between the cases, along with any interesting anomalies. The emphasis will be on using evidence, along with the contextual understanding gained from individual cases to explain how and why these occurred. The aim of this analysis is to draw some conclusions about

overall validity and generalisability of the SME PM Cycle and the conceptual model which underpins it (Table 9.2).

Performance Measure Characteristics	Development process requirements
Derived from strategy	Need evaluation / rationale
Clearly defined / explicit purpose	Key user involvement
Relevant and easy to maintain	Strategic objective identification
Simple to understand and use	Performance measure development
Provide fast, accurate feedback	Periodic maintenance structure
Link operations to strategic goals	Top management support
Stimulate continuous improvement	Full employee support
	Clear and explicit objectives
Dimensions of performance	Set time-scales
Customer Satisfaction	Be very resource efficient
Operational Effectiveness	Provide short term as well as long term benefits
Stakeholder Satisfaction	Be able to surface informal strategies
Supplier Effectiveness	Be dynamic and flexible

Table 9.2: Enhanced Conceptual Model of Integrated PM Development for SMEs

9.4.1 Similarities and Differences

The key similarity between the three cases was that every company experienced some benefits from using the SME PM Cycle. In each company, significant progress towards the fulfilment of the named objective was made through focusing improvement efforts using the Cycle. In addition, all companies reported improved interdepartmental communication and morale amongst the workforce. It is also interesting to note that all the companies selected the same objective to focus on; improving delivery performance. However, the methods used and the improvements identified to help achieve this objective were very different in each company.

Further similarities were also noted between Cases J and L. The participants from both these companies were clearly committed to the idea of making strategically aligned improvements, even when they were unclear initially about what their strategic objectives actually were. Company K differed in this respect because, although the participants did identify strategically aligned objectives, they were always reluctant to drop their focus on

internal efficiency and productivity to concentrate solely on the strategic objective. This illustrates the subjectiveness associated with the requirement that a need evaluation is carried out to ensure buy-in to the Cycle by each company. Although participants in Company K had convinced themselves that the Cycle would be useful, they appeared not to have the same openness to the changes it provoked as the other companies.

In addition, both Company J and Company L realised the value of measurement data and started using it to monitor and highlight further areas for improvements. In this respect, Company J were initially slow, as participating staff were rather more keen to implement improvements than to monitor them, but they quickly realised that to ensure performance continued to improve, measurements were necessary. This was not repeated in Company K, however. Here the participants had difficulties implementing the measures that they had developed and the measurements were purely output-oriented, providing little data on areas for improvement.

A third difference that was noticed between Company K and the other cases, was the style of managers who were participants in the Cycle. In Companies J and L, the managers were often frustrated and sometimes angry with various staff, but they were generally sympathetic to their needs and views. In addition, the project teams were made up of managers from different levels, with some being directly involved with the supervision and running of various parts of the manufacturing operation. This helped to ensure that decisions were reasonable and would be accepted by the staff. However, the attitudes of the initial project team in Company K were startlingly different. Both managers openly admitted that they felt that the workforce was generally lazy and ignorant and only responded to coercion to make them more efficient. As one manager noted:

> *"Basically people would rather turn up and do nothing for 3 hours and get paid for it than work harder during normal hours and take home a bonus.".*

Even when the project team changed, one of the original managers remained involved. This ensured that the staff who attended the brainstorming session felt uncomfortable, as the manager's opinion of them was openly low. As he said when brainstorming was first suggested:

> *"Well, forget that for a start – you won't find enough brains around here for that".*

This might have accounted for the disinterest shown from many staff at the brainstorming workshop and the lack of response to the survey. The workbook provides methods to ensure that staff get involved and provides guidance to help make sure that measures are developed by the people who will be using them. However, this alone is unable to ensure that the requirements for the involvement of key users and full employee support are fulfilled by individual companies. It does, however, help to validate that these requirements are important elements of an integrated PM development approach for SMEs.

A further difference between Company K and the other cases was that the participants claimed that they would not use the Cycle again, despite their commitment to introducing the brainstorming workshops across the Company. Company J participants, on the other hand, had provided evidence of continued use of the Cycle in their Company, with the Manufacturing Director commenting that:

> *"the process was the catalyst which galvanised the workforce into action...measuring is helping to make the Company transparent, so that every member of staff can see the effect of their improvement efforts and can see the Company beginning to achieve its primary objectives."*

Company L claimed it too was using the Cycle again and had identified the critical objective for this second cycle. It is interesting to note here, that Company J was the only company with a strong order book – both companies K and L had falling orders. The

difference between them is that Company L is using the Cycle to systematically achieve their internal strategic objectives, whilst external strategies to increase sales take effect. However, Company K is currently finding it difficult to look to the future and is relying on purely internally focused brainstorming workshops to try to instil an atmosphere of improvement within the organisation.

9.4.2 Summary

The validation cases, along with the initial developmental case, were all deemed successful in that each company completed one cycle of the SME PM Cycle, leading to actual performance improvements to the strategic objective identified. Case L fulfilled all the validation criteria, but Case K only partially fulfilled them. However, the reasons for this have been discussed and shown to be beyond the scope of a development approach. That Case K was less successful than the other cases lends support to the need for integrated PM development to conform to all the criteria in the enhanced conceptual model of integrated PM development, for SMEs.

Overall, when applied in SMEs, the SME PM Cycle seems to be an effective method of identifying appropriate improvements and measurements to drive performance towards the achievement of critical strategic objectives, whilst also helping to improve communication and morale across the company. However, Companies J and L, which derived the most benefit from the Cycle and were keen to use it again, differed from Company K in several key areas. It appears that, for the Cycle to flourish, Company staff must:

- Be open and willing to change;
- Have an understanding of the importance of measurement both to drive performance towards achieving the strategic objective and highlight areas for further improvements.

9.5 Conclusion

This chapter has detailed the cases undertaken to validate the SME PM Cycle and the SME focused conceptual model of integrated PM development. It has demonstrated how each case fulfilled the validation criteria and then compared them, along with the developmental case study (Company J), to establish the limits of generalisability for the Cycle. Of the three cases, two appeared to be more effective and have a more profound effect on the companies than the other one. Having investigated this phenomenon in detail, two key issues were identified which were missing in this case, but were present in the others. These issues have now been formulated into recommendations for companies, for the effective use of the SME PM Cycle.

Chapter 10: Conclusions

10.0 Introduction

This thesis has documented the research undertaken to extend current knowledge and understanding of integrated PM development into a SME context. From the literature review and initial empirical research, it was clear that current approaches for the development of integrated PM, aimed at larger organisations, were inappropriate for use in SMEs. Hence, despite the well-documented benefits of using integrated PM, SMEs have largely been unable to take advantage of them.

The research has identified the context-specific factors that affect the introduction of integrated PM into SMEs from both theory and practice. These factors supplemented the theoretically derived requirements for the effective introduction of integrated PM, to make them more applicable to SMEs. The requirements were used to design a new approach for introducing integrated PM into SMEs. This approach was developed and tested in three SMEs. The results of these studies were used to validate the requirements which underpinned the new approach.

This chapter identifies and describes the key conclusions of this research and details its contribution to knowledge. A brief discussion of the difficulties experienced conducting the research follows. The chapter concludes by identifying potential directions for future research in this area.

10.1 Key Conclusions

The research sought to investigate two key research questions:

1. Are current integrated PM development approaches appropriate for use in SMEs?
2. How can integrated PM be introduced effectively into SMEs?

The work undertaken to investigate these questions has identified two key conclusions:

1. Established approaches for integrated PM development are inappropriate for SMEs;
2. The SME PM Cycle facilitates the effective introduction of integrated PM into SMEs.

A summary of the research results from which these conclusions were drawn will now be provided.

10.1.1 Conclusion 1: Established Approaches for Integrated PM Development are Inappropriate for SMEs

The deficiency of current approaches for developing integrated PM in SMEs was the key conclusion from the Investigation Phase of the research. The conclusion was derived from four elements of the research, which were described in Chapters 3-6.

In Chapter 3, a conceptual model for the development of integrated PM was formulated from the literature. This focused on three sets of requirements: what should be measured, what measures should look like and the features of an effective development approach. The model represented a synthesis of current academic opinion about what integrated PM is and how it can be developed effectively. A number of established approaches for developing integrated PM were evaluated against this model. This resulted in the identification of an approach which conformed to all the elements of the conceptual model.

Chapter 4 established a set of SME characteristics from the literature. The conceptual model of integrated PM was then reviewed from the perspective of a SME exhibiting these characteristics. This review concluded that each element of the conceptual model was applicable to SMEs and that integrated PM should be useful in this environment.

However, it was also concluded that the development and implementation process is likely to be more challenging in this environment, due to the constraints emerging from their characterisation.

Two empirical studies were carried out. The first study aimed to evaluate whether SMEs already used integrated PM (Chapter 5). This was achieved by carrying out a number of interviews with SME managers. The results of this study show that SME PM systems have little in common with the conceptual model. This demonstrated that the research was relevant, as SMEs were not currently using integrated PM.

The second empirical study (Chapter 6) examined the development of an integrated PM system in a SME using the process which conformed to the conceptual model. A case study was carried out using participant observation techniques. The results identified that the SME characteristics exhibited by the case company had made the introduction of integrated PM problematic. Further analysis identified that the reliance of the development process on the availability of a formal strategy was a key reason for this failure. This also indicated that future attempts to introduce integrated PM into SMEs would be problematic if they used existing approaches. This is because existing approaches are reliant on the provision of a formal strategy from which to develop the measures. This led to the conclusion that existing approaches for integrated PM development are inappropriate for use in SMEs.

10.1.2 Conclusion 2: The SME PM Cycle Facilitates the Effective Introduction of Integrated PM into SMEs

The conclusion that that established approaches for introducing integrated PM are inappropriate for use in a SME environment stimulated the identification of additional requirements for a more effective development approach. Four specific requirements,

identified from the empirical study, were synthesised with the original conceptual model. The enhanced conceptual model formed the basis for addressing research question 2, through the design and development of a SME focused, integrated PM development approach. This comprised the Innovation Phase of the research and is reported in Chapters 7 and 8.

Chapter 7 described how an appropriate design process was adopted and how the requirements for a SME PM development approach were identified. To fulfil these requirements effectively, an alternative structure for the approach was investigated and an incremental structure was identified as being the most appropriate. The Cycle was populated with four stages for integrated PM development comprising: Strategic Objective Identification and Prioritisation, Performance Measure Development, Implementation and Review. A number of tools were then identified or developed to facilitate the completion of each stage and to ensure that the Cycle adhered to all the design requirements.

In Chapter 8, the SME PM Cycle was applied in a SME. This provided valuable insights into the implementation of the approach and resulted in some refinements. The addition of phases for identifying and implementing improvements as part of the Cycle, were then introduced. However, the study demonstrated that the Cycle complied with the identified requirements and provided a number of benefits to the Company involved. This suggested that the design requirements were appropriate and indicated the need for a validation study.

Chapter 9 described the Application Phase of the research. This began with the identification of five validation criteria, derived from the design requirements, from which to assess the usefulness and usability of the SME PM Cycle. These criteria were used to evaluate two further case study applications of the Cycle in SMEs. The cases were carried

out using action research techniques as the primary vehicle for data collection. This enabled the simultaneous evaluation of the Cycle itself and the SME context in which it was applied.

One case study fulfilled all of the validation criteria and one partially fulfilled them. A comparison between both the validation cases and the developmental case revealed that the companies that strictly adhered to the Cycle attained the best results. This indicates that the enhanced conceptual model, on which the Cycle was based, provides a more appropriate framework for the development of SME PM approaches. However, to overcome the difficulties experienced with companies that fail to comply with all the requirements, two recommendations for effective use were also identified. This led to the conclusion that the SME PM Cycle is appropriate for use in SMEs.

10.2 Contribution of the Research

The research reported in this thesis makes a contribution to both knowledge and practice. The major contribution to knowledge lies in the identification of the context-specific factors that affect the development of integrated PM in SMEs, along with an improved knowledge of how SMEs understand and use PM. The contribution to practice comes from the design, development and validation of a continuous improvement approach to the introduction of integrated PM systems, specifically aimed at SMEs.

The identification of the context-specific factors that affect the introduction of integrated PM in SMEs, along with existing criteria for effective integrated PM development identified from the literature, has enabled the formulation of a conceptual model of integrated PM development in SMEs. This model, illustrated in Table 10.1, identifies what should be measured and the characteristics of performance measures, along with criteria

for an effective development approach which incorporates these new, context-specific requirements for SMEs. This represents a significant step forward in overcoming the barriers that inhibit the introduction of integrated PM systems in this context.

Performance Measure Characteristics	Development Process Requirements
Derived from strategy	Need evaluation / rationale
Clearly defined / explicit purpose	Key user involvement
Relevant and easy to maintain	Strategic objective identification
Simple to understand and use	Performance measure development
Provide fast, accurate feedback	Periodic maintenance structure
Link operations to strategic goals	Top management support
Stimulate continuous improvement	Full employee support
	Clear and explicit objectives
	Set time-scales
Dimensions of Performance	**Newly Derived SME-Specific Requirements**
Customer Satisfaction	Be very resource efficient
Operational Effectiveness	Provide short term as well as long term benefits
Stakeholder Satisfaction	Be able to surface informal strategies
Supplier Effectiveness	Be dynamic and flexible

Table 10.1: Conceptual Model of Integrated PM Development for SMEs

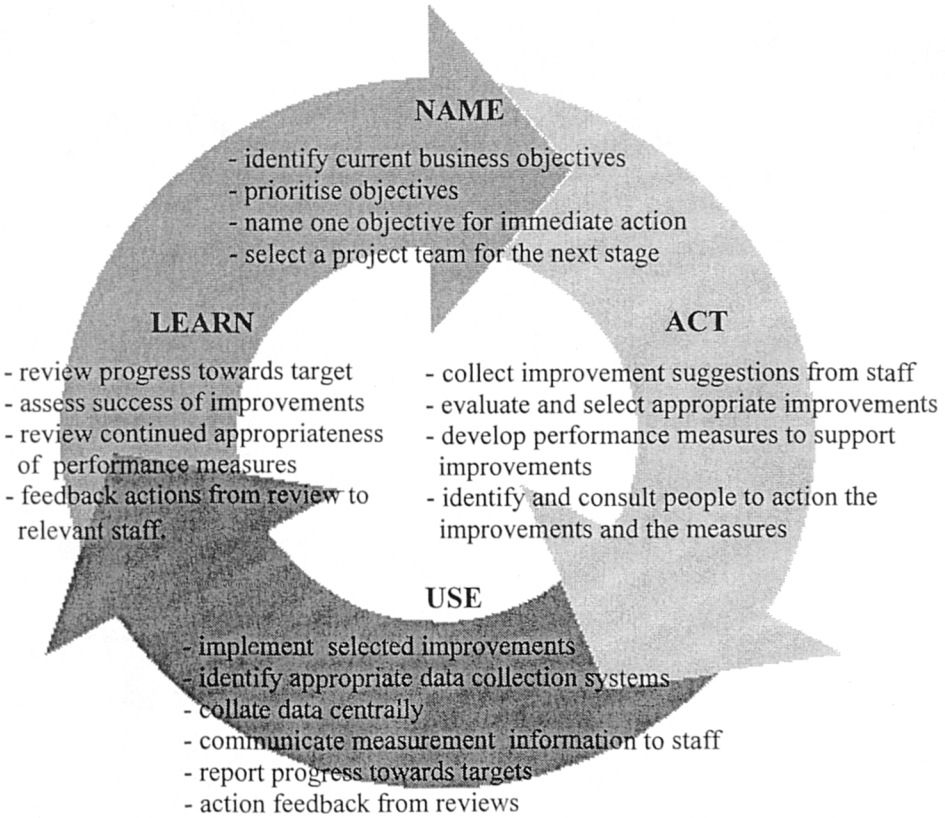


Figure 10a: The SME PM Cycle

The new conceptual model was used to design and develop the SME PM Cycle (Figure 10a), which conforms to all the criteria it identifies. This Cycle is novel because it currently stands as the only continuous improvement based approach for integrated PM system development in SMEs.

To summarise, the contribution to knowledge and practice through this research has been achieved by:

- establishing a set of context-specific requirements for the introduction of integrated PM into SMEs;
- adding these requirements to existing criteria identified in academic literature, to form a conceptual model of integrated PM development, specifically aimed at SMEs;
- designing, testing and validating a novel, continuous improvement approach for the development integrated PM systems in SMEs, which conforms to the criteria identified in the conceptual model;
- improving existing knowledge of how SMEs understand and use PM.

10.3 Critical Review of the Research

The research set out to fulfil a specific aim, which was to extend current knowledge and understanding of integrated PM development into the context of SMEs. To ensure that this aim was fulfilled adequately, a deliberate decision was made to limit the areas for research and the research methods used. As a result of this decision there are areas where, although one route for investigation was selected, another may have been equally valid or, with hindsight, perhaps more appropriate. In addition, some potential areas for investigation, which might have strengthened the overall findings, were excluded to help preserve a strict focus. Therefore, in the interests of future research which may build on the work reported in this thesis, a brief discussion of these limitations will now be given.

The research methods selected were deemed to be the most appropriate ways of gaining access to the information required at each stage of the research. However, as with all research methods, there are a number of associated limitations. The most obvious limitation of this study, which was conducted entirely from a case study and action research perspective, is that of generalisability.

To facilitate the generalisability of the research findings, precautions were taken to ensure that a representative sample of SMEs was selected. However, as SMEs are a very large and heterogeneous group, this was problematic. Therefore, the sample was limited through size, sector and location stratification. In addition, participating companies had to conform to the list of general SME characteristics derived from the literature, shown in Table 4.1. This was to facilitate the selection of a relatively homogenous group of SMEs, to increase the generalisability of the results. However, in practice, the characteristics were very difficult to check as there was no way of formally assessing conformance before working with the companies. In addition, as none of the companies in the sample appeared to contravene any of the characteristics, it raises the question of whether the use of such a set was really appropriate in the first place. If not, the level of confidence about the type of companies the findings of the research apply to would be more restricted.

A further limitation concerned with generalising the research findings may be found in the design of the developmental and validation studies. The SME PM Cycle was applied in three different companies, in order to test it in three different environments and increase the level of generalisability. However, this design precluded an in-depth, longitudinal, study of the use of the Cycle over time. This is important in view of the fact that the Cycle is claimed to facilitate the development of an integrated set of performance measures over a number of iterations. However, to overcome this weakness in the research design, where

possible the companies were followed up after the intervention to collect some longitudinal data on the continued use of the Cycle. This provided some additional confidence that the companies were not simply reacting to the influence of the researcher during the intervention, thereby reducing the Hawthorne effect.

In addition to the limitations of the research, there were some deliberate omissions in the research design, to ensure that the work remained concentrated on the research objective. An example of this is the literature review of integrated PM. This was strictly concerned with synthesising a conceptual model of integrated PM development from the literature and assessing existing approaches against it, thus leaving little room for critical reflection. Although the criteria in the conceptual model, together with the additional, context-specific, requirements for SMEs, were validated through the case studies, with hindsight a detailed critical evaluation of each criterion may have helped to strengthen overall validity.

Furthermore, an evaluation of the appropriateness of the conceptual model against the characteristics of SMEs was given in Chapter 4. This evaluation could, potentially, have been considerably strengthened through the use of a design matrix to evaluate each individual criterion in the model. However, this approach was rejected since its complexity would have caused the research to move away from learning about the development of integrated PM in SMEs and instead, would have triggered a detailed theoretical evaluation of the appropriateness of integrated PM for SMEs. Therefore, although this was not the purpose of this research project, it represents an interesting area for future development.

10.4 Concluding Observations

To test the new SME PM Cycle a total of 8 SMEs were approached, all of which appeared to conform to the sampling characteristics identified. Of these potential case companies, two expressed an interest in using the Cycle but did not wish to take part in the project due to the timescales involved. A further two companies wanted to use particular elements of the Cycle, rather than applying it in its entirety. Another SME wanted to work through the Cycle, but in its own time and without input from the researcher. Although this company initially agreed to give feedback from their experiences, the case was eventually abandoned as it appeared that no useful feedback would be forthcoming within the timescales of the research. This meant that only three cases (Companies J, K and L) used the Cycle and were monitored through to completion.

The issue of gaining access to companies is a challenge facing all researchers who study SMEs. For this research project, it was vital that all participating companies should be volunteers, in order to ensure that the Cycle was not seen as being imposed on any company. However, it has been noted that voluntary participation in improvement initiatives tends to encourage only those companies:

> *...with the least to change and therefore arguably the least to gain (Down and Smith, 1998).*

That Company K did not get as much out of using the Cycle as the other case companies, despite being a willing volunteer initially, demonstrates how initial enthusiasm is really only the first step towards effective use of the Cycle. It is clear that, before SMEs are willing and able to develop integrated PM in their organisations, they must have both an effective development approach and a clear understanding of its potential benefits. This research represents the first step in this process. The SME PM Cycle might make integrated PM more accessible to SMEs, but persuading companies to use it and providing

the impetus for change to do so effectively, represent some serious future challenges for the research community.

10.5 Future Research

This research has established a set of criteria, in the form of a conceptual model, for developing integrated PM in SMEs. An approach which conforms to those criteria has also been developed and validated for use in SMEs. However, to limit the scope of the research, the SMEs used in the study were all manufacturers based in the South West of the UK. Further research should now be carried out to establish the applicability of the Cycle in SMEs from other areas and industry types. As well as strengthening the overall validity of the criteria in the conceptual model, such a study would enable the effects of sectoral and regional differences in the introduction of integrated PM into SMEs to be explored.

Further validation of the continuous improvement style approach to the development of integrated PM in SMEs would also be useful. This could be achieved by undertaking a number of longitudinal studies on the use of an approach such as the SME PM Cycle, which would provide a detailed understanding of the ongoing use of such an approach in SMEs. In addition, a comparative study between integrated PM system development in large companies and SMEs would be an interesting way of assessing how perceptions of integrated PM change in these different environments.

Although outside the scope of this research project, the findings suggested that the regular surfacing of strategy is important for SMEs. Therefore, a future study might focus on adapting the SME PM Cycle to create a potential approach for emergent strategy development and implementation in SMEs.

Other areas for potential research include studying the quantifiable benefits of implementing integrated PM systems in SMEs. This would provide an incentive to encourage more SME managers to develop integrated PM in their companies. In addition, in-depth studies in SMEs need to be undertaken to identify the primary attributes that inhibit or improve the effectiveness of improvement initiatives such as integrated PM development. This would enhance academic knowledge of SMEs and enable the further refinement of SME-focused development approaches, not only for integrated PM but also, potentially, for many other improvement initiatives.

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Appendix 1: Investigation phase

Interview Sheet

Interview Summaries

Company I Case Study

Performance Measurement; SME Perspectives.

Company:_____ *Interviewee*;_____

Section 1: General Information

1] Number of Employees; _____

2] Annual Turnover; _____

3] Years in Business; _____

4] Type of Business; _____

5] Company Status (independent, subsidiary, etc); _____

6] Position in Supply Chain; _____

Section 2: Performance Measurement

1] In what areas of your business do you measure performance on a formal basis? (type; frequency; amount;)

2] Are there any other areas of performance that you measure on an informal or ad hoc basis? (type; frequency; amount;)

3] Why do you measure these things and not others – is there a strategy for measurement?

4] In terms of effectively managing your business, how useful are your current measures? (cost; quality; flexibility; reliability; speed;)

5] Do you use measurement to identify areas for improvement / change?

6] What internal and external factors trigger measurement? (gaining control; maximising employee /plant efficiency; competition; customer /supplier /shareholder demands; etc)

7] Would you like to change/ extend/ refine your current measurement system?

8] Have you ever looked at or implemented any improvement initiatives such as TQM, JIT, World Class / lean manufacturing?

9] How have you /would you go about the implementation process for any initiative? (Self; consultancy; Business Links; University support; etc)

Company A Interview Summary

Company Background
Company A is a company based in Plymouth which employs 130 staff. It manufactures high security cash-in-transit boxes and has a turnover of £8 million. The company has been in business for 14 years and is a tier 1 supplier, selling the security systems direct to the end users.

Characteristics of current Performance Measures
The company has a number of formal financially based measures, which include inventory levels and the number of orders taken and receipts issued. Quality measures include the number of pieces first time through test, the number of defects and user performance. Human resource measures are limited to the amount of accidents per month, as a safety measure. Informally, individual managers monitor work-in-progress, to ensure that the work rate and the quality of the boxes, tags and shoes are consistent. Job costing is also used, but because this requires time and effort from the employees, difficulties arise because it is seen as a waste of time to fill out the forms.

The PM system is focused towards improving efficiency, with many time based and cost control measures. However, although these are monitored and reviewed, there is currently no formal feedback system in place to ensure improvements are made where necessary and this is recognised as an area for attention.

PM Development
The PMs are generally developed by individual managers, on an informal basis. However, there are also various formal measures in place, developed by the management team. The main motivation for these measures is to gain control in specific areas, so that improvements can be easily identified. There is no explicit strategy for measurement, and the PMs developed are not designed to explicitly monitor the achievement of strategic goals. New measures are implemented by convincing the employees of their need and explaining the rationale behind them, to ensure support and commitment.

Perceptions of PM
Overall, PM is perceived as being a positive tool, which can be used to help monitor and improve the business. The current measures are seen as being useful to an extent – but require more structure and more feedback to be fully utilised. PM in general is seen to be a rather time consuming process, therefore it is necessary to ensure that there is an explicit reason for each measure in order to justify the time needed to collect and analyse the data.

Company B Interview Summary

Company Background
Company B is a company which designs furniture for people with special needs. The company is based in Newton Abbot in Devon and has 41 employees. It has a turnover of just under £1 million and has been in business for 14 years. It is a tier 1 supplier, selling furniture direct to the retailer / wholesalers.

Characteristics of current Performance Measures
The company currently has a range of financial and manufacturing measures. These include work in progress, goods out and lead times. In addition, product returns are tracked as a customer service measure. The main focus of the system is simply to help improve the running of the business, both through careful cost control and through identifying process improvements. However, much of the data collected is out of date before it is acted on. As a consequence, the company attempts to keep the number of measures down, for reasons of practicality and use.

PM Development
PM is not used as a strategic management tool, neither is there any particular strategy for developing new measures. However, the company is moving towards a more strategically oriented management system. Currently, the triggers for measurement are simply to help individual managers identify areas for improvement. Therefore they are generally developed on an ad hoc basis, with no links between the individual measures. As they are developed by individual managers, the managers implement and monitor them. However, this can mean that they are under-utilised due to the time constraints on each manager.

Perceptions of PM
Currently, perceptions of PM within the company are that although the measures should be useful, there is not enough time to use them to focus on change areas, and therefore they are under-utilised. Ideally, they would like to measure to manage the business, but there are various issues hindering this, including cultural and staff training issues.

Company C Interview Summary

Company Background
Company C is an 18 yr old company with 35 employees, based in Dartmouth in Devon. It is a semiconductor dye processing plant with a £2 million turnover and is a tier 2 supplier, selling goods to component manufacturers.

Characteristics of current Performance Measures
The company currently has a number of performance measures, mainly covering the financial side of the business. These include cash flow, sales, value added, quotes given, orders received, and various delivery performance measures. The system is historically focused – monitoring where they are, rather than focusing on achieving future performance targets. However, a new IT based PM system has just been implemented, which should enable more pro-active measurement to take place.

PM Development
The current system is not strategically focused, although the formal measures are developed through managerial brainstorming, to ensure that everyone is focused on the same goals. Triggers for measurement come either from customer demands or from managers attempting to gain control of aspects of the production process. This either happens formally, or is done on an ad hoc basis by individual managers. Implementation is achieved by selling the reasons for the new measures to the managers and staff, to get their support.

Perceptions of PM
PM is considered to be a major part of improving performance within the company. The current system is recognised to produce backward focused and out of date information, which is largely irrelevant because it does not identify what the company is capable of. However, the management team is currently implementing a new, IT based system which aims to overcome these problems. The impact of the new measures is being monitored to see how well it achieves this aim.

Company D Interview Summary

Company Background

Company D is a company which provides mechanical and electrical instrumentation control and automation service and manufacture. It has been in business for 11 years and employs 60 people. It has a turnover of £2.8 million and supplies its products and services direct to the end users.

Characteristics of current Performance Measures

Currently, the company's measures are very financially oriented. They include final profit per project, labour hours and material expenditure. Informally, they also measure specific issues which arise during projects. However, they are trying to introduce some form of process based measurement – looking at issues such as lead times etc. At present, the company is limited in the amount of use it can make its measures. This is because thy do not measure the right things, in sufficient quantities, or gather data that can be used to help make decisions.

PM Development

There is very little use of performance measures and they are certainly not used in any strategic sense. Measurements are generally put in pace only if a customer requests them, or for legislative purposes. Occasionally, specific measures will be developed informally, to monitor a specific difficulty, but this is rare.

Perceptions of PM

The current measurement system is seen as being hopelessly inadequate as a tool to manage the business, with measures that are irrelevant, vague and to financially focused. However, the company is beginning to see that there may be benefits in developing a more structured system. The family oriented culture within the company is not conducive to measurement, and there is a general feeling of scepticism from the staff about any motives behind introducing new measures. Before any improvements are introduced, it is recognised that this issue will have to be dealt with effectively.

Company E Interview Summary

Company Background
Company E is an office equipment manufacturer based in Newton Abbot, in Devon. It employs 12 people and has been in business for 21 years. It is a tier 1 supplier, selling direct to office furniture retailers / wholesalers.

Characteristics of current Performance Measures
The company has a very financially oriented measurement system, monitoring income, cash flow, gross profit margins and turnover. Although quality and time based performance is essential to the business, it is actually monitored in financial terms – returns per hour. If the target return are not met, then the situation is monitored to determine why and what effect that has had on the order fulfilment process. The data collected is used to control the business very tightly, and ensure that there are no short term losses.

PM Development
The Managing Director has the overall responsibility for the performance measurement system – and due to the size of the company they are currently very effective. However, when new measures are introduced, they are specifically designed so that they will not create an additional layer of bureaucracy into the system. Instead, the MD will create, monitor and track the effectiveness of the measures in terms of running the business effectively.

Perceptions of PM
Performance measurement is seen as being an essential part of the running of the business, but the only person who is really involved is the MD. The size of the company means that this is currently an efficient method of measurement. However, as the company is trying to move away from its hand-to-mouth existence through growth, it is recognised that a more strategic, pre-emptive system may well be needed in the future.

Company F Interview Summary

Company Background
Company F is a manufacturer of fire seals based in Newton Abbot in Devon. It employees 65 staff with a turnover of over £4.5 million. It has been in business for 20 years and is at the top of the supply chain, selling direct to the end users.

Characteristics of current Performance Measures
The company measures in three main areas: production, dispatch and sales. The production measures are process based and monitor throughput time and various quality issues including scrap. Dispatch measures include lead times and customer complaints, and sales and marketing covers accountancy measures as well as lead generation etc. The system is focused towards providing information for the board of directors, which creates lots of data, of which only a proportion is used effectively.

PM Development
The measurement system has not been developed with a strategic focus – although the company does use its measurements to produce financial forecasts for the following year. The triggers for measurement come from the board of directors and are usually to comply to legislation or to seek to further improve product quality and profits. However, it is left up to each manager to develop specific measures which will provide the information required – the board do not prescribe formal measures.

Perceptions of PM
The current system is viewed as being somewhat long-winded – each department develops their own set of measures according to what is requested by the directors. This is seen to lead to a complex system which provides a great deal of information, some of which never gets used. The company is currently looking towards IT as a possible means by which measurement can be improved. However, performance measurement is perceived to be a useful management tool, and is increasingly being used to this effect.

Company G Interview Summary

Company Background
Company G is a foundry based in Hayle, in Cornwall. It employs 48 staff and has a £3.5 million turnover. The company is independent and has been in business for around 30 years. It is a tier 2 supplier, selling components to end manufacturers.

Characteristics of current Performance Measures
Currently the company has a range of financial measures including turnover, expenditure per department and cost analysis of the production process. The company also has various operational measures. These include the number of upgrades carried out on castings, scrap and defects. The quality of the sand used to make the moulds and the quality of the metal itself is also measured.

The main focus of the measurement system is customer satisfaction – through eliminating defects. There is a monthly review at which the measures are discussed and feedback is given. These identify training needs and also highlight areas where the process can be improved.

PM Development
The company develops PMs reactively, in response to problems which have occurred in the production process, to prevent them recurring. However, they also measure the quality of supplies – which can be classified as a pre-emptive measure. The measures are developed by managers involved in the monthly review meetings and the quality forum, but they are generally developed without reference to the strategic objectives of the company. New measures are implemented by the managers, who monitor them. However, as the company does not have any rewards for getting things right, there is little incentive to put a lot of effort into improving things.

Perceptions of PM
Although the perception was that PM was generally useful and necessary for running the business, there were criticisms that the wrong things were being measured and that there were conflicts between measures which lessened their effectiveness. The overall feeling was that if there was the time available, upgrading the system to make it more useable and organised would be a priority.

Company H Interview Summary

Company Background

Company H is a company based in Newton Abbot which employs 240 staff. It is a home improvement manufacturer and retailer and has a turnover of £13 million. The company has been in business for 25 years and is a tier 1 supplier, selling the home improvement systems direct to the end users.

Characteristics of current Performance Measures

The company has a broad range of measures, from a comprehensive management accounting system, which includes measures such as turnover and profitability, to operational measures, which encompass not only the manufacturing side of the business, but also their retail sales. These measures include lead generation - where they come from and quantity, as well as the conversion rate – taking a lead and converting it into a sale. In addition service calls are monitored to identify the cause – whether it is a fitting problem, or a construction problem. From a manufacturing point of view, the main measure is productivity. This includes stock turnover, stock shortages, staff turnover, remakes and survey errors.

PM Development

Many of the measures in place are historical, this is because the systems in use have evolved throughout the life of the company and the measures have been developed to fit into the systems. This means that there are measures which, although still in use, are effectively redundant in terms of effective management. Measures are generally developed in response to problems that are identified, to monitor and correct them. The data from these measures go into a feedback system to help eliminate problem areas.

Perceptions of PM

The current system works well, but could do with some refinement, to eliminate redundant measures, and simplify the system. It would also be useful to determine who should act on the information from the measures, as it is sometimes left to the factory staff to act on the data, with little managerial input. However, performance measurement is viewed as an essential management tool and will be a critical part of the company's move towards becoming a world class business.

Company I Case Study

Background

Company I, based in Devon, are a subsidiary company of a Singapore based Group. The company currently employs around 54 staff and are one of the leading suppliers in the UK and Europe of advanced technological coatings. They provide a complete thin film capability from design, through to the development and manufacture of prototypes and full volume production.

The relationship Company I has with their parent company is purely through quarterly board meetings, at which the financial management of the company is reported and financial performance targets are set for the following quarter. However, they also have a responsibility to supply other companies in the Group with a range of thin film coatings.

Company I distinguishes itself from its main competitors by offering what they term a 'solution service' to their customers. This means that they do not simply offer a standard range of 'off the shelf' products. Instead, they produce specific coatings which conform to their customer's requirements. There are currently 2 main inter-group customers; one based in North Wales and the other based in Taunton. In addition to these customers, the company has various external customers.

Performance Measurement

The company recognised the need for a new performance measurement (PM) system and was keen to develop it using the facilitated process developed by Cambridge University. This process uses a workbook and a series of facilitated workshops to develop a strategically oriented PM system.

The facilitator was an academic from the University of Cambridge, who had been involved in developing the process. I was involved in a liasing capacity, and was able to observe the entire process. The original proposal was for a series of 4 workshops, and various individual sessions with the people involved in the process. The workshops were for the entire management team and aimed to develop a set of top level, strategic measures for the company. This covered only the first section of the workbook, but the facilitator advised that the second section, which develops operational measures for each business function, was unlikely to occur unless the top level measures had been implemented and were firmly embedded into the company.

Workshop 1

The initial workshop was planned to introduce the concept of strategic PM to the management team. The facilitator used transparencies to illustrate the Balanced Scorecard and the Performance Pyramid, these being the 2 most widely used tools for strategic PM. This presentation went down well, with people commenting that the

company had plenty of measures which were financial and historic, but very few that were either non-financial or predictive.

The presentation was followed with a 'strengths & weaknesses' chart being drawn up, showing what the managers thought of their current PM system.

The outcome of this exercise is given below:

Strengths	Weaknesses
- lots of info already collected	- lots of obsolete measures
- measure on time delivery to group companies	- do not always measure the useful stuff
- statistically analyse all defects	- lack of resources for measuring
- plant 'up time' measured	- 99% of current measures are financial
- returns (defective products) measured	- there is a need to review the measures
- every cost in business measured to pence!	- measures are not always meaningful /timely
- orders measured by section (predictive)	- understanding from the board @ ¼ly reviews
- ¼ market overview (for benchmarking)	- ¼ly rolling budgets are v resource intensive

Having identified the strengths and weaknesses of the current PM system within the company, the facilitator then asked the question 'why measure? This initiated a lively discussion on the reasons why they wanted to develop the new system. The main factors behind measurement were:
- communicating information to the Board (parent company);
- identifying cause & effect relationships;
- finance – bottom line is measured, but is not motivational;
- people identify and understand the measures;
- to fulfil strategic aims – risk assessment measures;
- to understand the value of the business;
- competition – the need to benchmark;
- soft factors brought in to group level board meetings;
- measure to manage;

The other useful point that came out of the discussion was that the company want to measure for themselves – to get a handle on local level management, rather than measurement being dictated by the parent company.

The facilitator then added to this list a series of general reasons to measure, all of which were agreed by the management team. These were;
- establishing current position /performance;
- communicating direction – where you want to go /what you want to achieve;
- influencing behaviour – motivating people in the right direction;
- stimulating action – to ensure that you are able to move in the right direction;
- to facilitate learning about the company.

Finally, the facilitator gave an overview of the Cambridge process for PM system design. After this, he seemed to have gained support from all members of the management team to move forward with developing the new system. The overall attitude was that current measures still left the managers unable to forecast what might happen in the future because there were too many unknowns – despite the fact that they collected vast quantities of data.

Individual Meetings

Directly after the initial workshop, the facilitator conducted individual meetings with each of the 7 managers who attended the workshop. The point of the meetings was to identify individually, commitment to the project and the perceived importance of developing a strategic performance measurement system in the company. The managers involved in the interviews were; the General Manager; Operations Manager; Production Manager; Marketing Manager; Finance Manager; Quality Assurance Manager and the Manufacturing Manager.

The outcomes of the interviews were that each manager was involved in at least one other project in addition to the PM project and their normal workload. However, commitment to this project was high – particularly from the newly appointed QA Manager, who saw it as an essential part of his job. All the managers stated that they currently had more than enough work to fill their working days, and although they all wanted to see the PM project succeed, only the QA Manager made it his top priority. When asked about the relative importance of this project compared with the other projects they were involved in, all the other managers made it a low priority project.

Workshop 2

The second workshop, held 1 month later, was designed to identify the business objectives, to enable the development of strategic PMs. To do this, the facilitator explained that to help prioritise, they should first identify and characterise the various product groups in the company.

The management team were able to quickly identify the 3 main product groups, without the need for the guidance offered in the workbook. Characterising the product groups was slightly more difficult and one of the charts from the workbook was used to help to identify the financial characteristics of each group. This proved useful to the team, as it enabled them to see at a glance which product group was the most profitable, and which had the most potential for growth. The results of this discussion are summarised below:

Product Groups

The company has 3 basic product groups; Conventional products; Control products and Precision & Graded products. The conventional products are relatively low technology and are generally those designed for the inter-group companies. These products account for around 40% of all sales and contribute around 35% to the gross margin.

The Control group of products is the main growth area for the company with a rapidly growing market and high sales. This group also accounts for around 40% of current sales, but it contributes half of the company's gross margin. The company is seeking to increase their market share, which currently stands at around 10%, in this product group.

Precision and graded products are the smallest product group, with the highest technological requirements, but this group is seen as having enormous potential for growth. It currently accounts for around 20% of total sales and just 15% of the gross margin. However, the company dominates the market in this area with 70% of the market share, due to their high level of expertise in the area of thin film technology.

Having identified and characterised the major product groups the facilitator used another chart to identify the customer and stakeholder needs in terms of the competitive elements; quality, cost, flexibility and time. This initiated a protracted discussion about the various order winners and qualifiers for each product group, which are detailed below.

Conventional Products

The company has retained their share of the market for the conventional product group by competing primarily on time and flexibility factors. Although cost is a qualifier, Company I are comparable with their competitors and it is not seen as an important order winner. Quality issues are very poor in this group, with an average 15% defect rate. This is an important internal issue, because of the costs involved in scrap and rework are considerable. However, at present they are able to cover these costs within the original budget, and the lead time takes into account the additional time needed for correcting defects. Therefore although poor quality is very costly and an improvement in this area would considerably boost the margin from this product group, because it is not an order-winner with customers, it is not viewed as a critical area for improvement.

The importance of turnaround times for inter-Group companies is such that an order that might typically take 3 weeks from receipt to dispatch for an external customer, can be completed in as little as 1 day when necessary. Flexibility is also critical, as the company is willing to run with small batch sizes when necessary, even though it takes the same resources in terms of time and money to coat 1 lens as it would to coat 100 lenses.

Although these issues are essential for winning orders, it causes major scheduling difficulties for the production manager. This is because for maximum efficiency, it is necessary to keep the plant up and running and the schedules are therefore developed to keep plant 'down time' to a minimum. If a Group order is given high priority, it prevents the scheduled work from being completed and can also lengthen 'down time' because the plant has to be set up differently for each order. This is exacerbated when orders are split and the machines have to be set up several times for the same order.

Control Products

The control group of products is the main growth area for the company, as it has the highest margin and attracts mainly external customers. This product group differs from

the conventional group because it is not forced to compete solely on flexibility and turnaround times. This means that the company is able to improve product quality, and they emphasise the need for total conformance to specification as a critical order winner. Although this group also cites time as an important factor, turnaround time is not as important as on-time delivery. This allows Company I to quote realistic lead times, which they can guarantee. The importance of on-time delivery is critical, as the supply chain is such that they are likely to lose the business if they fail to deliver on time even once.

The major order winners for this product group are quality and time, with conformance to specification and on-time delivery being key factors in winning and retaining customers. However, batch flexibility is also important in retaining customers. The main reason for this is that their customers generally supply-to-order. Hence, if their orders are down, they will expect Company I to run with smaller batch sizes, and conversely, when orders are up, the company is expected to find the extra capacity. For some customers, this means that regular orders can vary by +/-30% each time, once again causing plant productivity to drop.

Precision and Graded Products

Although the precision and graded products are the smallest product group, the company's technical capability in the area of thin film coatings has allowed them to dominate the market. This is the main area for innovation within the company, although they do not pre-empt the market with research and development programmes. Instead, they develop new products in response to customer requirements. Once a new coating has been developed in this group, it can be offered as a standard solution and therefore feeds into the other 2 groups.

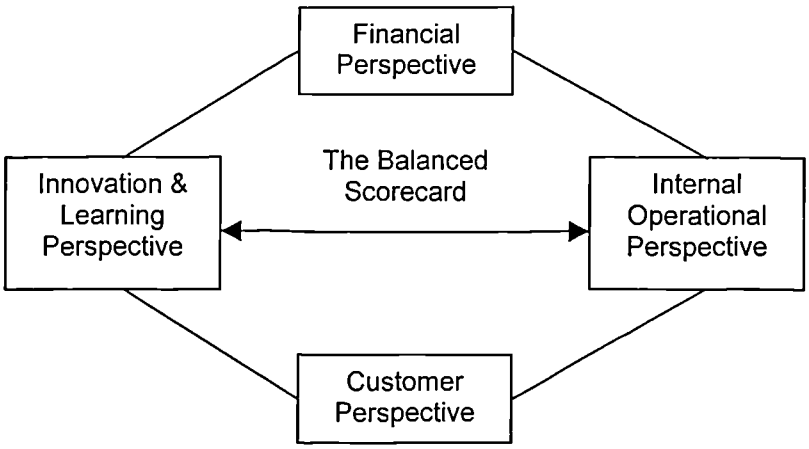
The critical requirements for this product group focus on the technical capability within the company. They win contracts because they are the only company capable of developing the new product. Although this is the main order winner for this product group, they also compete on lead time and quality issues. Quality in this instance is focused around their ability to develop the new product to the precise customer specifications and is therefore heavily dependant on the technology available. The difficulties arise here when the company accepts an order which they cannot develop successfully. Currently they win difficult orders on the basis that they are the company most likely to achieve success, whether this is actually a realistic possibility or not.

Lead times are planned to be realistic, rather than fast, and can be anything up to a year or more for certain projects. Once again, problems occur when ambitious projects are undertaken. In these cases the delays cause problems for the customers and adversely affect the company's image. However, because Company I is the only company currently capable of developing the product, they are usually able to retain the contracts.

Workshop 3

This workshop was held 3 weeks later, and the facilitator used the opportunity to verify the outputs from the previous workshop, before moving on to identifying the primary company objectives. All the managers agreed that the customer and stakeholder needs identified in the previous workshop were accurate, enabling the objectives to be developed swiftly. This was achieved by collating the information from the previous workshop and using this to develop a set of broad company aims.

After some discussion, the primary aim was identified as continuing to provide a swift, flexible and capable response to their customers. However, they also aimed to develop a research and development capability, to enable them to move into a position of leading their customers, rather than being driven purely by demand. Internally, the aims were to devolve responsibility throughout the company, in order to free the managers from the day-to-day production problems and to promote innovative and inventive thinking by the senior management team. They also aimed to set targets for sales growth, to ensure the company remains competitive.



Once these broad aims had been identified, the team was asked to revisit the charts that had already been completed, and use them to develop a set of specific objectives which would realise the aims they had set. The discussion that followed developed 13 objectives for the control groups of products, which were agreed to be common to both of the other product groups as well. A further 3 objectives were developed which were specifically relevant to the other product groups. To ensure these objectives were balanced, the facilitator plotted them on a chart which categorised them using the Balanced Scorecard perspectives (Kaplan & Norton, 1992), into financially based objectives, customer focused objectives, internal operational objectives and innovation / learning objectives. The objectives were agreed as follows:

Financial Objectives

- Achieve sales growth of £2.5million;
- Control fixed costs;
- Increase return on sales to 15%;
- Increase return on capital to 20%;

Customer Objectives

- 100% conformance to specification;
- To deliver a fast, flexible and capable response to the customers;
- To achieve 100% delivery on-time and in full (including prototypes);
- To provide production volume responsiveness;
- To raise the company profile;

Internal Operational Objectives

- Reduce scrap levels
- To maintain speed of production responsiveness;
- To solidify Group links;

Innovation / Learning Objectives

- To develop the current technical and commercial capability;
- To develop a capability to create new products and services in advance of customer needs;
- To identify and communicate goals and objectives to the whole company;
- To devolve responsibility and authority throughout the company;
- To have a committed and motivated workforce.

Having successfully developed a set of strategically aimed objectives for the company, the management team split them up, assigning individual responsibility for each objective to the members of the senior management team. The team were tasked by the facilitator to develop 1 measure for each objective before the final workshop, using the Performance Measure Record Sheet from the workbook.

Performance Measurement Development

After workshop 3, each manager had been given responsibility for developing 1 measure for each objective they had taken responsibility for. To develop the measures required individual sessions with the manager and a facilitator, using the workbook for guidance.

Although a month had been scheduled in which to arrange these individual meetings, because the company had just begun a restructuring programme, it proved impossible to meet with any of the managers before the date of the next scheduled workshop. The majority of the development sessions therefore occurred on the day when the final workshop should have taken place. However, 2 managers had to delay for a further month, leaving the process well behind schedule.

The actual process of developing the measures varied tremendously, depending on which objective was being looked at. Generally, the financial measures were very quick and easy to develop, because they could set very definite targets to work towards and hence develop definite measures to monitor progress. For example, one objective was to control fixed costs. The target for this objective was simply to remain within budget for fixed costs, making the measure a straightforward monitoring of the actual expenditure against

the budget. However, the measures in the innovation /learning area proved extremely difficult to develop. The main problem seemed to be that the objectives were not defined tightly enough, making it virtually impossible to identify a single measure that would accurately monitor progress towards the unspecified targets.

It seemed that the greatest difficulty lay in the fact that measurement implies a defined target, and when the objectives are looking to the future and are - necessarily – vague, specific targets are futile. For example, one objective was to develop a capability to create new products and services in advance of customer needs. Developing a single forward looking measure for this was impractical, and the eventual measure was agreed only as a working measure – something to present and adapt at the final workshop where all the managers would input and finally agree the top level, strategic measures.

Despite these difficulties, all the managers did manage to develop measures that they were happy to work with eventually, and these are listed below:

Financial Measures
- Sales Growth
- Fixed Cost Expenditure
- Return on Sales
- Return on Capital

Customer Measures
- Quality performance against original order
- Customer satisfaction with service
- Actual delivery against contractual obligations
- *to provide production volume responsiveness*
- Number & quality of contacts to outside companies

Internal Operational Measures
- Review of Quality stats, targeting scrap levels
- Manpower, equipment utilisation & services to production capability
- Number of face to face meetings with Group personnel

Innovation /Learning Measures
- Products delivered according to spec and on time
- No of sale /contracts generated by having a new capability /product in advance of customer needs
- Manager & employee satisfaction with goals and objectives
- Employee attitudes towards responsibility and authority

Workshop 4
Having developed the measures individually, a final workshop was supposed to allow the managers a chance to critique and review the measures they had developed, and to find

consensus so that they could be formalised and implemented. However, having re-planned this workshop 6 weeks behind schedule, the company were unable to keep to the date, and have been unable to give another date when this workshop will be possible, even though they stressed that at some point they would like to complete the process because it had been a valuable exercise.

Wind-up Meeting

As the process had met a somewhat untimely end, interviews were carried out with the available participants to find out why they had stopped and what they had got out of the process.

The Operations Manager had recently taken over as General Manager, following the retirement of his predecessor to a Directors role. He, along with the Finance Manager, the Marketing Manager and the QA Manager came to the meeting and the facilitator chatted with them each individually. The prime reason for stopping the process seemed to simply be a lack of time and resource to devote to the project. The Marketing Manager commented that "the meetings were great – but as soon as people get out the fire-fighting begins again and everything is forgotten until next time." This was echoed by the now General Manager who stated "We have a group of very experienced mangers who get involved in everything due to our fire-fighting approach – which works well, but doesn't allow us to get involved in anything else. We don't spend enough time looking to the future."

The participants described a number of changes which were going on in the company, which made it more difficult to complete the process; In addition to the promotion of the Ops Manager to General Manager, the Production manager had left the company and new QA staff had been appointed. This interrupted the impetus of the project and people seemed to lose interest and get so caught up in other projects, including a major restructuring programme which was ongoing, that they forgot about the PM project altogether. The former Ops Manager, summing up his view about why the process was left incomplete, commented that the process "needs customising to include day-to-day operations, rather than just the strategic stuff. We need to focus our attention on basics – how we can improve customer perceptions is the main one at the moment – we aren't quite at the stage for top level PMs yet."

Appendix 2: Innovation phase

Company J Case Study

SME PM Process Workbook

Company J Case Study

10/12/99

Company J is a SME based in the South West of the UK. It designs and manufactures electromechanical winches and gearboxes, primarily for use in the automotive recovery industry. It has been established for 26 years and currently employs 96 people. The company had been going through a major period of change, initiated by its sister company in the US, who were pushing to make them reduce costs and improve overall profitability. To help them achieve this, they employed a new Operations Director, who was keen to exploit the chance to tap into the University's resources to help the Company improve, particularly in the area of performance measurement. He felt that measurement would improve transparency across the company, leading to a greater understanding of their primary problems, along with more control. Therefore, a big group of researchers went into the Company (MH, CW, SC, JB, TG, JG) to see what they needed and to suggest an action plan of what we could usefully do for them.

Paul Jarvis (Ops Director) gave an overview of the problems: mainly linking Kanbans to the new MRP system, and the fact that they have no real control yet – there are no useful measures in place. as he said "I've started thinking about so many improvements here – but what we really need first is some measures to understand what is happening here and help us focus and prioritise what we are doing." I gave an overview of the PM development process I have designed – telling that it is only a prototype and getting feedback and useful amendments would be useful if I was to test it in SW. I then arranged to discuss with PJ in more detail, exactly what I could do on 21/12/99.

21/12/99

Myself, Cita Wood and Paul Jarvis had a 1 hr meeting illustrating how the process works and how the work I could do would fit into their strategic plan of improvements in the company. The meeting was more about proving that I wasn't going to do everything he thought I could do, than anything else, from my point of view. Eventually, I got PJ's agreement on what I could help them achieve and how we could go about doing it. Arranged to contact PJ early in January to kick off the process.

14/1/00

Myself, Cita, Paul Jarvis and Dave Stevens (Finance Director) met to kick off the process. As only 2 company people were present, it was rather difficult to keep the flow going well.

I explained what the purpose of the day was and introduced then to the customer / stakeholder analysis sheet. They needed some coaxing – particularly Dave Stevens – to get some useful information from them, but once we had given them some examples and got them going, they did come up with some useful information.

Difficulties were observed because the distinction between customer and stakeholder was irrelevant in some cases – because the areas were not always as important to both. Some difficulty getting the information down, but after both said they found it useful.

Transferred the objectives we had developed onto the balanced scorecard. Didn't really feel this was a useful exercise though – except that it made the objectives easier to read. The company seemed to think it was quite useful – as a final recap of the objectives they had developed – but neither Cita or I did. The only thing that came out of the BSC bit was that because they had to recheck what they had done, a major gap in their objectives was identified. This was in the area of capacity planning – which turned out to be critically important. Think that losing this bit, but ensuring that there is a place where the objectives can be checked, would be a useful improvement.

Plotting the objectives identified onto the performance – importance matrix was difficult because the company did not link its objectives only to their customer / the competition – there were internal implications which had a bigger impact on why they should achieve the objectives than either of these external forces. In order to get any useful results, we had to change the axes from competition and customers, to internal and external importance. This led us to successfully plot the objectives in order of importance. However, it was felt that the graph would be more useful if bias could be removed by taking the 'zones' out until all the objectives had been plotted – to discourage people from being influenced into making something more or less important than it really was. In addition, plotting was felt to be rather an arbitrary process, and would have been helped by having the graph divided up. At the company's suggestion, the tool is to be modified to include divisions, to have a layover sheet with the zones on, and to change the axes to internal and external importance.

Suggest removing the BSC tool, to simplify the process, and making the customer / stakeholder analysis chart easier to use by including a table of definitions of each of the dimensions. Also, to link the dimensions back to the typology and to provide continuity with the follow on tool, the suggestion is to change from customers and stakeholders, to internal and external needs, and to look at these needs in terms of time, finance, quality, flexibility, customer satisfaction and human resources.

The top priority objectives were: *To Deliver Products On-Time*
To Increase Manufacturing Capacity

We decided to focus on: *On-Time Delivery*

We then discussed the format for consultation and decided, for speed, to concentrate on a staff survey. This was to be distributed to all staff with their weekly pay. The date for collection would be 2 days later and would be clearly marked on the survey. Distribution date: 18/1/00, collection date: 20/1/00.

We arranged the next meeting for Friday 21/1/00.

21/1/00
Project team assembled from discussions in previous meeting, where PJ had said he would get a team of 5 people together.

Team consisted of PJ DS and 3 others – all either managers or supervisors. Had doubts about the team – thought it might cause problems as they were all high level, but as the company were owning the process, it was ultimately their decision.

Had 20+ survey returned c20% response rate. Divided them up and each team member picked out the issues that were critical to the achievement of the objective. There were lots of irrelevant comments – mainly focusing on traditional bugbears – i.e. pay and conditions. But it was surprising that many responses were very useful and did focus heavily on the objectives (see examples of survey responses attached).

Wrote every relevant point down on post-it notes and divided the board using an Ishikawa diagram with all the areas of the company as each bone, to depict the company structure. The team thought this was a good idea – but I thought it was a waste of time because we lost the structure almost immediately when the next stage of data sorting occurred. If the structure bit is to be retained (and I can't really see the value of it) I think it should come at the end of the process, not the beginning.

The next stage was to prioritise the issues – did this using colour coding (not in the guide, but the idea came from there) to indicate DONT DO, CONSIDER and DO – fits in with the prioritisation matrix outcomes. Majority fell into DO section. Then prioritised further using ++ - - scoring. Came up with the really critical activities and comments were enthusiastic "lets prioritise further" "lets sort out the MAIN thing which is preventing us from achieving this objective."

Realised at this point that there was a problem and took 5 mins out to explain that, although we had just identified all these problems, my role was to help them develop PMs – not solve the problems per-se. Suggested that 2 others could get involved to help solve the problems. This was not taken in the best spirit and 'initiativeitis' was mentioned. They thought it was best to get one thing done – and then bring in the new people.

Prioritisation of activities and issues critical to achieving the objective

++

- Kanban quantities to be followed
- Kanban quantities to be updated to present needs
- Purchase quantities on kanban updated to present needs
- Alternative systems to kanban investigated
- faster delivery of parts from machine shop
- improving stock information
- larger safety stocks of components and raw materials

- communication
- communication of live / on stop orders from admin to manufacturing
- better systems for communications and training
- communication of general information
- feedback on scrap

- availability of corrects DWGs
- buying appropriate parts
- teamwork
- machine breakdowns
- credit control
- control of accounts

+

- lack of production targets
- better under management
- MRB – ensure it happens for effective handling of projects
- monitor machine shop shift performance
- better availability of inspection equipment
- skill training

0

- correct test certificates to be freely available
- correct master manuals to be freely available

- monitoring of scrap
- working group to plan implementation of foreman
- incentive schemes
- closing loop on corrective actions
- on-line corrective stock control
- investment in new facilities and equipment

-

- labour capacity management
- manage labour resource effectively
- alternative components wash / rustban equipment
- flexibility of labour – cross training
- more effective methods of inspection of machined parts
- improve skill mix ratio

- -

- night shift

Had to wrap up the meeting b4 we got to measure development. PJ said it should be put on hold for 2 weeks. Lance said that while we have the initiative, we should crack on – plus it lets people see that we are using their ideas and have not just dumped them. Next meeting therefore arranged for 28/1/00.

25/1/00 PJ rang to cancel the meeting because the American sister company exec's were over and wanted all hands on deck to sort out the MRP problem. Not sure whether this was literal – or whether it was just PJ getting his own way as Ops director in the company.

Performance Measurement Survey

Objective: One of the key objectives of the company is to achieve on time delivery to our customers. Currently our performance in this area requires improvement and to assist in this aim we are seeking input from all employees of the company. Attached is a survey form, which we would ask if you could complete and return to Paul Jarvis - Manufacturing Director. We would appreciate it if you could complete the form by Thursday 20th January. If you have any questions on the completion of the survey then please contact either Paul Jarvis or Dave Stevens.

Please Respond To: Paul Jarvis

Please Respond By: 1300 hrs 20th January 2000

Please answer the following questions:

1 **How can you personally help achieve the specified objective?**
(Think of existing activities you carry out, or propose new ones which reflect your personal concerns)

I LIKE THE REST OF WORKFORCE ON FLOOR CANNOT BE EXPECTED TO COMPLETE THE WORK LIST ON THE PRIORTY LIST EACH DAY WHEN WE ARE ALWAYS WAITING FOR PARTS TO ARRIVE OR OLD MACHINES BREAKING DOWN. THAT ARE RAN DAY + NIGHT. ALSO YOU CANNOT EXSPECT SUPPLIERS TO SUPPLY US IF WE ARE ON STOP (NO PAYING BILLS)

2 **How can your team / group help achieve the specified objective?**
(Think of existing activities you carry out within your group, or propose new ones reflecting your collective concerns)

AS ABOVE.

3 **How can the company as a whole help achieve the specified objective?**
(Think of existing activities carried out by the company, or propose new ones which you think might help achieve the objectives)

YOU COULD START BY SORTING OUT THE PAY REVIEW THAT YOU SAID WOULD BE ALL SORTED OUT BY BY NOV 99 IT IS NOW GETTING TO THE END OF JAN 2000 WE HAVE HEARD NOTHING SINCE WE ARE ALWAY BEING TOLD THAT YOU ARE LOOKING INTO IT. IT IS COSTING US MONEY. IT CAUSES A LACK OF TRUST IN MANAGEMENT. WITH THE WORKFORCE ON THE FLOOR YOU SAY ONE THING AND DON'T DO IT.

I UNDERSTAND THAT MONEY IS NOT ALWAYS AVAILABLE, BUT MONEY CAN ALWAYS BE FOUND FOUND FOR NEW OFFICE EQUIPMENT, PAINTING TOILET'S ETC WHEN MACHINE'S ARE EXPECTED TO WORK FOREVER.

LET' BE FAIR YOU ARE PAYED TO RUN THIS COMPANY WITH YOU FINANCE. DEPTERWE ARE HERE TO MAKE THE WINCHES TO SELL TO PAY OUR WAGES FOR ALL OF US.

IF WE HAVE NOT GOT THE PARTS WE CAN'T MAKE THEM

YOU CAN'T SELL, WE DON'T MAKE ANY MONEY

YOU + I AND THE REST OF US DO GET PAYED. THAT'S ~~IT~~

THEIR IS ALSO A LOT OF MONEY WASTED ON PART THAT ~~ARE~~ ARE ORDERED AND THEN PICK IN THE SKIP.

WHY DON'T YOU TALK TO US MORE

SORT IT OUT.

PS I COULD SAY A LOT MORE

H14/E14P LINE

Performance Measurement Survey

Objective: One of the key objectives of the company is to achieve on time delivery to our customers. Currently our performance in this area requires improvement and to assist in this aim we are seeking input from all employees of the company. Attached is a survey form, which we would ask if you could complete and return to Paul Jarvis - Manufacturing Director. We would appreciate it if you could complete the form by Thursday 20th January. If you have any questions on the completion of the survey then please contact either Paul Jarvis or Dave Stevens.

Please Respond To: Paul Jarvis

Please Respond By: 1300 hrs 20th January 2000

Please answer the following questions:

1 **How can you personally help achieve the specified objective?**
(Think of existing activities you carry out, or propose new ones which reflect your personal concerns)

We need products parts coming through a lot quicker to keep up a constant flow of output. This does not seem to be happening. Why?

2 **How can your team / group help achieve the specified objective?**
(Think of existing activities you carry out within your group, or propose new ones reflecting your collective concerns)

We do the priority list on a weekly basis specifying whats parts are required and when and basically cannot see what else we can do to improve the situation. Maybe all the parts of each model of which could be logged on a computer so that when priorities are being compiled we need only look at the model numbers to get to the total for each particular week, instead of having to break every individual item down, as is very time consuming.

3 **How can the company as a whole help achieve the specified objective?**
(Think of existing activities carried out by the company, or propose new ones which you think might help achieve the objectives)

Maybe reintroduce a PRP system

Wages

26/1/00 Received an email saying "Could we please postpone the next visit for a couple of weeks? We have a couple of internal issues we are trying to resolve, which will mean that the team members involved will not be available until then."

Rang on 28/1/00 to find out what was happening. Was told that the Americans were staying another week – and I should call back at the end of that week to arrange another meeting w/c 7/2/00.

Rang Thursday 3/2/00 and was told to call back on 7/2/00. Rang Monday 7/2/00 twice, told to book a meeting for 18/2/00.

18/2/00
PJ emailed to say that only he was available for the meeting. Went out anyway, with Cita, and discussed the whole programme with him.

Realised, when talking to Cita, that the survey is wrong – it identifies problems, which means that they want to fix the problems fast – and forget about the measures. Hence spent some time reviewing what to ask in the brainstorming or survey sessions and how to analyse the data to wind up with measurable things, rather than a series of problems. This was confirmed by PJ, who stated that the reason why the meetings were becoming increasingly difficult to arrange was because, having highlighted their major problems, the focus for all the people involved in the meeting was to resolve the problems ASAP. Although the company still wants to develop some performance measures, they are more interested, in the short term, in fixing the performance inhibitors. A provisional date of 17/3/00 was set to develop the performance measures. However, it is entirely possible that by this time, the priorities and critical issues will have changed, meaning the process will have to be started from scratch again.

17/03/00
Emailed PJ on 16/03 to confirm meeting was still on – and was surprised at the positive response. 4 people turned up to the meeting; Peter (Shift supervisor) John (Production manager) and Lance (manager). As usual, Lance was enthusiastic and made up for lack of response from Peter, who was hungover. PJ turned up and we kicked off the meeting by reviewing the set of issues that we had prioritised at the last meeting.

This involved me asking the group about each point individually, starting with those with high importance (i.e. the ++ issues). However, it quickly became apparent that they had set about tackling three of the major problems: Kanban, communications and finances. Therefore, I asked them to explain what changes they had made and ticked off the individual issues as they were mentioned.

The first discussion related to the Kanban system. In the period between this workshop and the previous visit, a team of two people had been created to tackle the kanban problems. Their responsibilities included ensuring the quantities were correct and regularly updated, and ensuring purchase quantities were updated to current needs. In addition, the management had looked into the possibility of changing the whole system,

but felt that with the kanban team ensuring efficient operation, this was not necessary. By using the kanban system more effectively, they had been able to reduce the amount of safety stocks of components and raw materials. However, they felt that it was unlikely that there would ever be enough confidence in the kanban system to eliminate these stocks completely. Other benefits were that the delivery of parts from the machine shop were now quicker and stock information had been greatly improved.

Communication had been improved greatly. Since the previous visit and information board had been set up to feed important information back to the employees. In addition, the survey technique had been gauged to be such a success that it had been used several more times to gain feedback from the staff on important change issues. On a more specific note, systems were currently being redeveloped to ensure that live / on-stop orders were communicated effectively from admin to manufacturing. Although it had been solved in the short term, better systems were needed to ensure a long term solution. In addition, to manage scrap, machine breakdowns, production targets and shift performance effectively, the MRB (materials resource board) was re-established and holding regular meetings to discuss and eliminate the problems. This also helped to sort out other issues such as ensuring that appropriate parts were purchased.

The accounting point had been revamped to ensure that credit control was more effective. The new system had put payment up front for both the company and their debtors. This ensured that a) orders were not sent to manufacturing before payment had been received, and b) that they would no longer run out of components due to lack of payment on their behalf.

Other important changes included a shake-up of working conditions, designed to improve teamworking (although it was acknowledged that there was some way to go in this respect) and manage the labour resources more efficiently. This enabled the scrapping of plans for a night shift due to better capacity management and helped to identify skills deficits. Training needs were now being addressed under the Investors In People scheme, which it was hoped would improve the workforce flexibility.

Inspection equipment had been found, courtesy of the surveys carried out, to be being used for entirely the wrong purpose. Having solved this problem, the test equipment was more freely available and the certificates and manuals were kept in the same place to ensure easy access. In addition, a working group was planning the implementation of the new ERP system, Foreman, which was currently working towards getting stock control live on-line. The prospect of an incentive scheme had been put on-hold indefinitely, due to lack of finances, which were being put into investing in new facilities.

Once the group had gone through all the issues, we began to look at what performance measures might be useful. As the company already monitored delivery performance, they were unenthusiastic about creating another one to do the same thing. The main consensus was that all the changes had been made to improve process flow throughout the order fulfilment process. To ensure that the changes were a) meeting their aims and b) to highlight other improvements, the team identified one overarching performance measure. This was to monitor the number of 'stops' in the order fulfilment process. Lance

volunteered to create a form to record the 'stops' in the order fulfilment process. See below for a copy of the performance measure record sheet that was completed and for the form that was developed.

Performance Measure Record Sheet:

Measure	Stops in Flow (Order Fulfilment Process)
Purpose	Maintain flow of production / stop part batching / reduce overtime hours
Relates to	On Time Delivery
Target	zero stops per month
Formula	Number of stops recorded per month
Frequency	Weekly monitoring
Who Measures	Lance
Source of Data	Every department – Lance to develop form for stops
Who Acts on the Data	Head of department
What do they do	Improvise and overcome problems as they arise
Notes Comments	Monitoring form needs to be developed and distributed

Company J – On-time delivery:

Machine Downtime Record (G50) Monday					
M/C No	Setting Time	Machine Downtime	Reason for Downtime	Material I/D & Part No	Standard Hrs Available 45:00:00
S04		7:30:00	material shortage	H/Y	
S05		3:00:00	parts required	H/2	Overtime Worked 1:00:00
					Total hrs Worked 46:00:00
					Total Hrs Running Machines 31:00:00
					Total Downtime 15:00:00
					% of Downtime 32.61%
					07-Aug-00

Once everyone agreed that this was the only measure they wanted to implement at this time, I rounded up the process by asking the group for feedback on the process as a whole. The questions asked to stimulate feedback were:
How useful did you find the process overall?
How useful did you find today's session?
What was most useful?
What was least useful?
Would you use the process again?
Would you recommend the process for use in other companies?

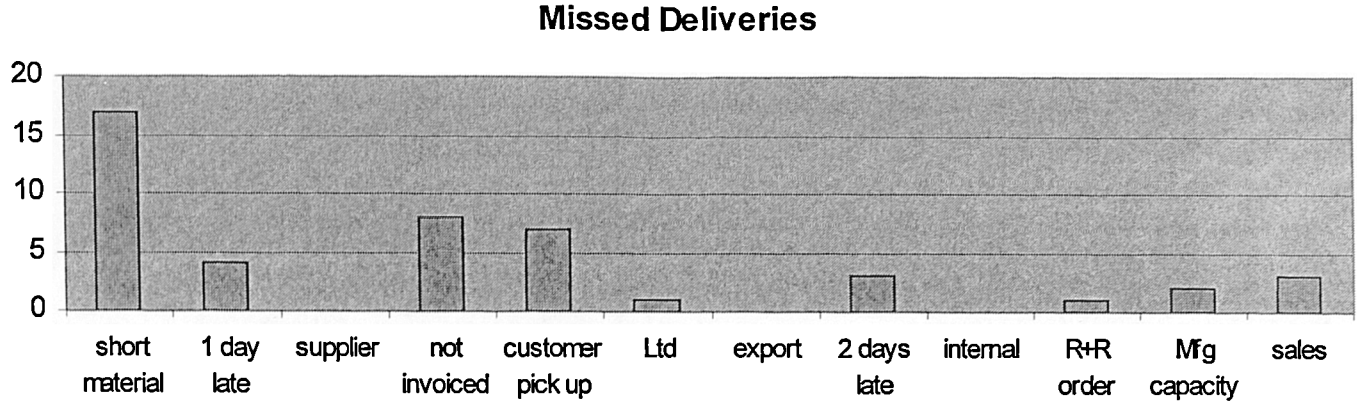
The questions prompted surprisingly positive responses from the group:

"It was a good way of doing it "
"it was constructive"
"helped focus on the critical problems"
"we didn't need lots of measures – we were able to focus on one thing"
"we're still using surveys – that was a really useful technique"
"the PM record sheets are a good idea"
"helped us highlight what can be achieved"
"will use the process again – and have already used bits of it, like the survey idea"
"on time delivery was really too big an area to focus on – more focus would be useful"
"useful process for any company – would recommend it"
"we might even implement a training programme to teach other people how to use the cycle, to take the pressure off the managers"

17/8/00

Called in for an update on how things were going, to see whether they had implemented everything and also whether they had thought of using the process again. Found that they had implemented the stoppage forms, one for manufacturing and one for machine downtime. These were completed daily and collected the full reason for the problem, the total hours worked, the total stoppages and the % of time wasted. Friday's sheets collate the weekly figures and give aggregated totals for the week, including % of downtime. These figures have been linked to the production planning information because they can highlight the reasons for poor performance on the build schedule. The production planning data is collated monthly to give an overview of the required, actual and planned production performance.

The stoppage monitoring forms are used to identify improvement actions by collating the data from these each month to see where the major problems lie (see diagram below). For the main problem identified each month, a cycle of continuous improvement is undertaken to establish the root cause of the problem and eliminate it. Therefore, if one potential solution does not reduce the extent of the problem, another improvement action is undertaken until it is effective.



Problem

In addition, the sister company in the US had heard about the process Company J had been using to improve delivery performance and decided to revamp the overall measure to make it more useful and informative. They worked with Company J to devise a "Measurement Spec Sheet" for recording measurement information and I was shown the measure for delivery performance, which was already in use in the US company and about to be implemented in Company J. This is illustrated below:

Title: Delivery Performance

Purpose: measure and report percentage of orders shipped "on-time".

Software: excel

Information Required:

Data:	no. of orders scheduled to ship	Source: Daily Delivery perf. Query (AS400 – group job menu)
	no. of orders still open	Source: Open orders by date (AS400)
	reasons for order not closing	Source:Order Prep Lead mark-up of open orders by date report

Distribution: post on bulletin boards, copies to assembly leadership group and Cust Svc.

Recommended "custodian": Assistant Leadperson – Order Prep (Scott W)

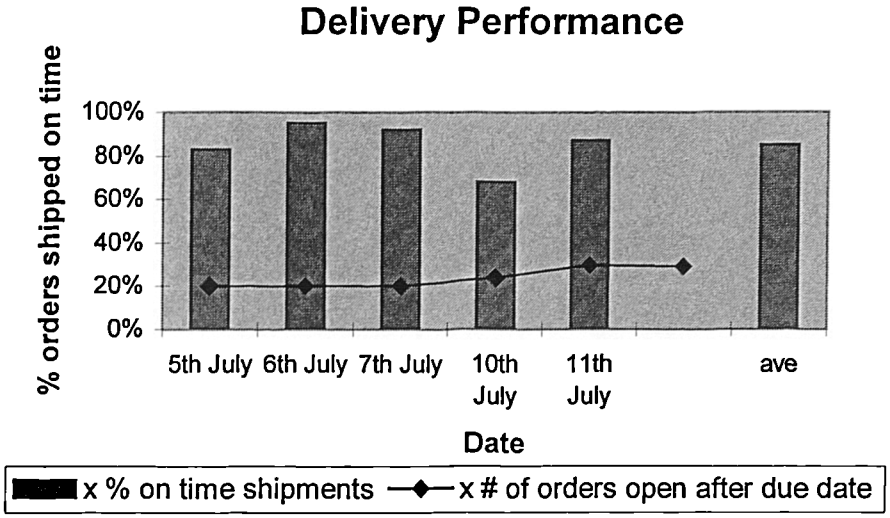
Procedure:

Daily:
1. Run Daily Perf. Query and open orders reports (after 12.15pm)
2. Go to "data" tab, enter no. of orders sched'd.
3. Enter no. of orders left open
4. Enter no. of open orders backlog
5. Go to missed detail tab, enter reasons orders missed

Weekly:
1. Run past due orders, enter reasons and ageing (backlog detail)
2. Distribute entire file via E-mail to Chuck, Dave and Ian

Monthly:
1. Change details in data sheet and clear input fields

The following chart shows how the data from this measure is displayed to give an easy illustration of delivery performance on a daily basis.



12/10/00

Unfortunately, as Cita was unavailable, for the next follow-up visit to the company, I had to take another researcher, who had not attended any of the other meetings. However, I felt that his 'outsiders' perspective would help ensure that I was not overlooking things and getting biased by the ongoing account of the process.

The company had still not got any data using the new version of delivery performance measure, but they were, I was assured, well on their way to having the systems in place to start collecting the data soon. When I asked about the stoppage monitoring, I was told that materials shortages were still the highest recurring problem which slowed down the production process. They had found that there were six key reasons for raw materials shortages, which caused the bulk of the problems:

- wrong lead time on orders in MRP system
- no checks on orders when they have been sent to the supplier, therefore no-one knows that it hasn't been delivered until it is too late
- defective raw materials are sent back to the suppliers but not re-ordered
- defective materials are not sent back to the supplier at all
- orders are not present
- orders not loaded properly

Through their process of continuous improvement, these problems were being systematically eliminated throughout the company.

As they seemed to have got on top of delivery performance problems, I asked whether any further iterations of the process had been carried out, with different strategic

objectives being made the priority for improvement. PJ replied that they had been around the process again, this time to improve the staff appraisal process. The reason for this was that as they had now started to improve morale by getting people more actively involved, it was essential to maintain this effort. As the appraisal process was notorious for being poorly thought and carried, out and since the grading received at appraisals determined pay levels for the following year, it is unsurprising that this was seen as critically important to change.

Using the process, they had managed to use the consultation to get buy-in from the staff and now had developed an appraisal system which was no longer based entirely on a person's immediate supervisor's assessment of his or her worth. Instead, the appraisal form was now a comprehensive map of a person's skills and duties, for which each received a rating from 1-5. These ratings added up to the final grade, which then allowed a far less subjective and ambiguous decision to be made on the subject of re-grading staff. The success of this new appraisal method was measured in terms of the complaints about the system, which dropped from 40 in 1999 to just 3 in the year 2000. This system has also allowed much more comprehensive skills data to be collected for each member of staff, allowing better targeted training in-house and has also fed better data about the skills at each grade to be used in the calculations for the pay review.

Finally, I asked whether they were likely to use the process again and was informed that they are currently planning to make further iterations, probably focusing on aspects of the order fulfilment process, in the near future, as this was an area of some concern at present.

25/5/01

Although I had not planned any further follow-up meetings at Company J, as they had seemed so pro-active in following the process through, I thought I would try to find out what, if any, other business objectives they had prioritised. Therefore, I rang PJ and asked him what had been happening for the last 6 months. First, he explained that they had finally sorted delivery performance and now measured it on a daily basis, according to the schedule. Lance had taken responsibility for this side of things and had produced a spreadsheet which gives an at-a-glance overview of delivery performance for the month, showing the scheduled due date for delivery and tracking the build quantities for each product group every day to ensure that the products are available for delivery when required. As can be seen from the attached email, the system is working well, with the only problems occurring through being let down by suppliers, rather than internal issues. To ensure visibility of the measure, the spreadsheet has been copied to a whiteboard in the canteen area, with the figures being updated daily.

In addition, to deal with short notice customer demands, they have started keeping a small safety stock (5-6) of each of their standard winches. This means that if a customer has an unreasonably urgent order for a customised winch, which cannot be fulfilled in the time requested, they are able to offer the customer the equivalent standard product, which the customer can have immediately, straight off-the-shelf. This has helped improve customer satisfaction as they are seen to be doing everything possible to get the order processed as fast as possible.

PRODUCT GROUP	STATUS	Carry over	WEEK 1					WEEK 2					WEEK 3					WEEK 4					WEEK 5				
			MON	TUE	WED	THU	FRI	MON	TUE	WED	THU	FRI	MON	TUE	WED	THU	FRI	MON	TUE	WED	THU	FRI	MON	TUE	WED	THU	FRI
				1	2	3	4	BH	8	9	10	11	14	15	16	17	18	21	22	23	24	25	BH	29	30	31	
	SCHEDULED TARGET	0	0	0	6	4	30		0	2	4	14	0	0	8	3	26	5	0	0	6	2		2	10	2	
	TODAY'S BUILD			9	15	17	10		9	12	0	0	12	15	12	8	2	7	8	1	1	1		10	0	2	
	ACTUAL BUILD			9	13	13	6		3	12	0	1	3	12	12	9	4	4	8	5	0	1		10	0	2	
	RUNNING TOTAL			9	20	33	39		42	54	54	55	58	70	82	91	95	99	107	112	112	113		123	123	125	
	CUM SCHED TARGET	0	0	0	6	10	40		41	43	47	61	61	61	69	72	98	103	103	103	109	111		113	123	125	
HUSKY	SCHED DEMAND	186	186	186	186	186	186		186	186	186	186	186	186	186	186	186	186	186	186	186	186		186	186	186	
	SCHEDULED TARGET	2	0	0	0	2	45		0	0	6	42	0	0	0	6	35	0	0	0	33	0		0	0	12	
	TODAY'S BUILD			0	2	46	19		24	10	35	28	24	18	18	28	5	20	11	15	10	9		0	0	3	
	ACTUAL BUILD			0	2	33	8		6	10	4	20	11	16	0	18	4	10	11	15	3	9		0	0	3	
	RUNNING TOTAL			0	2	35	39		46	52	62	66	86	97	113	113	131	135	145	156	171	180		180	180	183	
	CUM SCHED TARGET	2	2	2	2	4	49		49	49	55	97	97	97	97	103	138	138	138	138	171	171		171	171	183	
H8 E10	SCHED DEMAND	279	279	279	279	279	279		279	279	279	279	279	279	279	279	279	279	279	279	279	279		279	279	279	
	SCHEDULED TARGET	0	0	2	2	0	13		4	0	11	4	0	0	0	10	6	6	0	0	1	3		4	0	0	
	TODAY'S BUILD			2	2	0	11		13	20	10	5	5	5	8	10	6	6	2	5	8	4		4	4	9	
	ACTUAL BUILD			2	2	0	0		4	20	10	5	0	6	0	10	0	6	2	1	0	4		4	4	9	
	RUNNING TOTAL			2	4	4	4		8	28	38	43	43	49	49	59	59	65	67	68	68	72		76	80	89	
	CUM SCHED TARGET	0	0	2	4	4	17		27	27	38	42	42	42	42	52	58	64	64	64	65	68		72	72	72	
X6 X9	SCHED DEMAND	81	81	81	81	81	81		81	81	81	81	81	81	81	81	81	81	81	81	81	81		81	81	81	
	SCHEDULED TARGET	0	0	0	0	2	7		0	0	7	11	0	0	0	8	4	0	0	0	14	0		0	0	3	
	TODAY'S BUILD			8	1	5	0		0	0	9	0	6	15	3	4	0	7	7	7	7	12		0	0	0	
	ACTUAL BUILD			0	1	5	5		0	0	9	0	0	12	3	4	0	6	7	0	0	12		0	0	0	
	RUNNING TOTAL			0	1	6	11		11	11	20	20	20	32	34	39	39	45	52	52	52	64		64	64	64	
	CUM SCHED TARGET	5	5	5	5	7	14		17	17	24	35	35	35	35	43	47	47	47	47	61	61		61	61	64	
H14P	SCHED DEMAND	64	64	64	64	64	64		64	64	64	64	64	64	64	64	64	64	64	64	64	64		64	64	64	
	SCHEDULED TARGET	11	0	0	0	0	0		0	0	0	0	0	0	0	0	2	0	0	0	10	0		0	0	11	
	TODAY'S BUILD			0	0	5	5		0	4	4	0	1	3	0	0	0	0	0	0	11	11		S/B	0	3	
	ACTUAL BUILD			0	0	0	5		0	0	4	0	0	3	0	0	0	0	0	0	10	0		0	2	0	
	RUNNING TOTAL			0	0	0	5		5	5	9	9	9	12	12	12	12	12	12	12	22	22		22	24	24	
	CUM SCHED TARGET	11	11	11	11	11	11		11	11	11	11	11	11	11	11	13	13	13	13	23	23		23	23	34	
H14W	SCHED DEMAND	28	28	28	28	28	28		28	28	28	28	28	28	28	28	28	28	28	28	28	28		28	28	28	
	SCHEDULED TARGET			0	0	0	0		0	0	0	0	0	0	0	0	0	1	0	0	0	0		0	0	0	
	TODAY'S BUILD			0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
	ACTUAL BUILD			0	0	0	0		0	0	0	0	0	0	0	0	0	1	0	0	0	0		0	0	0	
	RUNNING TOTAL			0	0	0	0		0	0	0	0	0	0	0	0	0	1	1	1	1	1		1	1	1	
	CUM SCHED TARGET	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	1	1	1	1	1		1	1	1	
H8PN	SCHED DEMAND	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
	SCHEDULED TARGET	0	0	0	0	0	10		0	0	4	1	0	0	0	0	0	0	0	0	0	0		0	0	0	
	TODAY'S BUILD			0	0	0	0		4	0	10	10	1	1	1	0	0	0	0	0	0	0		0	0	0	
	ACTUAL BUILD			0	0	0	0		4	0	0	10	0	0	1	0	0	0	0	0	0	0		0	0	0	
	RUNNING TOTAL			0	0	0	0		4	4	4	14	14	14	15	15	15	15	15	15	15	15		15	15	15	
	CUM SCHED TARGET	0	0	0	0	0	10		10	10	14	15	15	15	15	15	15	15	15	15	15	15		15	15	15	
H30	SCHED DEMAND	29	29	29	29	29	29		29	29	29	29	29	29	29	29	29	29	29	29	29	29		29	29	29	
	SCHEDULED TARGET	16	0	0	0	0	0		0	0	0	0	0	0	0	0	6	0	0	0	0	0		0	0	0	
	TODAY'S BUILD			0	0	0	0		0	0	4	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
	ACTUAL BUILD			0	0	0	0		0	0	4	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
	RUNNING TOTAL			0	0	0	0		0	0	4	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
	CUM SCHED TARGET	16	16	16	16	16	16		16	16	16	16	16	16	16	16	22	22	22	22	22	22		22	22	22	
PTO	SCHED DEMAND	23	23	23	23	23	23		23	23	23	23	23	23	23	23	23	23	23	23	23	23		23	23	23	

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Mel Hudson

From: Paul Jarvis [redacted]
Sent: 04 June 2001 08:59
To: M.Hudson@plymouth.ac.uk
Subject: FW: LANCE MMP MaySHEET.xls

Importance: High

Mel,

This is our daily performance measure against Due Date Delivery Performance. Any Use??

Give me a call on 01822 614101.

Hope you got the other info.

Paul Jarvis

-----Original Message-----
From: Lance Blackmore
Sent: 01 June 2001 08:09
To: Alan Hayball; Brian Northmore; 'David Schramm'; Dick Sutherland; Jim Cardwell; Paul Jarvis; Shift Leaders; Susannah Harland
Subject: LANCE MMP MaySHEET.xls

[[LANCEMMP.xls : 1814 in LANCEMMP.xls]]

Shipped Today Thursday 31/1/01 Hennrichs. INC. + a very small amount of Odds & Sods.

As you can see on the sheet we have completed D.D.D on all lines, excluding H14W x7 units. This is mainly down to a supplier not coming up with the outstanding Keys on the days and dates given. Diane has hassled them for a few weeks and has been given numerous answers and basically been fobbed off. The revised delivery date is now this coming Monday.

I will be unable to attend the 09.30 production meetings for the next few days . Myself and Brian will be working on the new sheet/board during the day, hopefully I will have all the new figures by start of play Monday.

Cheers
Lance

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As a follow-on from the delivery performance objective, the company had also looked at other areas of customer satisfaction, which had led to a short iteration of the process to improve their after-sales service. This was because many of their customers are very small and operate with a single recovery pick-up truck. Therefore, if their winch breaks down, they cannot afford to wait for a week to get it repaired, as they are ten unable to operate. Company J, recognising this, have streamlined the process so that if the winch is under warranty, the customer is supplied with a temporary replacement winch within 24hrs, for the duration of the repair. The proviso attached to this is that the customer only has one winch at a time – i.e. the replacement winch is only supplied when the broken one is received for repair and vice versa. For non-warranty repairs, they offer a 48 hr repair service, on the same basis, providing that there is a guarantee to pay. The replacement winches are supplied from the safety stocks which are held at the company.

Finally, PJ described how they had now started another major iteration of the process, which was proving to be just as far reaching as delivery performance. They had re-established, in conjunction with their sister company, their strategic objectives, and were now focusing on cost-reduction as their top priority business objective. Specifically, the target for this is a 30% year-on-year reduction in costs. This has triggered a massive improvement initiative within the company, which was possible, according to PJ, due to the fact that there is now a pro-active improvement culture in the company, which was started with the consultation exercise in the first iteration of the process. As the scale of the improvements are so big, they have been broken down so that each product line in turn becomes the focus for improvements. These are selected on a competitive priority basis, which involves benchmarking against competitors for each product group and establishing which group is most in need of improvement.

To improve each line, statistical process control is carried out and where tooling/fixtures are thought to be at fault, the company has devised a process for requesting, validating and making/ modifying these, as illustrated in the attached sheets. The aim is to ensure that a cost analysis is carried out and that there is a complete justification for all tooling and fixture requests. As PJ said " Engineering change procedures have been brought in so that people can change things efficiently and effectively."

I then asked him whether they had been able to see tangible, bottom line results of this, or any of the other iterations of the process. Having now worked through the process 4 times, through two major objectives (delivery performance and cost reduction) and two smaller objectives (staff morale and after-sales customer service), over a period of some 18 months, PJ was convinced that the process had had a major impact on overall company performance. When we started the process, the company were under severe pressure to become more profitable from their sister company, who were, at the time supporting them. The situation has now all but reversed, with Company J being more profitable, having more orders and a higher turnover than their American counterpart. Although there is no tangible evidence to suggest that this would not have happened had Company J not started using the process, PJ said that he felt that "the process was the catalyst which galvanised the workforce into action". He had found the process useful as

a method of linking continuous improvements to strategically important objectives. He also noted that "measuring is helping to make the company transparent, so that every member of staff can see the effect of their improvement efforts and can see the company beginning to achieve its primary objectives". This has helped to improve staff morale and given people the confidence that managers will listen if they have ideas for improvements.

TECHNICAL WORKS INSTRUCTION

SCOPE

This procedure defines the process for controlling the manufacture and maintenance of tooling and fixtures used on the shop floor. It applies to all recorded tools and fixtures used on the shop floor that affect the quality and efficiency of production.

1. In order for any new tooling to be produced or existing tooling to be modified or repaired, the originator must complete a Tooling/Fixture Request Form (or TFR) – SW114. The following sections of the SW114 need to be completed:

    a) **Originator –** the name of the person requesting the tooling
    b) **Section –** the work area of the originator.
    c) **Date –** the current date at the time of the request.
    d) **Date Required –** when the originator requires the tooling for production.
    e) **Details of Request –** a brief outline of what the request involves.

Also the originator will place a tick in one or more of the following boxes as appropriate:

Cost Saving, Damage, New, Mod, Remake.

2. The completed form and any useful additional information that may benefit the request should be submitted to the Shift Leader. At the discretion of the Shift Leader the SW114 is then passed on to any member of the Improvements Team for review.

3. The SW114 is issued with an identity number, which is registered in the Tooling/Fixture request database along with the basic details of the request. The team will consider the validity of the request and collate a brief estimate of the manufacturing cost and the improvements expected.

4. The SW114 is then reviewed with the Operations Director who will sign the request with an authorisation to proceed with the project or to reject the proposal with a valid reason. Any SW114 that is not accepted will be kept in a reference file. Feedback will be given to the originator for any reason for rejection.

5. Any SW114 that receives authorisation to proceed will then become a project activity for the Improvements Team. All design work will be completed and official drawings created. Drawings will be annotated with a tooling number. All new tooling is identified with the prefix 2-04 followed by a four-digit number determined in numerical order in the tooling file. Existing tooling with a 2-04-**** number that requires a change as a result of the request will be up–issued to reflect this activity. All drawings whether new or existing will be placed in a file called – "In Progress – Tooling" for the duration of the design phase. Superseded tooling drawings will be kept in directory called "Tooling Archive".

6. Other information collated by the Improvements Team as part of each tooling project will be:

    a) Total predicted cost of implementation
    b) Impact on the machining process and assembly of related components
    c) Other tooling requirements
    d) Possible creation or update of CNC programs

7. When the project is deemed complete at the design stage the finished drawings will be reviewed with the Originator and Section Leader to make sure the SW114 has been interpreted correctly. If both approve, they will sign the "Approved to make " section of the SW114 and the "checked by" box on the drawings.

8. A copy of the signed SW114 will be displayed on an "In Progress" board to advise shop floor personnel that this is a current activity. It will indicate a revised date for completion of the project for their information.

9. With production clearance now granted, the Improvements Team will raise purchase requisitions for all materials required and determine a schedule for machining and assembly of the parts. A completion date for the project will be set on this basis.

10. 10. Each drawing will be issued to the shop floor with a Tooling Timesheet – SW115. The drawing and SW115 will stay with the component throughout the machining process. Each operator concerned will enter the labour times for each specific operation on to the sheet. These times will be entered onto the tooling database. The database will also track the cost of materials and outside services to give the overall cost of the project.

11. Once the machined parts have been completed they will be inspected to drawing. Any deviations will be brought to the attention of the Improvements Team who will assess functionality and modify the drawing if necessary. The results will be recorded by the inspector on a database held in the Q.A department. The drawing will be signed by the inspector as proof of inspection and then kept as part of the project file.

12. The component parts will then be assembled in preparation for the first production run.

13. During the first production run the tooling/fixture will be assessed. Critical dimensions on the component produced will be measured for capability if the part is essential to the quality of the final product. A revised cycle time will be recorded for the parts produced using this set-up.

14. The Improvements Team will write a concluding report. This will be filed as part of the complete project.

This will consider the following as part of a formal statement:

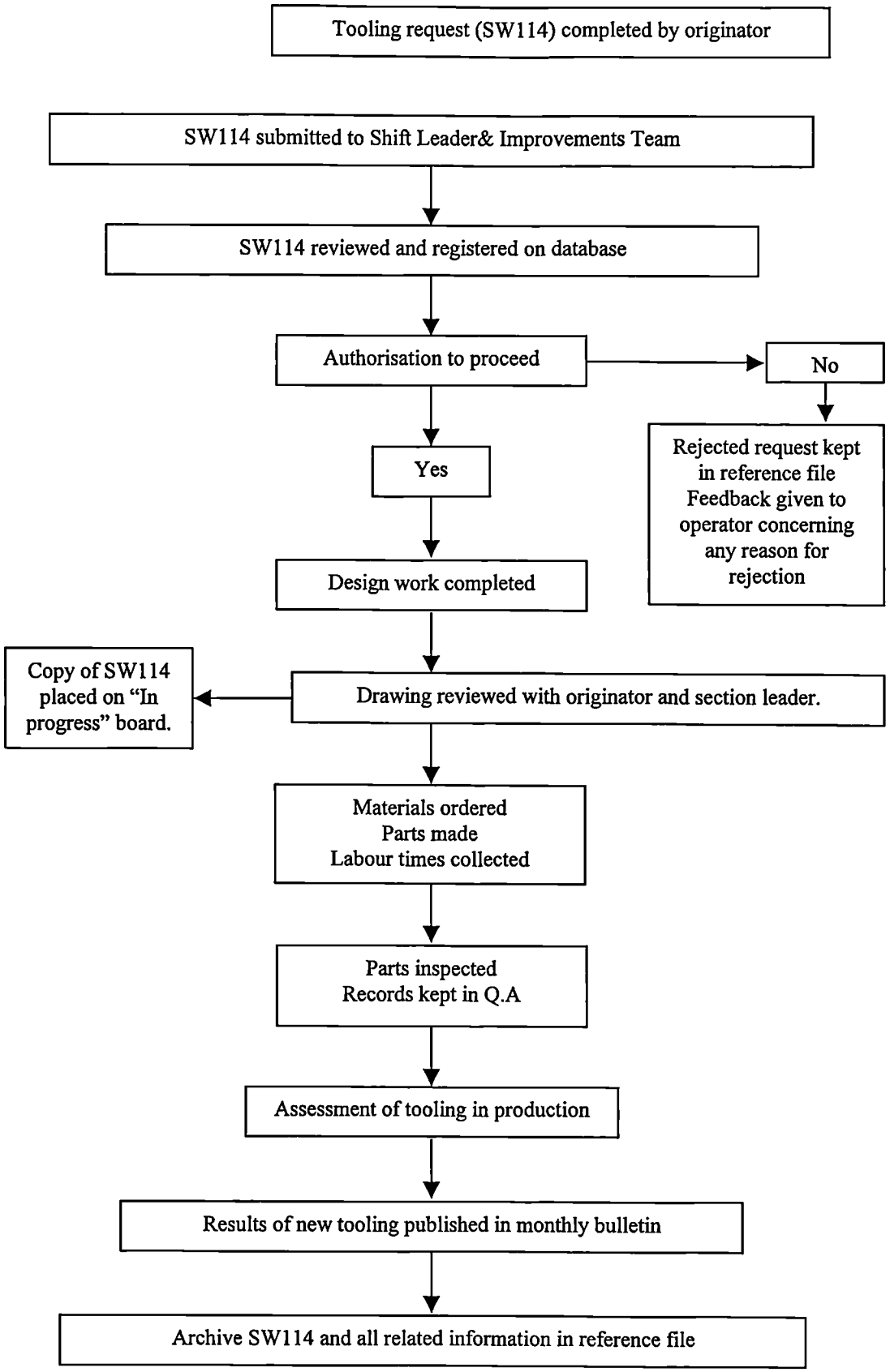
Existing	Planned	Actual
Changeover	Changeover	Changeover
Cycle Time	Cycle Time	Cycle Time
Quality/ Scrap	Quality/ Scrap	Quality/ Scrap
Floor to Floor	Floor to Floor	Floor to Floor

15. The Method of Manufacture and Bill of Plant for the component produced will be updated on Fourman to reflect the improvements made by using the new tooling.

16. The results of the project will be published to the shop floor as part of a monthly report. The copy of the request form will be removed from the "In Progress" board.

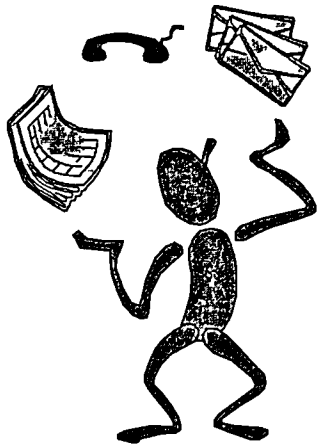
17. The completed package for this tooling activity will be archived in the reference file.

Tooling/Fixture Request Process



Continuous Strategic Improvement

through



Effective Performance Measurement

A Guide for SMEs

Mel Hudson

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PREFACE

Whenever a new management tool or technique is developed, there follows a plethora of management books which explain what it is and how to implement it. These books invariably make a number of assumptions about their respective audiences. These assumptions are that the interested manager comes from a company where:

- the management team regularly find time to sit down and develop strategies for improving the business;
- the management team have a high degree of autonomy over critical business decisions;
- the team of staff know and understand the strategies developed;
- the operating environment can adjust easily to incorporate improvements and changes.

In my experience, working with small companies, these assumptions are invariably flawed. The typical small company seems to comprise;

- a management team who are rushed off their feet trying to deal with day to day crises in the company;
- a management team whose decision making activities are often severely restricted by financiers, customers, legislation and the company owners;
- a team of staff who often have little knowledge, let alone understanding of the business strategy;
- an operating environment which will require a major restructure (and often significant investment) in order to incorporate important improvements and changes.

These characteristics often preclude small companies from gaining the benefits of new management methods, not because they are unsuitable *per se*, but simply because the scenarios described in the text books rarely translate effectively into the practical experience of small company managers.

My primary aim in writing this guide was to stay rooted in small company reality and develop solutions which will work in this hectic environment. This guide provides a set of tools and techniques for developing continuous strategic improvement which are designed to work within these constraints. I hope that you will find it a useful resource.

Mel Hudson *October 2000*

INTRODUCTION

The Gap Between Vision and Strategy

Think for a minute about the direction in which you would like your company to develop and grow. This is probably not difficult – it is simply your vision for the future. However, now think about how you are going to get from where you are now, to actually attaining that vision. This is the rather more tricky bit – this requires a strategy; how to get from point A to point B.

All companies have visions – even if that vision is for the company to remain the same. However, small companies seem to find the strategy bit more difficult. This is because small companies need the ability to adapt quickly, in order to capitalise on opportunities and overcome potential problems. This requires a flexibility that long term plans cannot give, rendering them effectively obsolete. Therefore, in this environment, thinking of strategy as a set of plans is of little value. However, strategy can also be described as a pattern of actions which shape the business over time. This model seems to be a more appropriate method of describing small company strategy. The reason for this is that it removes the constraints of formal planning and allows a more flexible and dynamic management approach. This is essential to enable small companies to respond effectively to new opportunities or potential threats.

The problem with this type of strategy is that, all to often, it can turn out to be no strategy at all. This happens when short term flexibility takes over and management becomes purely reactive, rather than proactively driving towards the long term vision. This leaves us with a problem: Managers can make plans detailing how they intend to achieve their long term vision – knowing all the time that their plans are likely to alter course significantly over time, thus rendering them of little use. Alternatively, they can be flexible enough to react to the fast changing environment and ultimately exchange strategy for short term tactical manoeuvres.

The Solution

There is, however, a third option which is – conveniently – the subject of this guide. The third option involves what is known as incremental or emergent strategy. This option attempts to formulate strategy through evaluating and learning from short term tactical manoeuvrings. In order to do this effectively, a process of *continuous strategic improvement* is required, which can:

- identify appropriate short term tactics which will support the long term vision;
- identify improvements and develop performance measures to drive performance towards achieving the short term tactics;
- evaluate and learn from the measurement data to improve performance.

A key way of achieving these aims is effective performance measurement, which can provide appropriate data for monitoring, evaluating and learning purposes. This guide describes a practical process for achieving continuous strategic improvement through effective performance measurement.

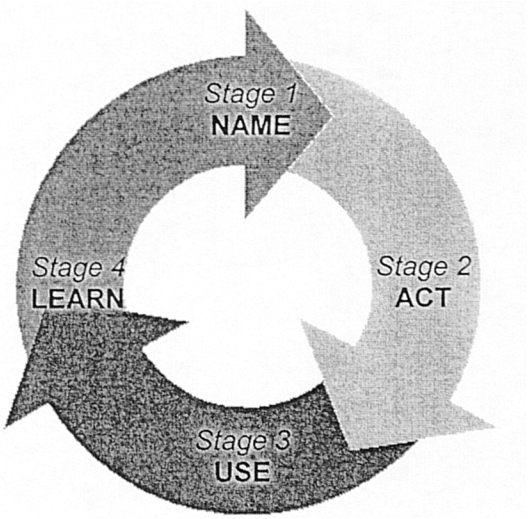
The Continuous Strategic Improvement Process

The process is presented as a cycle so that tactics and measures can be reviewed and updated on an ongoing basis. The diagram below illustrates how the process works by first naming an appropriate short term objective, then acting by identifying improvements and developing performance measures to monitor and evaluate progress towards the objective, through to implementing the improvements and finally feeding back performance, to enable strategic learning.

The process of naming the top priority business objective helps to focus improvement efforts and eliminate communication problems (*Name*). This is helped by identifying improvements and developing a few performance measures to drive progress towards the priority objective (*Act*). Using the performance measures helps evaluate the success of the improvement efforts

(*Use*). Reviewing the performance data regularly gives an early warning of potential problems and ensures that the measures remain relevant and coherent by highlighting and deleting obsolete measures (*Learn*).

Continuous Strategic Improvement Process



The main benefit of this cyclic approach is that it can help stimulate continuous strategic improvement in the business. This is because the process provides a mechanism for prioritising and monitoring business objectives, enabling the whole business to focus on achieving one objective before moving on to the next one.

FREQUENTLY ASKED QUESTIONS

As a small company manager you probably have a million and one things to do already – so why would you want to bother wasting your time reading the rest of this guide? The purpose of this section is to try to convince you that it is worthwhile – not just to read it, but to start using the process it describes in your company.

Why should I bother with this process?

Think about the improvements you would like to make in your company. If you are thinking of more than one or two improvements, this process can help you. Instead of trying to sort out all your problems simultaneously, the process helps you to prioritise and choose just the most important improvement objective to focus on. As there is only one objective, it is easy to communicate to the rest of the staff, so everyone knows where they stand and what they are trying to achieve. When you have achieved one improvement, you take another look at your priorities, which may well have changed, and identify a new focus for improvement. Throughout each improvement, performance measures are developed and used to track progress and act as an early warning system if things start going wrong. It is a simple idea, and a simple process. Continuous strategic improvement can transform your company – try it and see the difference!

How long will it take?

The process is designed to help you achieve ongoing business objectives. It is a method of continuously evaluating where you are and where you want to go, and then monitoring your success in getting there. Therefore, there are no overall time limits for the process. However, each cycle will take approximately one day of management time, ideally spread over a couple of weeks.

How much will it cost?

Everything you need to work through the process is contained within this guide. There are no costs involved apart from staff time. Initially, more time will be needed to implement the process, but as it becomes part of your day to day management, the time involved will reduce considerably.

Will it improve the bottom line?

By only focusing on one objective at a time, there is a greater chance of achieving success. If the objective has been correctly identified as the main priority for the company, then achieving it should have a positive impact on the bottom line. The philosophy of continuous strategic improvement that this approach fosters can also help to improve profits indirectly, through a more proactive atmosphere of improvement among staff.

How hard is it to actually do?

Implementing a new management method is never easy. However, this guide provides the tools and techniques you will need to get through the difficulties and overcome any resistance to change. Being positive about change and managing it effectively is the key to making the transition as smooth and pain free as possible. Once you have got over the initial implementation, the process is extremely straightforward and easy to use.

PROCESS SUMMARY

The process illustrated in this guide is designed to enable companies with dynamic strategies to develop a system for continuous strategic improvement that is resource efficient and able to adapt quickly and easily to changing business demands. It is represented as a cycle to illustrate that it is a continuous process of naming improvement objectives, developing and implementing performance measures to help achieve those objectives and then reviewing the data to achieve strategic learning.

Stage 1: **NAME**

This stage involves the management team naming the top priority business objective as a focus for this cycle of the process. This is achieved by identifying and then prioritising the company's current strategic objectives. The most critical objective is then chosen as the focus for attention and a project team is identified to develop appropriate performance measures to support this objective.

Stage 2: **ACT**

A project team consult staff and collect suggestions for improvements which will help the company achieve the named objective. The suggestions are evaluated and appropriate action is taken to implement improvements. A small amount of performance measures are developed to monitor progress towards the identified objective. Appropriate members of staff are appointed to implement the measures and collect data for review.

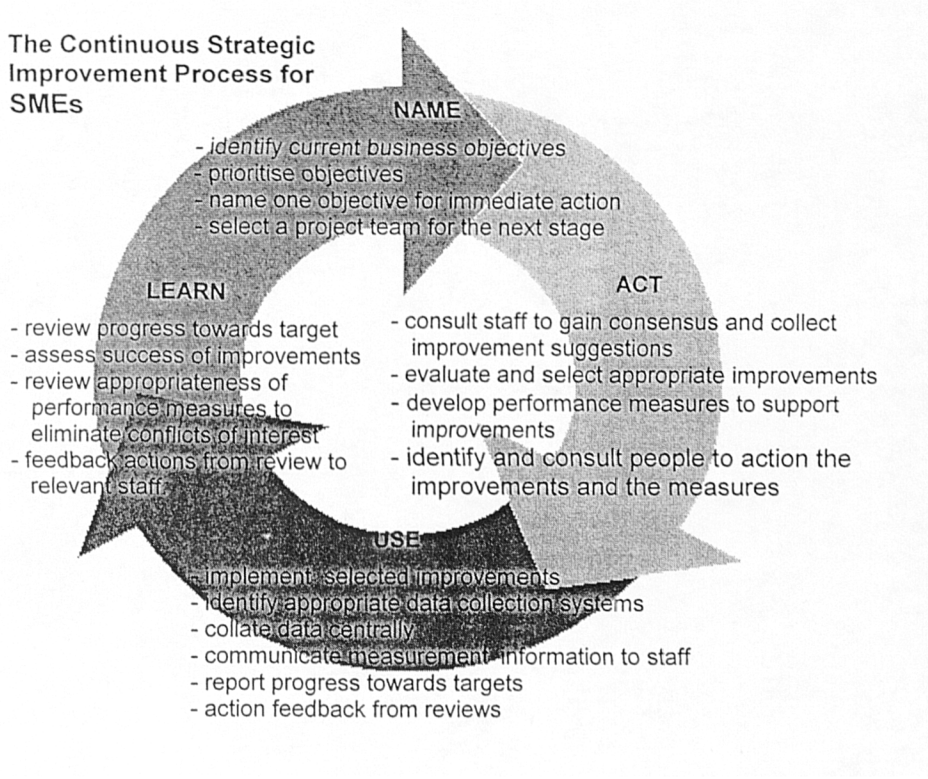
Stage 3: **USE**

Each appointed member of staff sets up and co-ordinates data collection procedures for their measure. Ideally this includes an

information site to ensure that all staff can monitor progress. They are responsible for reporting progress and also for actioning any feedback from the reviews.

Stage 4: **LEARN**

The management team reviews progress to target on all performance measures. In addition, all measures are assessed for their continued appropriateness to company needs and to ensure that no conflicts arise between measures. Actions from this review, including revised targets or the deletion of obsolete or conflicting measures, are then fed back to the relevant staff.



STAGE 1: NAME

Aim: to identify your current most important strategic objective.

People: the management team

Tools: Templates of the tools used can be found in Appendix 1.

This is the planning stage of the cycle, where you must name your current most important strategic objective. It is essential to get this right to ensure that your improvements reflect your current strategic priorities. This section will guide you through the process of defining and prioritising business objectives. It will then suggest who should participate in a company-wide team who will be responsible for identifying appropriate improvements and developing performance measures to monitor progress.

1.1 Define Strategic Objectives

If you have one, a strategic / business plan or mission statement will be useful for this activity, as it will help you to identify your current strategic objectives.

The first step in identifying your business objectives is to identify your business needs in terms of the critical dimensions of performance.

Tip: Making a list of your various stakeholders (e.g. investors, employees, owners, affiliated companies etc.) will help at this stage, as will identifying your major customers.

The diagram in figure 1 illustrates the hierarchical relationship between the various dimensions and sub dimensions of performance. From this diagram, it can be seen that the four dimensions that are critical to business success are Operational Effectiveness, Supplier Effectiveness, Stakeholder Satisfaction and Customer Satisfaction.

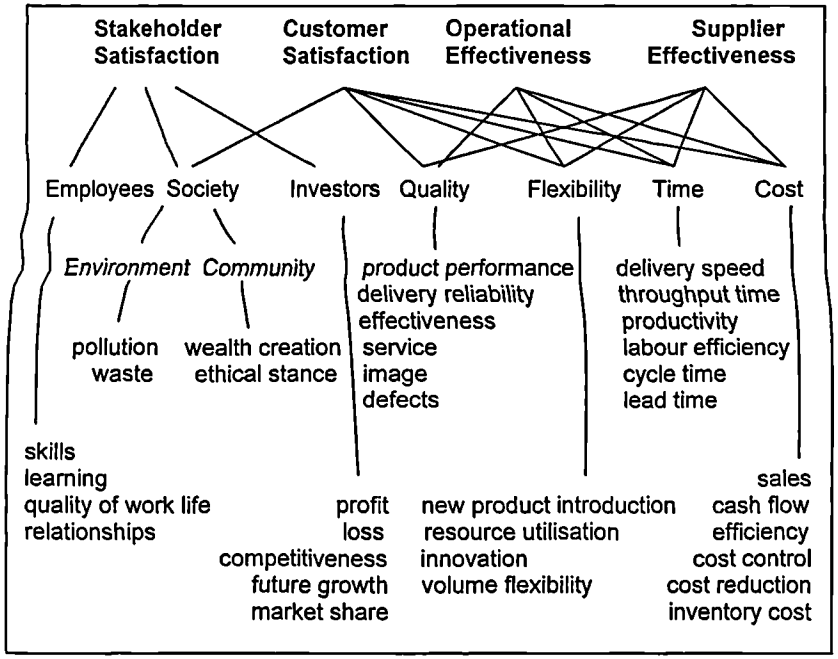


Figure 1: Relationships between dimensions and sub-dimensions of performance

Using Tool 1, you should now start to think about identifying your current business needs for each of the critical dimensions of performance. Use the diagram as a guide to ensure that you cover all the relevant aspects of performance within each dimension.

Your business needs may be classified into two groups for examination; internal needs and external needs.

Internal needs essentially relate to the working practices within the company itself. They may include current operational concerns, specific improvements, or other changes you wish to make.

	Business Needs	Strategic Objectives
Operational Effectiveness		
Supplier Effectiveness		
Stakeholder Satisfaction		
Customer Satisfaction		

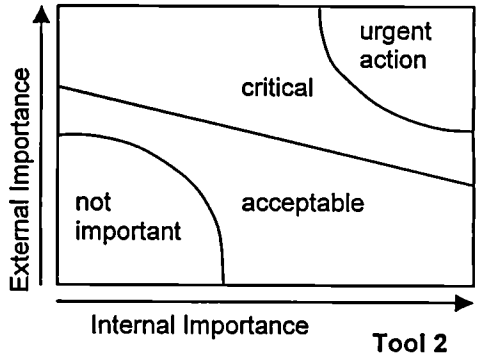
Tool 1

External needs may be classified as the many external forces that influence the way your company works. This includes any current opportunities or threats you are facing. Identify the external requirements that will ensure improvements across each dimension of performance.

Once you have identified a balanced set of current business needs, you need to develop your current strategic objectives by capturing precisely what actions you need to take in order to satisfy those needs.

1.2 Name Top Priority Objective

To identify which objective is currently most critical for financial success, plot your set of objectives on the matrix (tool 2)*.



Tool 2

This is achieved by looking at each objective in terms of a) how important it is to achieve the objective as far as your company is concerned (internal importance) and b) the importance of achieving the objective as far as your customers and stakeholders are concerned (external importance).

Identify the objective(s) which is currently the most critical for financial success. This will generally be any objective which falls into the 'urgent action' zone on the chart, although it is advisable to focus on just one objective each time.

The objective you choose should now become your named focus for improvement for this iteration of the process

* Adapted from Slack, N. (1994) "The Importance Performance Matrix as a Determinant of Improvement Priorities" *International Journal of Operations and Production Management*, Vol 15 No 4 pp59-75.

1.3 Identify Project Team

Select a project team who will have responsibility for identifying appropriate . improvements and developing performance measures to support the chosen objective (usually 5/6 people per team, depending on company size).

Remember that although it might seem logical for the project team to consist entirely of managers, this could present significant problems, including:

- difficulties getting the team together, due to day-to-day managerial issues
- the project being overtaken by short-term problems
- a tendency to alienate the project from the people who will be expected to implement and use the resulting PMs.

Therefore, it is strongly recommended that the project team has representatives from all levels of the company, including:

- team leaders;
- supervisors;
- other capable members of staff;
- management.

STAGE 2: ACT

Aim: To identify appropriate improvements and develop performance measures to support the named objective.

People: The project team identified in stage 1.

Tools: Templates of the tools used can be found in Appendix 1.

This is where the project team consult staff throughout the company to gather suggestions which will help achieve the named objective. They then identify performance measures to monitor and evaluate progress towards the named objective. The following stage illustrates the tools and techniques to help you achieve these aims.

2.1 Consultation

The purpose of this exercise is to consult with members of staff to communicate what you are trying to achieve and to gather improvement suggestions that will help the company achieve the named objective.

Depending on your circumstances, you may decide to use one or both of the following methods of consultation:

- a survey to all staff;
- team brainstorming sessions.

The table in figure 2 illustrates the key trade-offs between each method.

The main focus of either method should be to inform staff of the focus for improvement and identify what they perceive as being the ***'top three improvements'*** necessary to achieve the named objective.

Survey	Brainstorming
• involves all staff • quick to administer • easy to set up with no experience • typically low reply rates • lots of off-topic information • time consuming data sorting required	• involves only selected members of staff • time consuming to set up / do • difficult to do without experience • full participation from the selected staff • mainly relevant, on-topic information • data can be sorted in the session

Figure 2: Survey V's Brainstorming Trade-offs

Staff Survey

The survey method is particularly useful for gathering data from the entire staff quickly and efficiently. However, the drawback of this method is that although it is easy to administer, the response rate and the quality of the responses will be lower.

Hints and tips for an effective survey are given below.

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Hints

To get the best response, it is essential to explain:

- What you are trying to achieve (i.e. the named objective)
- How it will be achieved (i.e. by focusing improvement efforts in this one area and monitoring and evaluating progress)
- The purpose of the survey (i.e. to gather improvement suggestions from all staff relating to the achievement of the named objective)
- The information you want:
  What are the *top three improvements* you can think of which will help us to achieve the named objective?
  (In addition, you might want to provide space for further comments, to allow other important issues to be raised)

Useful prompts to incorporate on the survey form might include:

- What improvements in your team would make it easier to achieve the named objective?
- What improvements in the company as a whole would help us achieve the named objective?

Tips

- Make sure that the named objective is clearly stated on the survey.
- Make sure everyone in the company receives the survey – this way everyone has a chance to suggest improvements, if they want to.
- Set a date by which all replies must be received – otherwise you will be waiting indefinitely for replies.
- Do not expect everyone to reply – the main point of the survey is to inform people about the project and invite their input. People who are interested enough will reply.
- Expect lots of information not directly related to the named objective – this is to be expected and could be useful for other projects, even though it is not directly relevant here.

Brainstorming

Brainstorming sessions have the advantage of gathering detailed data from specific groups of people. However, although this method is more productive, it is also the most time consuming and difficult to arrange.

Hints and tips for conducting this brainstorming session effectively are given below.

Hints

- At the beginning of the session, explain what you are trying to achieve. Make this VERY clear, to ensure that everyone is focused on answering ONE question:
  What are the *top three improvements* you can think of which will help us to achieve the named objective?
- Write both the named objective and the question on a whiteboard / flip chart, as a reminder to everyone of the purpose of the session.
- Lead the discussion, where necessary, by prompting the group with questions, or suggesting improvements that you personally think would help the company achieve the objective.

Prompts might include:

- What improvements in your team would make it easier to achieve the named objective?
- What improvements in the company as a whole would help us achieve the named objective?

Tips

- 5-8 people are the optimum number for effective brainstorming. More than this will inevitably end up with the session getting side-tracked onto different issues, whereas fewer may result in a lack of ideas for discussion.

- Use post-it notes to record information – they are easy to move around and you can use different colours to denote different issues.
- A whiteboard or flip chart will give you plenty of room for adding or removing post-its, as ideas develop.

2.2 Evaluation

The consultation phase should result in lots of improvement suggestions which need to be evaluated to identify which are critically important to achieving the named objective. This process will differ slightly depending on whether the consultation format you used was brainstorming, or a survey.

If you used brainstorming
– the evaluation can be carried out at the end of the session to save time.

If you used the survey method
– the evaluation should be carried out in a separate session with the project team. (With this method, there is also a need to sort the data before evaluating it. This involves taking each survey in turn and writing each suggestion down on a post-it note, then grouping similar suggestions under general headings.)

Evaluation should be conducted on the basis of the importance of each improvement to achieving the named objective.

This can be achieved using a 5 point +/- scale (see tool 3), to rate the relative importance of each suggestion in achieving the priority objective. The easiest way to do this is to draw the scale on a whiteboard / flipchart, and stick the post-it notes you have already written against the relevant section.

This process should be repeated to higher and higher levels of importance, until you have between 3-5 critically important improvement suggestions.

	Suggested improvements to achieve the named objective
++ *(v high importance)*	
+ *(high importance)*	
0 *(important)*	
- *(low importance)*	
- - *(v low importance)*	

Tool 3

It is important that the improvements identified have management support, so that they can be implemented quickly and efficiently. This support is required before moving on to the next step. Tool 4 provides a method of recording the critically important improvements, detailing what they are, who will be affected and responsible, and how long the project is expected to take. Copies of this sheet should be sent to all relevant people for information and approval.

Improvement:	
Area affected:	
Person Responsible:	
Action Required:	
Estimated time:	
Signed off:	

Tool 4

2.3 Develop Performance Measures

Having gained management support for the selected improvements, it is now time to develop some performance measures to evaluate their success and monitor the overall progress towards the named objective.

To ensure that performance measurement does not become cumbersome, you should aim for just one measure to monitor overall progress towards the named objective. In addition, you may wish to develop measures to assess the effectiveness of the improvements you are undertaking. However, a useful guideline is that there should be no more than 3-4 measures per named objective. All the measures should be clearly related to the named objective, have a clear purpose and be simple to use and understand. The performance measure record sheet (tool 5*) can be used to help you achieve this.

Measure	The title of the measure. Should be self explanatory and avoid jargon.
Purpose	Should be related to the effect you are trying to achieve.
Relates to	Identify the business objective that this measure relates to.
Target	Specify the level of performance required and the timescales within which they need to be achieved.
Formula	How something is measured affects the way people behave. The formula should drive people towards good business practice.
Frequency	The frequency with which performance should be recorded and reported is a function of its importance and the available data.
Who measures?	This box should identify the person who is going to collect the data. This is the formal 'owner' of the measure.
Source of data	Where is the data coming from? To track changes in performance over time, then the data must come from the same source each time.
Who acts on the data?	This box should identify the person who has the responsibility / authority of acting on the data. Normally, this will be either the person who collects the data, or their line manager.
What do they do?	Without some action here, the measure is pointless. You should define a general process to be followed in the case of good/ bad performance.
Notes	Any specific issues, concerning the measure should be detailed here.

Tool 5

* Neely, A. Mills, J. Gregory, M. Richards H. Platts, K. and Bourne, M. (1996) *Getting the Measure of Your Business*, Works Management, Cambridge. P65.

When you complete the performance measure record sheets you are asked to identify a member of staff who will be responsible for managing that measure. A copy of the sheet should be sent to this person, for information, along with an implementation date and information about reporting and feedback procedures.

STAGE 3: USE

Aim: to implement the improvements and performance measures and develop procedures for reporting / feedback.

People: The Management team and identified members of staff.

Tools: Due to its nature tool 6 is for illustration purposes only.

This is the implementation stage of the cycle. It is essential that this stage is completed effectively, because otherwise the other stages have been a waste of time. This section gives advice to ensure effective implementation. The tool illustrated is an example of a paper-based information point, but may be substituted if your company already has effective dissemination systems in place.

3.1 Planning Implementation

Good communication is the key to effective implementation. Your implementation plan should therefore ensure that:

- all staff are informed about the improvements being undertaken and the related performance measures (with reasons why!);
- a central, open access, file is developed, containing all the information for each named objective, to ensure visibility throughout the company;
- members of staff who are to be responsible for implementing and managing performance measures are informed of their role and the reporting procedures;
- information points are set up, displaying performance data for each measure.

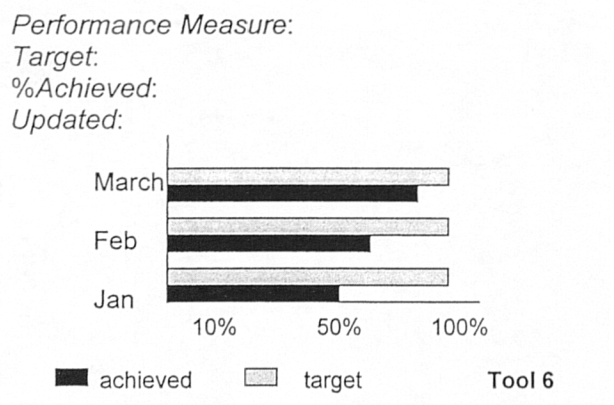
Information Points

To ensure visibility across the company, performance data for each measure should be summarised and displayed in a prominent position (either paper or electronically based).

The information should be maintained regularly by the owner of each measure.

Tool 5 illustrates a possible format for an information point.

Information Point



The Continuous Strategic Improvement File

This file should contain all the information relating to continuous strategic improvement within the company.

The file should contain the following information:

Section 1:

- The current named objective
- A list of current improvement actions relating to the named objective

- Performance measure record sheets for the current named objective (tool 6)
- Review sheets for each performance measure (see tool 7)

Section 2:

- Previous named objectives
- A list of the improvements undertaken which related to the named objectives
- Performance measure record sheets for the previous named objectives (tool 6)
- Review sheets for each performance measure (see tool 7)

Section 3: (for reference purposes)

- Performance measure record sheets for obsolete objectives (tool 6)
- Review sheets for each obsolete performance measure (see tool 7)

3.2 Data Collection Systems

The performance measure record sheet should contain all the relevant information for data collection, including who is responsible for collecting the data, where the data will come from and the frequency of collection.

It is the responsibility of the person who is managing the measure to:

- ensure that the data is collected correctly, according to the information given
- complete and update the information point with progress on a regular basis
- complete a review sheet before each review meeting (See Tool 7)
- action any feedback on the measure received from the PM review.

STAGE 4: LEARN

Aim: to assess the impact of improvements made and to evaluate progress towards achieving the named objective.

People: the management team

Tools: Templates of the tools used can be found in Appendix 1.

This stage of the process aims to review the performance data collected from all performance measures, to ensure that the targets remain relevant and that obsolete measures are deleted. In addition, potential conflicts between performance measures can be identified and resolved.

4.1 Review Progress

To ensure that all your performance measures are relevant and appropriate to your current needs, they need to be reviewed regularly. Reviews should occur:
a) every month / quarter (as appropriate)
b) every time you introduce new measures (even if they are not developed using this process).

Each Review should:
a) monitor progress towards the named objective;
b) assess the continued value of each measure;
c) ensure that there are no conflicting measures.

To review progress on existing performance measures, you will require the following information for each individual measure:
1. the title of the measure,
2. progress to target,
3. major actions undertaken,
4. any other relevant issues.

This information should be provided by the person responsible for each measure, using a Review Sheet (See Tool 7 for a template Review Sheet).

Review Sheet

Measure	
Person Responsible	
Performance Data	
Target	
% Achieved	
Actions Undertaken	
Issues	
Review Comments	
Progress to Target	
Actions	
New Review Date	

Tool 7

Using this information, you can carry out the review. This will entail:
- ensuring progress towards the named objective is satisfactory
- evaluating the improvements made using the relevant performance measures
- reviewing / changing / extending targets for individual performance measures, as appropriate
- deleting obsolete measures
- ensuring that none of the measures conflict with each other
- feeding back any actions to the appropriate members of staff.

CONCLUSION

This guide has illustrated a step-by-step process for the development of continuous strategic improvement. The process enables you to:

- identify your current most important business objective
- identify the critical improvements you can make in the company which will help you achieve that objective
- develop performance measures to monitor and evaluate your improvement efforts
- learn from your experiences to facilitate future improvements using the process.

The process is designed to be continuous and, therefore, this should not be seen as the conclusion of strategic improvement in your company, but simply as the end of one cycle.

To ensure that you can continue to focus on the achievement of your most pressing strategic objectives, it is essential that you integrate this process into the company's way of working, so that every time your strategic priorities change, you can use it as an opportunity for improvement, through another iteration of the process.

Good Luck!

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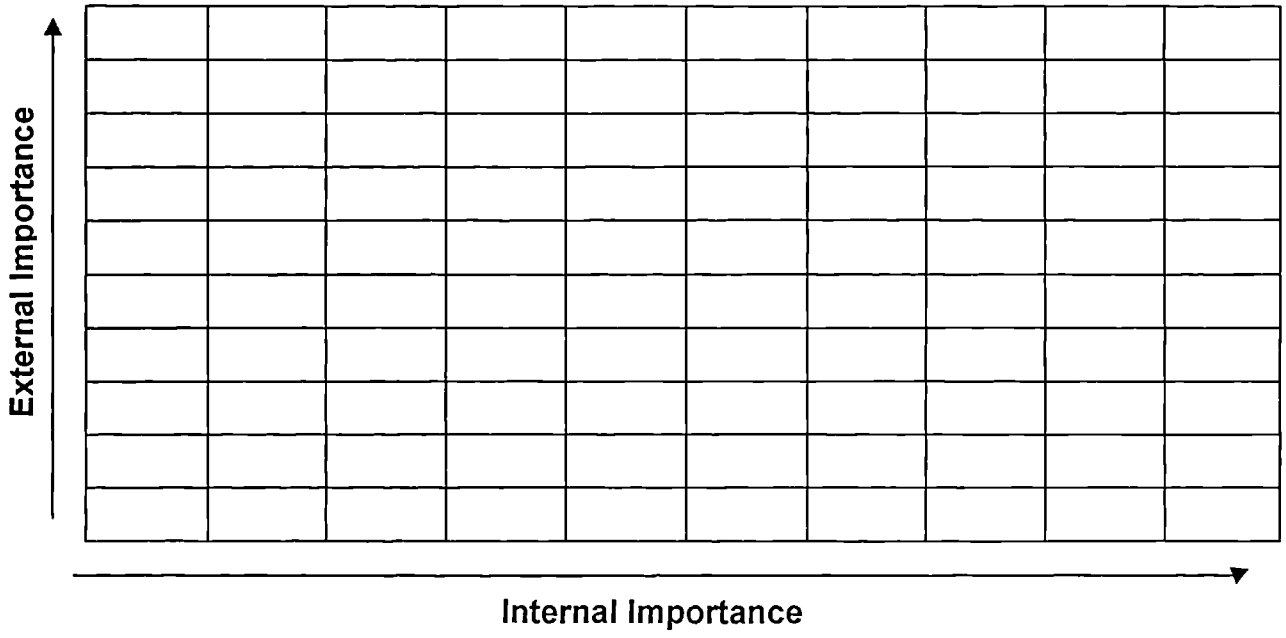
APPENDIX 1:

Tool Templates

Tool 1: Business Needs Analysis

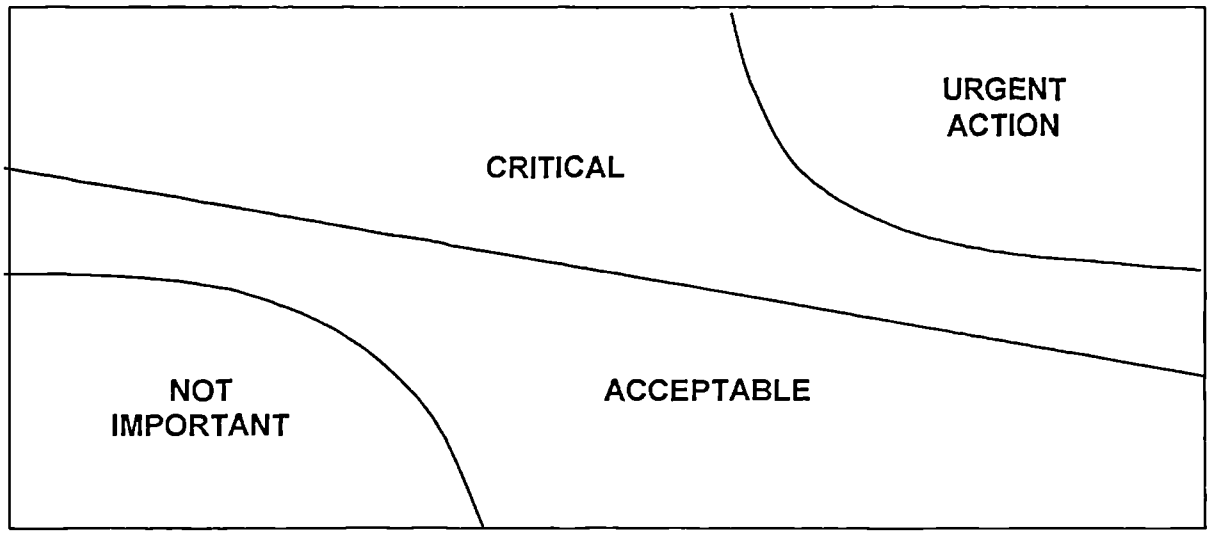
	Business Needs	Current Strategic Objectives
Operational Effectiveness		
Supplier Effectiveness		
Stakeholder Satisfaction		
Customer Satisfaction		

Tool 2: Internal / External Prioritisation Matrix*



* Adapted from Slack, N. (1994) "The Importance Performance Matrix as a Determinant of Improvement Priorities" *International Journal of Operations and Production Management*, Vol 15 No 4 pp59-75.

Tool 2: Internal / External Prioritisation Matrix Overlay Sheet (photocopy onto acetate)*



* Adapted from Slack, N. (1994) "The Importance Performance Matrix as a Determinant of Improvement Priorities" *International Journal of Operations and Production Management*, Vol 15 No 4 pp59-75.

Tool 3: Prioritisation Chart

	Suggested improvements to achieve the named objective
++ *(v high importance)*	
+ *(high importance)*	
0 *(important)*	
- *(low importance)*	
- - *(v low importance)*	

Tool 4: Improvement Action Sheet

Improvement:	
Area affected:	
Person Responsible:	
Action Required:	
Estimated time:	
Signed off:	

Tool 5: Performance Measure Record Sheet*

Measure:	
Purpose:	
Relates to:	
Target:	
Formula:	
Frequency:	
Who Measures:	
Source of Data:	
Who acts on the Data:	
What do they do:	
Notes/ Comments:	

*Neely, A. Mills, J. Gregory, M. Richards H. Platts, K. and Bourne, M. (1996) *Getting the Measure of Your Business*, Works Management, Cambridge. P65.

Tool 7: Review Sheet

Performance Measure:	
Person Responsible:	
Performance Data	
Target:	
% Achieved:	
Actions Undertaken:	
Issues:	
Review Comments	
Progress to Target:	
Actions:	
Next Review Date:	

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Appendix 2:

Feedback Sheet

Appendix 2: Feedback Sheet

To help to improve this Continuous Strategic Improvement Process, it would be helpful if you could complete the following questions.

When working through the guide, which tools did you use:

Tool 1 (Internal / External analysis chart) Yes / No ?
Comments:

Tool 2 (Internal / External Importance Matrix) Yes / No ?
Comments:

Tool 3 (Prioritisation Chart) Yes / No ?
Comments:

Tool 4 (Improvement Action Sheet) Yes / No ?
Comments:

Tool 5 (Performance Measure Record Sheet) Yes / No ?
Comments:

Tool 6 (Information Point Illustration) Yes / No ?
Comments:

Tool 7 (Performance Measure Review Sheet) Yes / No ?
Comments:

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Using the grid below, please assess each stage using the scale given, with 1 being the highest and 5 the lowest grade.

	1	2	3	4	5
STAGE 1 NAME					
1. The quality of information provided					
2. Ease of use					
3. Level of guidance					
4. Overall usefulness					
STAGE 2 ACT					
5. The quality of information provided					
6. Ease of use					
7. Level of guidance					
8. Overall usefulness					
STAGE 3 USE					
9. The quality of information provided					
10. Ease of use					
11. Level of guidance					
12. Overall usefulness					
STAGE 4 LEARN					
13. The quality of information provided					
14. Ease of use					
15. Level of guidance					
16. Overall usefulness					

Overall:

The guide should include examples of each tool in use:
Yes / No

There was enough information to complete each stage successfully:
Yes / No

I would recommend this process for use in other SMEs:
Yes / No

Please feel free to suggest any further improvements to the process:

Please return completed forms to:
Mel Hudson
Department for Business Development
6th Floor MoneyCentre
University of Plymouth
Drake Circus
Plymouth
PL4 8AA

Appendix 3: Application phase

Company K Case Study

Company L Case Study

Case Study: Company K

16/11/00

Contact established through a PM workshop held on 16/11/00. This illustrated the PM process to the participants through a practical exercise using a fictitious case company. The company participants – three in total – were keen to learn about PM, and how it could help then improve efficiency and productivity.

The company manufactures boat propellers for the luxury powerboat market, primarily in the UK. It employs 170 people at it main plant in Devon, with a further 40 at their bases in Fareham, (UK), Holland, Dubai and the US.

Discussed the possibility of using the company as a validation case with the Production Director, after the workshop. He was happy to help, primarily because he perceived it to be good value – he would effectively be getting free consultancy, in return for giving some advice and feedback on the implementation process. Therefore, a meeting was arranged for early December, to work through stage one of the process and put together a plan of action for the rest of the process.

4/12/00

The meeting kicked off at 10 am. Barry Luke and Brian Morrison were the only company staff involved, being the Production Director and the Production Manager respectively. Barry had already looked through the workbook with Brian, to bring him up to speed on the process – as he had been to the workshop he knew more or less what it was all about.

Had a chat with both of them about what I wanted to do – and they were both open to the fact that this was, in fact, a test of the process – therefore all suggestions for improvements – and criticisms – were considered an integral part of the project.

We started discussing, in general terms, what they thought the process might be able to achieve in the company. Barry took this as a cue to go off on a long and rambling account of the situation concerning performance measures in the company and how they had been trying to improve them. The focus for both Barry and Brian's attention concerned productivity improvement – which is not really surprising considering both of their positions within the company.

They discussed their efforts to date in detail. They had completely revamped the performance related pay scheme, so that it was more results oriented – particularly around team results. The PRP system was seen as a remedy for 'habitual overtime' whereby people had been known to turn up every weekend for overtime, whether or not it was needed, because staff built the overtime payments into their pay – mainly to boost it to respectable levels. As Barry said "We are trying to stop habitual overtime – we have people here who just turn up for 3 hours on a Saturday morning – not because there is any work to do, but because they see it as an easy way to make extra money." Since the PRP system had been introduced, there was, according to the managers, now scope to improve their pay levels without the need for overtime, through increasing productivity.

The suggestion that people were expected to work harder to earn more caused a lot of bad feeling amongst the staff, who felt that their previous efforts were being undervalued. However, the management showed graphical evidence to suggest that when they implemented the new system and cracked down on overtime, productivity went up. However, after a few weeks, overtime started creeping back up again, PRP earnings went down and productivity dropped back to original levels. This gave the managers the impression that they were basically dealing with a lazy workforce, who would rather do less in more hours, than hit their targets and go home on time. As Brian noted; "Basically people would rather turn up and do nothing for 3 hours and get paid for it than work harder during normal hours and take home a bonus."

Barry also gave an overview of the structure of the company, which was started 26 yrs ago as a general engineering firm. There was a change of ownership in 1997, when the current MD took over, but there is still a major legacy from the old firm, where staff are reluctant to change to the new ideas of the new management team.

After this discussion, I tried to pull them back onto the theme of the day – which was to work through stage one of the process – identifying business needs and developing the current key business objectives. Using the business needs matrix, the three of us worked through each section in turn – and it was clear that the main priority as far as they were concerned was improving productivity. The main needs under Operational Effectiveness and Customer Satisfaction included resource utilisation and delivery reliability – two things that they both saw as being closely linked and saw the solution as being focused around improved productivity.

The needs identified during this session are summarised below:

Operational Effectiveness:
Resource Utilisation;
Flexibility;
Delivery Reliability;
Casting Quality;
Outsourcing option;
Lead times;
Rationalising products;

Supplier Effectiveness:
Occasional difficulties getting large shafts;
Generally ok pricing / quality

Stakeholder Satisfaction:
Employees: pay / bonuses / overtime;
Shareholders: low or no returns at present;
Creditors: have deferred payments at present;

Customer Satisfaction:
Delivery reliability;
Price;
Rationalise customer base;

Lead time / service / after-sales flexibility.

From these, short term business objectives were developed as follows:
1] Improve resource Utilisation to >70% by 6/01;
2] Improve delivery reliability to 80% by 6/01;
3] Rationalise Products and customers;
4] Performance Appraisal system implemented and explained by 3/01;
5] Reduce overtime by to <5% by 12/01.

Although 4 of the 5 objectives had already been discussed, rationalisation of products and customers had not. I asked why this was necessary and was informed that one of the major problems – certainly in production – was that the company had in excess of 4000 standard patterns for their propellers – and all their products were make-to-order. This meant that set-up times caused havoc in the machine shop, in addition to the fact that they actually have to store all the patterns for each product – some of which are quite sizeable. Production bottlenecks could be reduced, they felt, if there were fewer products, meaning that fewer machine changes would be necessary for each product run.

In the case of customer rationalisation, they cited cases of small customers who use them once a year for small orders – with little used – or even new – patterns required for them. These customers, they claimed, got in the way of them keeping the 'big 4' customers happy (the big four are 4 major luxury powerboat makers, who use the company for large quantities of propellers each year).

The objectives were plotted on the graph – although I already knew which ones would be prioritised as the urgent action objectives. These were resource utilisation and delivery reliability. As these are closely linked, we decided to use both of them together as the starting point of the performance improvement cycle.

We then discussed stage 2 – what we should do next. I explained that in order to drive towards these objectives, we needed to consult the staff and find out where improvements could be made. Barry suggested that as productivity had been rising in three of the production areas, we should concentrate our improvement efforts on the 4th, and biggest area, where productivity had remained low, despite the introduction of the PRP system. Both Barry and Brian felt that it was better to concentrate on one area for the improvements, rather than going to the entire company – which they felt would give somewhat unmanageable amounts of data.

When I asked whether they felt that brainstorming or a survey would be the best means of gaining the required information from the propeller section, Brian stated that it would have to be a survey – as brainstorming required the presence of brains amongst the staff. "Brainstorming? Well forget that for a start – you won't find enough brains around here for that." I thought this was interesting – he was the production manager and he appeared to have an extremely low opinion of his staff. However, despite this general lack of confidence in their staff's abilities, both Barry and Brian conceded that they were essentially ok – there were just a vociferous minority among them who complained constantly about everything.

When I asked how we should design the questionnaire, Barry seemed to have the idea that the employees were only interested in financial rewards, rather than the wellbeing of the company, and that therefore, we should talk about the new bonus scheme and how it could substantially improve their earnings potential as there is no ceiling on how much can be earned through an increase of productivity. He wanted me to rationalise the questionnaire along these lines – pointing out that in this section, they felt that the bonus scheme was not fulfilling its potential – therefore, could they suggest improvements which would help this – and inadvertently also help improve delivery performance etc.

When I asked when this survey should be distributed, Brian suggested that it should be left until after Christmas. This was because he felt staff morale was extremely low at present – due to the fact that the company had cancelled the Christmas bonus for the first time ever this year, which had annoyed staff no end, along with the threat of redundancies just before the shutdown period. "Leave it 'til after the Christmas break. Everyone is pissed off at the moment because we cancelled their turkey vouchers! If we send them out now we'll just get loads of whinging back!" Therefore, he thought that any survey sent out at this time would come back with too much in the way of whinging, rather than any constructive improvement suggestions.

Dec 2000 – Jan 2001

After the meeting, I designed the survey as well as possible – and sent the draft to Barry to finalise and distribute to the staff after the Christmas break. He modified it and sent it out early in January 2001. The final wording was as follows:

Objective: Three of the key objectives of the company are to increase productivity, improve on-time delivery and reduce production lead times. We have already made improvements to the bonus system to reward staff for helping us achieve this objective. We are now seeking suggestions for further improvements that will help the company to increase productivity and provide substantially increased bonus earnings for our staff.

Below is a survey form, which we would ask if you could complete and return to the production director. We would appreciate if you could complete the form by Friday January 12th 2001. If you have any questions please contact either Barry Luke or Brian Morrison.

Although I wasn't really happy about the this, I had no input after I'd sent out the draft – I only saw what had actually gone out when we next met to look through the replies, which was obviously a bit late when it came to changing anything about it.

22/1/01

I arrived for the meeting which had been arranged to go through the survey responses and identify the critical improvement suggestions. Barry and Brian had been discussing the meeting before I arrived and had already had a good look at the responses. They were obviously disappointed with the response rate – and generally the quality of them too. They had 9 responses, out of 40, with 3 incomplete. The most often recorded response was along the lines of improving staff morale / communication across the company, which was mentioned in 5 out of the nine responses.

The low response rate was seen to be caused by a lack of 'buy-in' to the process by the staff involved. Barry had recently seen the results of a quality workshop in the foundry area of the company, which had led to a massive improvement in culture and had helped improve quality. He wanted to try to get the same effect with the propeller shop if possible, and having seen the results of the survey, he thought that it was probably the act of being personally involved and in charge which had made the foundry workshop so successful. He felt that running the workshop had helped to galvanise the foundry workers, improving morale whilst also empowering them to make useful improvements there. Therefore, he offered to arrange a similar type of workshop for the propeller shop, to identify improvements around the prioritised objectives. From my point of view this was testing out the alternative route of collecting improvement suggestions, so I had no problem with the brainstorming approach – although I did note how the terminology made a big difference in perception – originally brainstorming had been cast aside because the managers felt that the staff would be unable to participate fully in the process. Now, under a new name of a performance improvement workshop, they thought that it was bound to work brilliantly.

Barry and Brian discussed who would be the most appropriate people to attend the workshop – they realised that they would have to pick a representative group, who were respected in the team and would also have good ideas. As Barry said "We need people from both shifts...enthusiastic guys – but not just the young ones 'cos the old guys won't listen to them...we'll have to think about this carefully I think" I left them to organise the right people, as they appeared to have the right idea. In addition, to give a bit of continuity in the process, the aim was to get the workshop facilitator from the foundry workshop to run it and have a representative from the foundry attend. This was designed to help ensure that someone could start off with a burst of enthusiasm – just in case it was lacking elsewhere!

25/1/01

A meeting had been arranged to sort out when and where the workshop would take place, and who would run it. Whilst discussing the rationale for the workshop, Barry mentioned that one of the big four companies had just taken 200k of business from them, due to poor delivery performance. This had had the effect of making Barry realise that, at only 50% currently, improving delivery performance really was the top priority. This was interesting as he suddenly stopped talking about productivity improvement as being the top priority – although in effect he still wanted this as the remedy for the delivery performance. The date was set for the workshop for 1 months time 26//2/01. I would be there all day. In the morning I would attend a follow up session for the foundry quality workshop and then in the afternoon I would attend the performance improvement workshop, after a walk around the propeller shop, to give me (and the workshop facilitators) a feel for what was going on.

Early Feb 2001

I found out that my process champion, Barry Luke had been headhunted and had left the company. Unfortunately, he wasn't the best communicator in the business and had failed to tell anyone much, or anything, about the PM process we were working through. Brian Morrison had also failed to say anything about it and had plenty of work to do on the shop floor, since he now had no back up from Barry. Two people

came to the rescue – both TCS Associates (TCS-As) at the Company (TCS Associates are graduates employed by the University, who are funded by the DTI to undertake change projects in SMEs).One TCS-A is involved in improving the quality assurance procedures in the Company, and the other is an IT developer, who had been working with Barry to develop and implement a new Avanté ERP system. The quality TCS-A, Sarah Dransfield, was involved in the original quality workshops and was keen to see further improvements throughout the company. As the IT system had just gone live, Stewart Kelly (the other TCS-A) was happy to get involved in identifying methods of improving and refining the propeller shop to maximise the advantages of Avanté. Therefore, the workshop remained on schedule, with a consultant, Malcolm Quarterman, who had been brought in by one of the company's main investors to help them sort out the business, being brought in as the effective replacement to Barry.

26/2/01
Arrived at the company ready for the follow up session to the foundry workshop. The idea of this was to give me a feel for the way it had worked and the improvements that had come about from it in terms of morale and quality in the foundry.

The discussion focused around some very specific casting issues – they had found various problems with some of the casts and had traced them back to faulty patterns. Generally, this led to lots of blame being shifted to the pattern making shop. Therefore, after lots of discussion, and the inclusion of one of the pattern shop employees being called in to the meeting, they decided to implement a whiteboard communication system. This would monitor suggested modifications / repairs to patterns from the foundry, so that when the pattern shop had slack time, they could easily see what was required.

Lots more discussion about specific problems, then one of the workers pointed out that many of the skilled founders were due for retirement in the next few years and now should be the time to start training replacements, if they are to be trained up in time. There was a general consensus that bringing in older people was a waste of time as they rarely stay for more than a year of two. Therefore, the preferred route was to employ school leavers and give them a proper training programme.

Overall the meeting was positive, with only a few gripes about issues that were effectively out of the hands of the foundry workers, but still affected them. They agreed to continue with 6 weekly meetings to surface any ongoing/ new issues. Interestingly, there was no link to strategic stuff – the only monitoring that was being done for all these improvements was very much ad hoc.

In the afternoon, Stewart and Sarah showed myself and the two facilitators for the afternoon workshop around the propeller shop, to give us an idea of what happened there and where potential difficulties might lie. However, due to the noise levels, it was difficult to query anything in detail. Therefore, apart from illustrating where and how everything happened, this was not able to give us any specific insights into potential problem areas.

We all gathered in the meeting room for the afternoon workshop, with Stewart and Sarah, along with 7 members of the propeller shop and, against the advice of the facilitators, who felt that they would inhibit a frank and honest discussion, both the

consultant, Malcolm Quarterman and Brian Morrison insisted on being present throughout. The Production controller, Rob Madle, was considered the only member of the management team who should be present, as he was generally perceived as being 'one of the workers' as well as part of the management. He introduced the workshop and explained that the theme of the day was to identify how they could improve on-time delivery and productivity. He linked this intro the quality workshop in the Foundry and explained the positive effects it had had there and how he hoped the same could be achieved in the propeller shop. Malcolm Quarterman supplemented this with more of the same and then one of the facilitators, who had recently worked at one of the 'big four' customers explained how important it was, both now and for the future to improve delivery times. He highlighted that the only reason the company got the contracts in the first place was because they were perceived as being flexible and high quality. This meant that to date, they had managed to gain orders without being particularly cheap. However, delivery performance was likely to severely inhibit future orders unless it improved drastically now.

This presentation, although very honest, did not go down particularly well with the people present at the meeting, who commented that the company does not have a standard items catalogue and that it is very difficult to get things out of the door on time when they make to order and many of the standard times for machining propellers are wrong. Comments included: "we make to order – you can't expect prefect delivery because we don't always know how long it will take to machine them" and "All our lead times are wrong because the the standard machining times are all wrong – so we can't get the stuff out of the door on time." This was supplemented by lots of general discussion about the external factors over which they have no control – lots of blame shifting going on even though the point of the initial speech was only to point out why improvements were needed, not to allot blame to the propeller shop workers. It seemed to show that they were very unused to this type of exercise and lived very much in a blame culture. This was almost certainly exacerbated by the involvement of Brian, whose people skills needed a lot to be desired and Malcolm, who was a relatively new face whom no-one had had time to get to know or trust.

The facilitator brought the workshop back on course by suggesting that people write down their ideas for improvements on post it notes, which were distributed around the table. Once people had filled up an enormous number of post it notes, we were asked to spend some time trying to group these under appropriate headings. This took a long time and people were beginning to get rather bored, so whilst some of us stayed behind to finish the categorising process, many of the others went out to have a break. There was a good, friendly atmosphere throughout the categorising process, although Malcolm and Brian did not get actively involved, simply commenting, albeit as a joke, that several of the categories involving employee satisfaction and other cultural issues should be put straight in the bin.

The lead facilitator summarised the categories on a whiteboard, to give people the chance to explain each improvement suggestion in context. This was useful for getting discussion and consensus going about what was actually meant by each category.

Problems and issues in the following categories were identified from this process:

Planning
- workflow in factory
- incorrect information
- scheduling

Inspection and Tweaking
- too much tweaking needed
- correct inspection / inspecting the right things?
- inconsistencies
- patterns not accurate

Machine Layout
- set-ups
- movement of work
- are jobs being completed on the correct machines?

Cranes
- time wasted waiting for cranes to move propellers

Tooling
- jigs and tooling
- can't measure pitch etc in polishing
- set-up accuracy
- tools not available
- planning tool availability
- different fixtures

Morale
- bonus scheme lowering productivity – would prefer a collective bonus
- lack of teamwork between groups
- passing the buck – no responsibility for problems

Training
- multi-skilling needed
- more and better training required
- better management of training issues
- trained instructor to train people - to maintain skill levels and best practice
- need to define best practice working methods – no standardisation at present
- pictures for fettling to show required quality of product

Investment
- bigger tweaker required
- more polishing tools
- old machinery to be replaced by CNC machines

Communication
- between departments
- future plans
- support from sales

Finishing
- XYZ rumble finish
- polishing standards

Casting
- boss length
- casting consistency / quality / hardness / material

Patterns
- finish on castings
- incorrect pattern selection

Quality
- scrap / re-work
- fettling standards & impact upon finished product quality
- over-engineering – not using the correct machine for the job

Environment
- working conditions
- split location – decoy and railway buildings
- car park
- safety procedures

Avanté IT system
- Real time data
- make it more user friendly
- old Archimedes system still used for pitchometers
- incorrect information on the route cards/ pick lists

NGRs (Notification of Goods received)
- rush jobs
- not included in work lists
- not kept in a separate store
- lots of returns

As we were running out of time by this point, the facilitator was keen to get some actions detailed before the end of the session, to ensure that work on the improvements would actually take place. A relatively short discussion revealed that there were essentially three of the categories which people felt deserved the most immediate attention. These were Avanté, Communication and Training.

The primary issue for the Avanté system was to improve the quality of data and planning. This was assigned to Stewart Kelly and Brian Morrison to action. Sarah Dransfield and one of the propeller shop supervisors were given the task of improving the use of the scrap and re-work monitoring forms. This was the key improvement under the communication category. The problem was that the propeller shop often had problems with the castings brought over from the foundry, but because the castings were not bad enough to scrap, the propeller shop would simply spend longer finishing, polishing and tweaking the propeller until it was correct. The idea was to

modify the forms so that people would use them for all re-work purposes, rather than just scrap, as currently they were getting false data from the monitoring sheets. This is an example of how an existing measure was being improved to gather accurate data about the amount of re-work undertaken, which was perceived to be very high, rather than simply scrap – which was always very low. Finally, two enthusiastic people volunteered to develop a new training plan, which could be used to train up people in the propeller shop to 'best practice' standards.

Other improvements identified which were already being addressed were the planning of a separate cell for any returned goods to be re-worked, to eliminate problems with these parts confusing the planning process. Also Brian Morrison was tasked with raising awareness in the foundry of the consequences of poor fettling in terms of the amount of additional machining that can be required in the propeller shop. This would be measured through the new rework sheets as the main point of this activity was to raise fettling standards and thereby reduce the amount of rework done in the propeller shop.

Early March 2001
When going over the notes from the workshop, I found a number of references to the PRP system which I was interested in because this was the main tool Barry had envisaged for improving productivity in the propeller shop. It appeared that it was having a less than satisfactory response from the employees, but for different reasons from those cited by Barry or Brian. This was because team based PRP meant that members of different teams were less likely to help each other out, as any work done in another team was only helping that team's bonus, rather than theirs. Also, there was the distinct feeling that some hard working members of the team were having to support those who were perceived as being lazy, which had managed to cause problems within the teams themselves.

To further clarify the situation, I emailed Stewart Kelly and asked him to fill in the gaps in my knowledge about this system. The email and response were as follows:

Me: I have been writing up my notes from the meetings / workshop and have some referring to the new PRP system. These aren't that clear and I have a few questions about it which you may well be able to answer for me.
1) How did the original system work - was it basically piecework rewards - or what?

SK: It was based on the operation times and what the guys claimed they had booked them as. E.g. most booked that they worked at 125%, i.e. 25% faster than the time on the card.

Me: 2) What was wrong with this approach? Why was it necessary to change it?

SK: It was abused and difficult to check. It also meant people were very selfish in that the difficult jobs that they knew were not achievable within the standard time were ignored.

Me: 3) How does the new system work (I have info that says it is team based rewards - is that right?)

SK: It is based upon the product of a standard bonus payment figure and an efficiency fraction. The efficiency fraction is the number of standard hours completed within a department over the number of clocked (attended) hours.

Me: 4) What was this supposed to achieve?

SK: By counting the standard hours completed by a department (e.g. all the propeller functions) and dividing it by the clocked hours, it was supposed to improve teamwork through a process chain.

Me: 5) I seem to remember you saying it had been put on hold -why was this?

SK: To count the standard hours you need two pieces of information, firstly what products had been despatched in a period and secondly how long each product should have taken to manufacture (the standard hours). With the new Avanté system came new standard times for jobs. This meant we had 3 sets of standards times for any job, those used on the bonus, those on Avanté (that were supposed to be equal to the bonus times) and the old Archimedes (predecessor to Avanté) times. When the new Avanté route cards appeared there was some concern as to the validity of the standard times on each job. People compared the old and new job cards and had proof in black and white that the times had been altered. Of most concern to the shop floor was that a lot of jobs had time removed from them. Then people started questioning the bonus times. They were assured that there bonus would not alter due to the new times on the Avanté route cards as the bonus times had not changed from before the introduction of Avanté. Anyway the shop realised that they had no way of validating the bonus calculation, as they had never seen the standard times we used to calculate the bonus. We now have 3 times for each operation, but no one is willing to say which times are correct and so on. Also, obtaining a list of despatched items from Avanté was difficult. We are now reviewing the bonus times used.

I then arranged to see Stewart and Sarah, to try to develop a useful measure connected with improving the Avanté system, as it appeared that this was preventing the PRP system working properly, along with causing planning difficulties.

19/3/01

Met as arranged with Stewart and Sarah, with the option of bringing in Malcolm or Brian Morrison if this was necessary. After some discussion of the points raised concerning the Avanté system from the workshop, we managed to pin down a key improvement measure in the form of measuring the consistency of production loading.

The purpose of this would be to ensure that machines were being used to capacity. This could be achieved by modifying the work centre dispatch report to include a column which recorded the actual date each part reached the machine and another to record when the work was completed. This would enable the production plan to become more accurate, and the times for each job to be updated. If jobs were received late, this would highlight a problem further down the production process, which could be investigated and eliminated. If the jobs arrived on time but left late, the reasons for this could be investigated and eliminated – i.e. if the standard times were wrong they could be modified, if the machine had an poorly trained operator they could receive

extra training etc. All this data could then be fed into the Avanté system shop floor model to make it more accurate, thereby improving the planning process and rectifying some of the underlying problems with the PRP system.

Measure	Consistency of production loading (level production plan)
Purpose	to ensure resources are used to full capacity
Relates to	Improve delivery performance
Target	100% compliance to production plan
Formula	No jobs available on time / No jobs completed on time
Frequency	Weekly
Who Measures	Propeller Shop Superintendent
Source of Data	Work centre dispatch report
Who Acts on the Data	Stewart Kelly
What do they do	Use data to refine Avanté system shop floor model
Notes / Comments	

23/5/01

Having not been in contact with anyone from the company for a couple of months, I decided to find out what had been happening in my absence and rang Stewart, Sarah and Malcolm. Stewart, typically, was unavailable and asked me to contact him by email instead. Therefore I put together a number of questions asking him what progress had been made, which he did answer, albeit in a rather short and to the point way. I got the impression that Stewart had lost interest in the process entirely, being bogged down in computer system implementation work which was taking up all his time. He was never the ideal person to run the process, but as the original champion had left, I was grateful for any support that we could get to help the process along smoothly. However, his attitude now appeared to be more along the lines of 'leave me alone – I have more important things to do here than this.'

Despite this, he had used the measure we had designed on an 'as and when appropriate' basis, to ensure that the work centre loading on the Avanté system matched the actual capacity of the work centre. The reason why this was not done permanently was due to the time to regularly maintain it. However, the measurement data was giving them a better idea of whether they had the correct shop-floor loading for each machine, which would, he said, reflect in the on-time delivery eventually as it would prevent the overloading of the shop floor, thereby increasing efficiency.

When asked about further improvements which might have been implemented since I left, he simply stated "make the products on time, quote a realistic lead time, stock more materials..." which made the point that there are many areas in the company which need improvement but, from previous conversations with Stewart, he is disillusioned about the amount of top management support and buy-in to change initiatives. Therefore, this appeared to be his top three whinge list of things that he has pointed out need doing but no one has bothered to actually change. He also claimed that the process would not be used again due to the "time and effort, struggling to implement other initiatives" along with the fact that he found the process "time consuming to start" and with too much "commitment to the long term".

When I spoke to Sarah I was lucky to find that she was still very interested in the concept of improvement and measurement – although, considering her job as the quality guru within the company this was hardly surprising. I asked her about the scrap and re-work sheets she had redesigned to establish the accurate reporting of re-work within the company. It had taken a long time to get the new forms developed and into use, so they had currently had only a few responses. However, Sarah was encouraged that they were beginning to be used properly and were beginning to highlight the extent of the re-work problem. Until these sheets had been re-designed, no-one had any concrete data that showed the delays re-work was causing throughout the company. Although people thought that there had been a problem, this was just a 'gut feel' which had been difficult to persuade management to believe. Now that forms were beginning to come in, management were beginning to see the extent of the problem, particularly when shop floor workers commented that a form could potentially be filled in for every other propeller that came through.

When I asked how the forms were used, she told me that it is still down to the operators to complete the form – so there is a push on to get them to see the value in doing so. Then Sarah enters the data onto a database and once a month, a report will be run off and the biggest cause of re-work for the month will be the focus for improvements.

In addition to the monitoring of re-work, Sarah also explained that although at the time the workshop had appeared to be problematic, with people feeling intimidated by the presence of so many managers and not really getting as much out of it as they should, there had been several positive things which appeared to have come out of it. The most tangible of these was that the people who had volunteered to put together a training programme for the machining and finishing of propellers had done so and started to implement it already. The programme is 12 months long and covers all aspects of the propeller shop, to ensure that everyone knows how to do every job effectively. This should also help cut down re-work and prevent machines being left idle if their normal operator is unavailable. However, more importantly from my point of view, Sarah seemed to think that the workshop had helped to stimulate improved morale within the propeller shop. This was, she admitted, difficult to attribute directly, but she did comment that although morale appears to be increasing, sadly the order book was not and the company as a whole were actually having to work harder than ever to remain solvent. Finally, although she admitted having to nag constantly to achieve this, a kanban system had been implemented for high quantity, low value work, which has improved work availability on the shop floor.

Interestingly, although Stewart had claimed that the number one priority at present was simply to try to make a profit, Sarah still felt that delivery performance was top, as did Malcolm, when I spoke to him. They had split delivery in two, so that the 'big 4' customers were prioritised and monitored effectively "The big 4 – well big 3¼ really at the moment – are being measured and prioritised.". Unfortunately, as she noted, most of the work from the big 4 is very low margin, so they are unlikely to get into a profit making position unless they keep their other, lower value but higher profit customers happy as well. When I asked Malcolm about this, he said that the bulk of our trade still comes from the big 4 – we have to keep them happy to stay in business". Therefore they are currently working to partition the propeller shop into 2,

with 60% capacity going to the big 4 and 40% to other customers. They have already begun to publish separate statistics for these areas, with the big 4 enjoying a 96-100% on time delivery, but the others still languishing at around 50%. Although delivery was already being monitored before the company began the process, it is only since we worked through it that they have started to publish the data on notice boards, which has now been occurring for about three months.

When I asked about whether they had used the process again, both Malcolm and Sarah agreed with Stewart in that they hadn't, as such, but they did give much more detail as to why. As it turned out, they hadn't actually run through the process as a whole again, but they had run three more workshops and had a further 2 planned – as she put it " the workshops have really become the focus for improvement – focusing on quality". In addition, they had held one review meeting and had planned another. Therefore, they were effectively still running through the first cycle of the process and incrementally introducing the idea of identifying improvements to increase on-time delivery to other areas of the company. However, whilst they were keenly identifying strategically oriented improvements through these workshops, the use of performance measures to help drive this forward has been less emphatic. Improvements included the aforementioned implementation of a kanban system, the setting up of procedures for each process, to standardise the way propellers are cast, machined and finished – to improve quality and reduce re-work and the identification of the need for version control on the drawings, which were currently not being updated fast enough after delays. However, from these, the only measurement that was developed was monitoring the use of the kanban system, although it hasn't yet shown any verifiable improvement in stock control.

Despite this, according to Malcolm, the focus on improving delivery performance has certainly made a difference, if only to the big 4 at presence. Although the company are unlikely to run rigidly through the process again, it appears that the core concept of aligning improvements with current strategic priorities and using performance measures to help this (albeit in a relatively small way) has been taken onboard by the company. In addition, the process has helped improve communication at least between middle managers and the shop floor workers in a number of different areas. This could well, it seems, have helped improve morale and has certainly helped increase the staff's perception that managers do occasionally listen and act on their advice.

28/6/01

Finally received the PM info on delivery performance from Malcolm, which I had requested at the last discussion (see attached sheets – the customer names have been changed to Companies W, X,Y and Z, to preserve confidentiality).

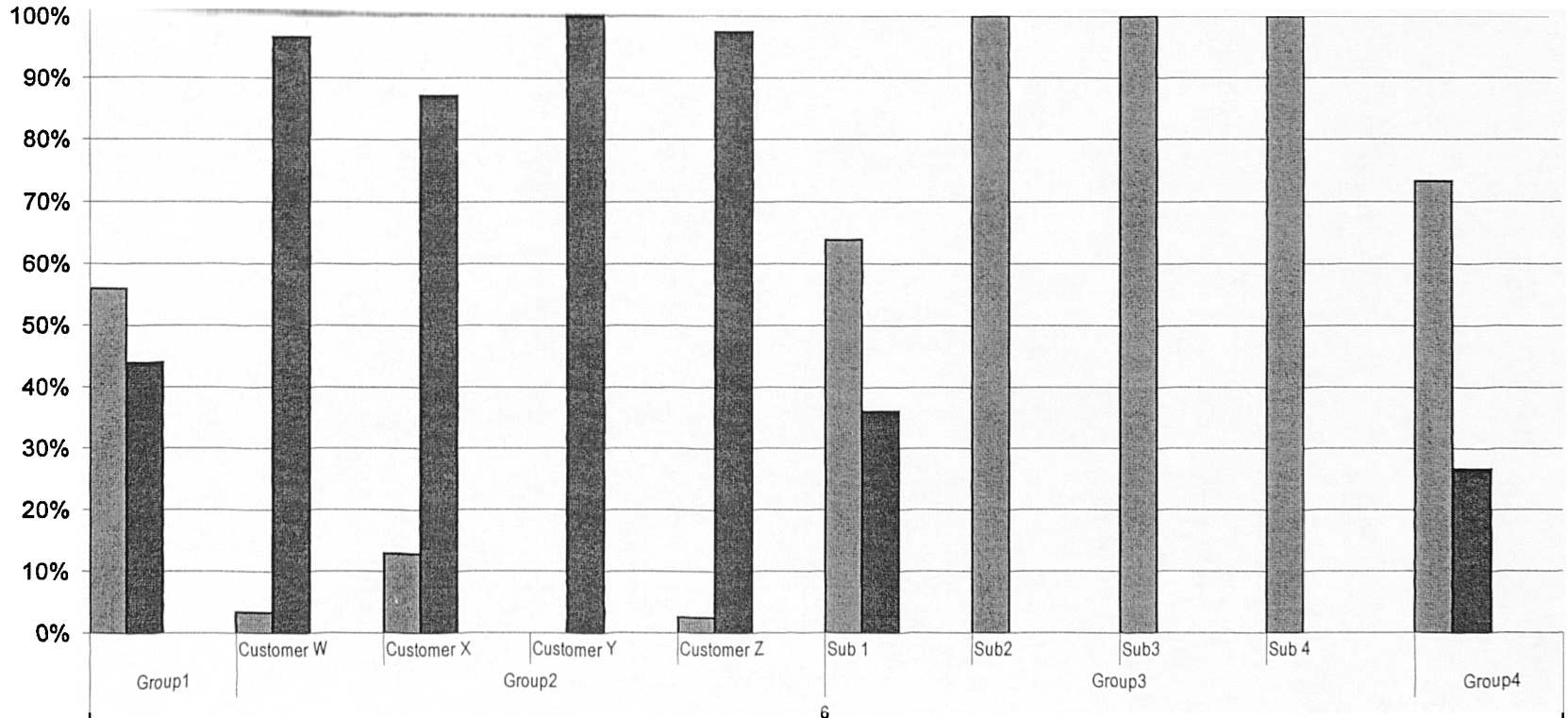
This prompted me to call Sarah to see if she had had any luck implementing the re-work sheets – and if so, what she had done with the data. I chatted to her for some time and she updated me on what was happening in the Company. Since our last conversation, the old MD had been sacked – by the financiers who were then the only thing stopping the Company from going bankrupt. They replaced him with a so-called emergency MD, who has had success turning around other failing companies in the past.

I was quite shocked by this information – although I knew the Company were going through troubled times, I had not realised the extent of their financial problems. Apparently, since the new MD had arrived, Malcolm had been extremely busy, trying to sort out the operations side of the business – which was why it had taken more than a month to get the PM info to me. Sarah felt that the change of management must be a good thing, as previously, she had been disheartened by the lack of management buy-in to any of the improvement initiatives she had tried to start. It seemed that she was quietly optimistic about her future role – although her response remained guarded as she did not want to have her hopes dashed yet again.

When we finally got around to talking about her re-work measurement, her despondency returned. She had issued the sheets 6 weeks previously, and had had only limited responses – virtually all coming from one person. This indicated that other people were simply not completing the forms, rather than that there were no problems to report over that time period. As she pointed out, shop floor workers are unused to filling in forms and therefore attempts to make them do so now were being met with resistance, which sadly, the shop floor managers were unable – or, she thought more likely, unwilling, to do anything about. She sent me her spreadsheet, which had collated the data from the sheets she had received, but until the shop floor workers could be persuaded that they should complete them accurately, she felt that it could only be of limited use. (see attached for the re-work spreadsheet and defect codes chart).

From the evidence provided by both Sarah and Malcolm, it appears that Company K have many hurdles to overcome before they are likely to be in a competitive position once more. Although delivery performance has improved, it is entirely possible that this has been achieved more through a reduction of orders from the big 4 customers, than from any particular improvements they have undertaken (Customer Y, for example only had 3 shipments during the period illustrated). The ongoing cultural battle seems to be to drive home the need for change throughout the Company – at all levels. It is the challenge of the new MD to try to achieve this. If he succeeds, he might just save Company K from its self-induced decline.

On Time Delivery Performance (See below for Period)



6

2001

Delivery Performance - Late	56%	3%	13%	0%	3%	64%	100%	100%	100%	73%
Delivery Performance - On Time	44%	97%	87%	100%	97%	36%	0%	0%	0%	27%
No. of Shipments - Late	28	4	13		2	23	5	4	4	11
No. of Shipments - On Time	22	115	88	3	77	13				4

Scrap & Re-work Reports

Works Order No	Sales Order No	Date	Code No	Size in "	Description	Pattern No	Quantity	Operation No	Defect 1	Defect 2	Defect 3	Defect 4	Action Taken	Reported By	Person Responsible	No Minutes Lost
7329	80508	25-Apr-01	PPL12807	32 X 42 X 5	AQUAFOIL 92	9113	1	40	206					John Backway		0
7328	80508	25-Apr-01	PPR12807	32X42X5	AQUAFOIL 92	9114	1	40	205					John Backway		0
7105	80363	27-Apr-01	PP12859	2000 X 2235 X 4	KAPLAN LH	9319	1	170	405					Darren Endacott		0
8231	80788	11-May-01	PDR27212H	27X 21 X 3	AQUAPOISE 55	3074	1	170	405					Darren Endacott		0
7979	80705	04-May-01	PPR12660	32 X 48 X 5	AQUAFOIL	8780	1	160	405					Stuart Bryant		0
7886	80655	15-May-01	PP9731	680 X 1006 X 5	CUSTOM 130	8595	2	160	505					Darren Endacott		0
9241	80952	16-May-01	PPL12958	26 x 30.5 x 4	CUPPED FOIL	9160	1	160	106	405				Darren Endacott		0
9046	81053	23-May-01	PPL12697	25 x 27 x 4	AQUACUP	3716	1	160	205					Darren endacott		0
9071	81032	23-May-01	PPL12964	1810 x 2080 x 4	NOZZLE LH	9341	1	160	205					Darren Endacott		0
10159	81404	27-Jun-01	PPR11085	700x470x3	Tractor	2954	1	170	106	405				Darren Endacott		0
10019	70897	27-Jun-01	PEL2522GA	25x22x3	Aquapoise 65	990	1	170	209					Darren Endacott		0
8492	80872	05-Jun-01	PPR12499	21x25x4	Aquacup 87	8703	1	160	205					Darren Endacott		0
10020	70897	27-Jun-01	PER2522GA	25x22x3	Aquapoise 65	991	1	170	209					Darren Endacott		0
9203	81089	09-Jun-01	PP12573	32.5x43x5	Aquafoil 92	3688	1	160	102	401				Darren Endacott		0
9202	81089	09-Jun-01	PP12573	32.5x43x5	Aquafoil 92	3689	1	160	102	401				Darren Endacott		0

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Scrap	No Minutes for rework	Authorised/Accepted after rework	Date Authorised/accepted	Database entry by	Database date	*Notes*
FALSE	15			Sarah Dransfield	25-Apr-01	
FALSE	0			Sarah Dransfield	25-Apr-01	need to tie up with weld Shop report
FALSE	0			Sarah Dransfield	15-May-01	need to tie up with weld shop report
FALSE	60			Sarah Dransfield	15-May-01	extra tweaking
FALSE	120			Sarah Dransfield	15-May-01	
FALSE	0			Sarah Dransfield	30-May-01	60 minutes marking up blade thickness before incorrect drawing noticed
FALSE	300			Sarah Dransfield	30-May-01	300 minutes taken to tweak to M tolerances
FALSE	0			Sarah Dransfield	30-May-01	weld trailing edge - need to tie up with weld Shop report
FALSE	0			Sarah Dransfield	30-May-01	need to tie up with Weld Shop report
FALSE	150			Sarah Dransfield	28-Jun-01	found to be 565 pitch
FALSE	0	Bill Thomson	27-Jun-01	Sarah Dransfield	28-Jun-01	incorrect material used HTB1 instead of AB2- incorrectly marked on pick list - authorised to go by BT
FALSE	0			Sarah Dransfield	28-Jun-01	section of boss missing sent to weld shop - need to tie in weld report
FALSE	0	Bill Thomson	27-Jun-01	Sarah Dransfield	28-Jun-01	incorrect material used HTB1 instead of AB2- incorrectly marked on pick list - authorised to go by BT
FALSE	300			Sarah Dransfield	28-Jun-01	edge thickness T/E L/E + tip 0.360" all blades - extra work for polishing
FALSE	300			Sarah Dransfield	28-Jun-01	edge thickness T/E L/E + tip 0.360" all blades - extra work for polishing

Defect Code Table		
Code	Area	Defect
101	Pattern	Propeller Style
102	Pattern	Blade Thickness
103	Pattern	Boss Dimensions
104	Pattern	Rake
105	Pattern	Handing
106	Pattern	Pitch
201	Casting	Porosity
202	Casting	Inclusions
203	Casting	Shrinkage
204	Casting	Cold Shut
205	Casting	Short Run
206	Casting	Surface Finish
207	Casting	Chilled
208	Casting	Fettling Error
209	Casting	Wrong Material
301	Machining	Wrong Bore
302	Machining	Wrong Taper
303	Machining	Wrong Boss Length
304	Machining	Wrong Key Depth
305	Machining	Key Fillet Radius
306	Machining	Extraction Holes
307	Machining	PCD
308	Machining	Thread
309	Machining	Tips Eccentric
401	Finishing	Edge Thickness
402	Finishing	Edge Radi
403	Finishing	Surface Finish
404	Finishing	Boss Roundness
405	Finishing	Pitch Errors
406	Finishing	Diameter
501	Misc	Pattern Style
502	Misc	Dimensions
503	Misc	Drawing Errors
504	Misc	Design Defect
505	Misc	Wrong Drawing

Company L Case Study

Company L are based in Plymouth, employing around 100 staff. They manufacture a range of lubrication systems for plant vehicles and trucks which can considerably extend the life of the bearings. These autolube systems are usually retrofitted to the vehicles, through a centrally co-ordinated, franchise distribution network. This network also carries out maintenance and repairs to the systems. The standard product range is made up of a number of multi-line lubrication systems, but to remain competitive, the company have been investigating the development of single line systems, which are more popular and can be fitted to a greater number of vehicles.

Jan – Feb 2001
Established contact with Mike Cusack, the new MD for the company. The company had been contacted by the University about a range of possible mutually beneficial partnership opportunities. The company had already had a meeting with a colleague to discuss the areas for possible projects. MC had identified two main areas; new product development and improvements to their business processes. I was referred to them to help with the latter project, as the company had been shown the PM process workbook and had thought that this would be a good way of achieving the required improvements.

1/3/01
Met up with MC to explain what I could do and to ensure that this company was in fact a SME, using my own definition of this term. Mike was very pleasant and related the history of the company to me. It had started out as an independent SME and had been taken over by a large German firm for many years, until they had sold it to a management buy-out in August 2000. The firm now had 5 years to bring the company on to secure future investment. I was given a copy of the business plan to read, which had been put together in a series of 2 afternoon workshops involving all the directors. Although the plan was well thought out and highlighted all the areas which desperately needed improvements, I had some doubts about how practical it would be to implement. However, from my point of view, I picked up on several key objectives which I felt were important and just the sort of thing the PM process was designed to tackle. These were 'delivery performance improved', 'significant improvements in manufacturing productivity and responsiveness,' 'aggressive cost reductions,' 'improved production planning' and 'inventory reduction'. Having discussed these with Mike, I explained that these sort of objectives had been the focus of the other cases I had undertaken, and had produced some useful results. I then explained how I could lead the company through the process and what sort of involvement would be required on both mine and the company's behalf. Mike seemed enthusiastic, but told me that he would not be running the process. He would delegate this responsibility to Dave Richardson, the Manufacturing Director. He also said that the go ahead was reliant on Dave's support for the project. As he pointed out, since the management buyout, the company had started a number of initiatives to try to start improvements, but most had ground to a halt before they had got going. Therefore, he thought it would look poor if he authorised yet another improvement initiative which proceeded to fall flat. I left with an assurance that he would speak to Dave and try to persuade him that this might work where the other initiatives failed. I didn't know how much of this was a fob-off, but thanked him and hoped for the best.

16/3/01
Had an unexpected phone call at work from Dave Richardson, the Manufacturing Director, who had been assigned the role of 'project champion' by MC. He informed me that he had been speaking to Mike and thought that we should meet up to discuss the project in more detail, so he could be confident about what was going to happen. We arranged to meet the following week, hopefully with a couple of other managers who would almost certainly be involved if we went ahead with the process.

22/3/01
Met up with DR, eventually. Unfortunately my car broke down on the way out there – but having got someone from my office to call and apologise for my lateness, Dave was very supportive and simply sent his best wishes that I get my car back on the road and that he would be very pleased to still see me if I managed to get there this afternoon. I took this as a good sign – it seemed like he actually wanted to see me rather than only doing so grudgingly, in which case I would have expected him to say that he was busy for the rest of the afternoon and I should make an appointment for some other time.

When I finally got to the company – an hour later than scheduled, I found that Dave was the only person available - the other two managers he wanted to get involved were out of the company, one who had been commandeered at the last minute to go to a conference in Birmingham and the other who was off on a study day. Therefore I explained to Dave what I could do – he wanted to know how much involvement was required on my part and his. I wasn't sure whether he wanted me to get involved by going native in the company for a bit, as he did ask about this. I simply said that I could do whatever he felt would be the most beneficial – but in the other trials I had generally come in and led the meetings, but hadn't actually worked full time in the company. From my point of view, I think working full time would probably reduce the commitment for the process in other managers – therefore if ongoing benefits were to be obtained, it would be better to make sure they were thoroughly involved from the start. However, as I didn't want to put him off, and also because it might be useful +/or necessary to take a more actively involved role at some point, I didn't say this.

Dave had obviously read and largely understood the workbook, as he described what he felt could happen using the process, and it was pretty close to the mark. This I took as a good sign- he was interested enough to have got his head around the process- albeit not a difficult task, but he'd also thought about how it could be applied in his company. Unfortunately, as has happened in the past, he already had in mind which objective he wanted to work on. I think this is always problematic but is probably less so the more people you get involved in identifying them, as this reduces the personal bias of each manager. Anyway, his problem baby was essentially late orders – aggregated monthly into cash value. I think this is more a cash flow monitoring issue than actually trying to monitor delivery performance from a customer point of view, but I guess it will be discussed in greater detail later on. I didn't want him to get too hung up on the specific objective we were going to tackle as this was only going to cause problems, so I arranged to meet him and the other managers a week later to start the process properly then.

27/3/01

Met up with the project team: DR, Steve Downing (Manufacturing Controller), Peter Wildman (Logistics Controller). I explained what I wanted to do and briefed those who I hadn't already met on the process. They seemed reasonably happy with what I planned to do, which was good. I asked them to start thinking about possible objectives, using the dimensions of performance matrix to help. They started having a lively discussion about the operational elements and quickly linked this together with customer satisfaction. The main point was the need to get goods out of the door on time. This appears to be a problem for every company in the world!!! They pointed out that they currently offer a 3-4 week lead time across the board. This causes problems on several fronts because unless there are enough stocks of components to make the orders, the lead times will almost certainly be wrong, due to the length of time required to get the parts in.

The Logistics controller explained that many of the components they buy in require modifications for certain products. These modifications are carried out in a company in Wales or Exeter. He did say that this was not a problem, as both companies were able to offer a 24hr courier service – but it all adds up and increases the likelihood of the lead time being too short. The company deals with somewhere around 15,000 components in total, at a cost of around £800,000. This is split between some 180 suppliers. The only real issue here was that many of their suppliers have difficulties with flexibility. They are only able to supply to order with standard lead times – which for some components, can be as long as 8 weeks. Therefore, if an order comes in and the company do not have the required number of components, but need to order a new batch from their suppliers, the lead time quoted is easily doubled.

As time was drawing on, I tried to focus the conversation around completing the Business Needs Analysis chart, to get some specific needs and objectives written down on paper. Starting with Operational Effectiveness, I gathered details of the perceived needs in each area. They explained that they currently only run at around 50% efficiency – calculated by dividing the sales output by the clocked hours. This had led them to believe that they had a capacity problem. However, they were unsure whether this was due to lack of staff or machines. Another difficulty was volume flexibility. Orders were regularly received for very small quantities of products, which meant that, due to otherwise prohibitive set-up times, they would have to do a batch run of maybe hundreds of the products – which then increased their inventory problems. In addition, there was the lead time problem already discussed, which they desperately needed to improve.

Customers perceived that the company had poor delivery reliability, which was linked back to the fact that the wrong lead times were quoted to them. This had a knock-on effect on morale, as employees constantly felt as though they were performing badly because of the difficulties getting the goods out of the door on time.

Having collected a useful number of the most important business needs, we set about turning them into useable business objectives, bearing in mind the company's overall strategy, which was to grow and develop new markets, so that in 5 years time, enough investment could be secured to keep the company trading successfully. The objectives developed were as follows:

- Improve on time delivery
- Improve overall efficiency
- Sort out lead times
- Increase volume flexibility
- Increase capacity

The use of the prioritisation matrix was unnecessary at this point, because everyone agreed that delivery performance was the key issue. The rationale for this is that this objective has a knock-on effect on all the others – i.e. to deliver products on time, capacity, efficiency, flexibility and lead times are all important. Additionally, there were considered to be greater effects on improving customer satisfaction and staff morale from improving delivery performance, rather than simply focusing on one of the purely operational objectives.

Having decided to focus on delivery performance improvement, I changed the usual format somewhat, because they were unaware of what delivery performance actually was. They already measured the cash value of open orders at the end of each month – which was considered to be quite high, but had no way of being able to tell whether this deficit came from one large order or 15 smaller ones. Therefore, we decided that, to establish a benchmark for improvements, we would immediately design a useful performance measure to monitor actual delivery performance, by orders. After a lot of discussion about the best way of achieving this, the following measure was developed.

Key strategic Objective: ***Improve On-Time Delivery***

Preliminary Performance Measure

Measure	Delivery Performance
Purpose	Gain a clear understanding of current delivery performance.
Relates to	Improving On Time Delivery
Target	This will be decided when a clear picture of the current situation is gained.
Formula	Actual deliveries per day / total promised deliveries per day
Frequency	Daily monitoring
Who Measures	Customer Service team
Source of Data	IT Department
Who Acts on the Data	Continuous Strategic Improvement Team
What do they do	(initially) establish a baseline for delivery performance, which improvements can be measured against.
Notes Comments	Need to inform Customer Services and IT dept, to enable data collection system to be set up.

I then met Mike Boyd (Financial Director) and Terry Brigstock (Sales Director). The reason for this was to make sure that they knew what we were doing and why, and to discuss the possibility of getting the data to start using the measure. This we were assured was eminently possible and the data was almost certainly already collected in some form- therefore all we had to do was track it down and make sure it was available in a format that was easily understandable. I agreed to type up the draft measure and forward it to Steve ASAP. Dave and Steve agreed to chase up the

necessary data during the week and we agreed another meeting the following week to check on progress and maybe update the measure if enough back-data had been found to give a good benchmark figure of delivery performance.

3/4/01

Met with DR, Mike Boyd, PW and SD, to discuss the progress on the measure we developed last week. The first thing that came to light was the fact that Mike Boyd had been slightly inaccurate in saying that the data was there already. In fact, it wasn't. I think this had annoyed Dave a little, as he decided to experiment with the use of a tape recorder in this session, so that, as he put it, "people can be reminded of what they did and didn't say when they are arguing about it at a later date." Anyway, after several false attempts at getting the appropriate data, Dave and Steve had managed to track down a database which could print out all the orders for a specified period which gave the promised ship date against the actual ship date, along with the order value. The database could sort out those orders that were early, those that were late and those on time, but currently had no function to aggregate those figures to provide easily accessible data. Therefore, Dave had physically gone through a print out for one period and counted them, showing that of 1002 orders for the period, 414 were shipped late, 426 were shipped early and only 162 went out of the door on time. This means that the current delivery date performance stands at 59% if early shipments are classified as acceptable, and only 16% if not. I argued that shipping goods early is probably as bad as shipping them late, but everyone else in the room assured me that their customers are happy to receive goods early, but it is the lateness that is unacceptable. Therefore, we decided that only after late deliveries had been sorted out, would we focus attention on the early orders. My personal belief is that there is a high probability that cutting down late shipments will eliminate early shipments anyway, as tighter scheduling will be in place, however, we shall see.

Mike went off on a management accounting trip which involved making some entirely pointless and extremely complicated graphs from the data, which appeared to tell no one anything interesting apart from him. They were something to do with monitoring the time variance from standard rate of fulfilling orders – and as everyone pointed out to him, as they are a make to order company, this was unlikely to ever be useful, particularly as there has never been a 'standard' work rate. My feeling was very much that working to get the orders out of the door on time was the key for the time being – when they could achieve this, then might be the time to start thinking about accurately monitoring capacity. Doing both will almost certainly confuse the issue – especially when they already think that there are bottleneck problems to deal with. One more problem with this was the implication that the company should be moving away from make-to-order and instead maximising efficiency and capacity and making to stock. However, as PW pointed out, the variation in their product line made this almost impossible. To prove this, he produced his demand forecast for the required components for a period. The high variety and combination of components meant that the forecasts were necessarily set to the lowest scale, in order to keep their inventory levels low. This in turn caused problems when an unexpectedly large order arrived – particularly if it was a slightly less common product.

After all this discussion, we were all happy that we had been able to find a data source which could provide the information...eventually. We arranged another meeting for two weeks time because this would give Steve time to arrange for the data to be made

available in a more appropriate form, which would give us the key measure for benchmarking and monitoring improvements from.

20/4/01
Turned up at the company, only to find that I had either got the date wrong, or the meeting had been re-arranged in my absence and I had turned up several weeks too early. Having been informed that the actual date of the next meeting was 11th May, I left them to it.

11/5/01
Arrived in work to find a panicked note from DR telling me not to come out to the company, today, as they were having a bit of a trauma which needed everyone's urgent attention. I then received an email rescheduling the meeting for the following Friday.

18/5/01
Arrived and met finally with Steve, Dave and Peter. On the plus side, they had collected quite a bit of data in the time between this meeting and the last. On the down side, everyone was extremely depressed and miserable because they currently had a falling order book and had had to lay off 17 employees the previous week – hence why our meeting had been cancelled. Unfortunately, this really overshadowed the meeting and hampered progress somewhat as a result. When I suggested that the best way of getting people to agree to changes that they might not like if they were simply imposed on them was to talk to them and get them to suggest their own method of improvement, I was told "we've already tried that" "the problem is that the men left down there now are all going to be retiring in less than 5 years so they don't give a shit about whether the company survives or goes to the wall." I soon surmised that the reason for these people still being there was only because the company could not afford to make them redundant. Hence the more pro-active and useful members of staff, who had been there the least time, were the ones to be made redundant instead.

The irony of this is that one of the people who was laid off was a shift supervisor, who had used his own initiative to start trying to track machine efficiency as he was fairly sure that it was low. The two days worth of data he managed to collect before he was laid off showed that this was indeed the case and at the meeting we decided to continue and expand this monitoring, to see if we could collect enough data to identify any patterns developing which might help indicate where the problems lie here. The reason for measuring this was that both Dave and Steve thought that delivery performance was being adversely affected by the length of time taken to set each machine, along with the fact that they see, whenever they walk around the shop floor, a number of machines lying idle for no apparent reason. Part of this, according to Dave was the fact that people split batches, thereby doubling the set up time, to enable urgent orders to be processed. Steve and Dave had a row about this as Steve claimed that this no longer happened and Dave refused to believe him.

An additional issue that was highlighted was that the delivery performance data from the previous period appeared, on first inspection, to show that it was so called front loaded orders which were causing delivery problems. This happens when a customer rings up and nags the salespeople for long enough to get them to agree a much shorter lead time than the standard 21 days. These orders are then prioritised because they

appear to be late, which screws the schedule for all the other correctly scheduled orders. However, once again it appeared that there are almost as many orders going out early as late, showing that their standard lead time is anything but accurate for the majority of their products.

A summary of the actions of the meeting was then put together:

Performance Measurement:
- Continue monitoring on-time delivery;
- Monitor no. of actual arrears every Monday to give a snapshot of the number of arrears carried over from the previous week (This is in addition to the chase lists, which Peter and Steve currently use to monitor arrears along with soon-to-be-needed items.) The arrears should just be a number, no specific details are required (Steve Downing and Peter Wildman).
- Expand machine efficiency monitoring sheets to CNC areas and continue monitoring in auto shop to give an idea of which machines are causing problems(Steve Downing)

Improvements:
- Run full batch sizes to improve machine efficiency and reduce set-up times (Steve Downing)
- Analyse delivery performance data to see whether it improves if all orders with less than 21 day lead time are taken out (Peter Wildman).

I suggested that, if the outcome of the analysis of the delivery performance data shows that it is primarily orders with less than the minimum lead time which are late, we should use the next meeting to brainstorm ideas to look at
a] reducing lead times across the company,
b] changing the sales method in use so that at least small orders cannot be booked in for less than the standard lead time and
c] looking at re-organising the scheduling to offset some of the orders which are currently delivered early against those that are late, to even up and hopefully get the majority of orders going out on time.

We then scheduled the next meeting for two weeks time and closed the meeting. Hopefully, next time people will be feeling more positive about everything and we'll be able to really tackle some of the hard issues. I might even ask if I can go have a chat to some of the "I don't give a shit" shop floor workers, to get a first hand impression of their intransigence and maybe even persuade them that it is worth their while to get involved even if they are up for retirement in the near future!

1/6/01
Met once again with Dave, Steve and Peter. Peter had looked into trying to work out whether it was mainly front-loaded orders which were late. He had done this by looking only at the order date, rather than the delivery promise date and looking to see how many were more than 21 days late from the date of the order being received. Sadly, the figures did not show that front loading accounted for many of the late orders. In fact, it accounted for just 8% of the total number of late orders and was therefore almost certainly not the biggest problem.

Therefore, we revisited the monthly delivery performance charts and, after some discussion, decided that maybe if there was no obvious link between delivery performance and shortened lead times, there might be one to be found between the delivery performance and the type of product being produced. The discussion moved towards the thought that perhaps late orders were those which used non-forecasted items rather than those which were entirely made up of forecasted items. The rationale for this was that all standard items are forecasted, meaning that the materials should be in stock ready for an order when it comes in. Therefore, there is no excuse for products made entirely of forecasted items being late, particularly now that the shop floor were running full batch sizes. However, non-forecasted items might well force late delivery due to the variety of parts that might be needed (prohibiting the keeping of safety stocks) and the fact that on many of them there are long lead times which can greatly increase the 3 weeks lead time.

Peter was therefore directed to go away and have another look at the data to see whether there was any correlation between forecasted and non-forecasted items and delivery performance.

After this, Steve briefed us on the machine efficiency project. He had designed 'time cards' to gather the information, which he would then input into the computer each week. The cards were not yet in use as he was waiting for them to come back form the printers. He thought that there was a good chance they would be in use by the next meeting, which we arranged for the following Friday.

8/6/01

Met up again and saw the new time cards, which had been distributed that week amongst the machine shop staff (see diagram).

Company L Time Card

Date: **Shift:**	**Setter:**
Machine No:	**Component No:**
Production Time:	**Setting Time:**
Tooling Time:	**Maintenance Time:**
Waiting Time:	**Other (specify):**
Allowed Time:	**QUANTITY PRODUCED**
Actual Cycle Time:	
Comments on reverse please:	

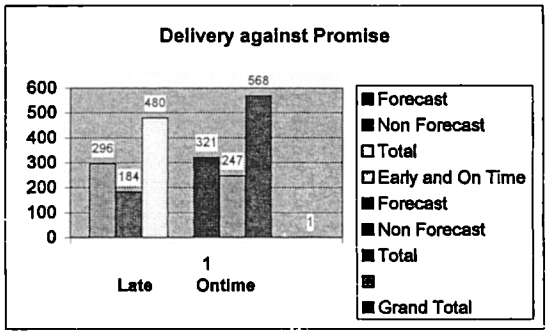
As it had only just been distributed, there was no feedback or data from it yet, but Steve hoped that it would shortly be forthcoming.

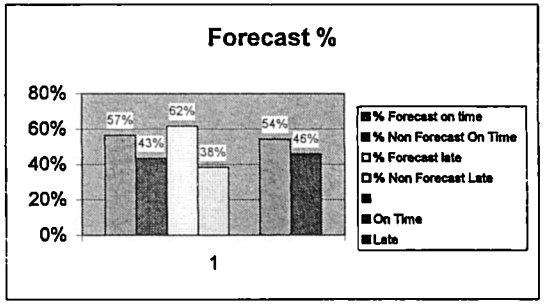
Peter then showed us several permutations of his data analysis exercise for the previous week (See attached charts). When he had finally managed to get the percentages to add up correctly, he explained what he had done. Because there was so much data, he had split the months orders into early/on-time and late. sadly, there appeared to actually be fewer non-forecasted items products going out late than there

	Forecast	218
Early	Non Forecast	150
	total	368
	Forecast	103
On Time	Non Forecast	97
	Total	200
Late	Forecast	296
	Non Forecast	184
	Total	480

Late	
Forecast	296
Non Forecast	184
Total	480
Early and On Time	
Forecast	321
Non Forecast	247
Total	568
Grand Total	1048

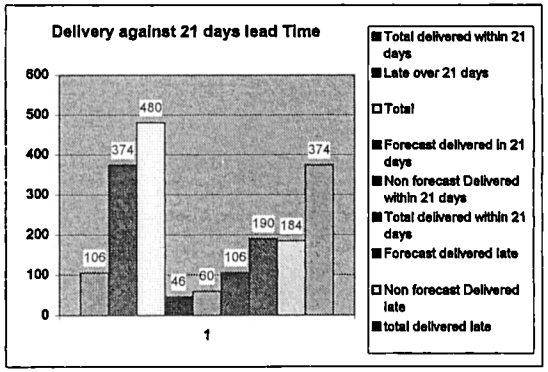
% Forecast on time	**57%**
% Non Forecast On Time	**43%**
% Forecast late	**62%**
% Non Forecast Late	**38%**
On Time	**54%**
Late	**46%**





21 days lead time

Total delivered within 21 days	106
Late over 21 days	374
Total	480
Forecast delivered in 21 days	46
Non forecast Delivered within 21 days	60
Total delivered within 21 days	106
Forecast delivered late	190
Non forecast Delivered late	184
total delivered late	374



were forecasted ones. When I pointed this out, Dave immediately defended this by pointing out that forecasted item products make up far more of their overall sales than do the non-forecasted ones. However, everyone was slightly surprised and upset that so many forecasted orders were going out late. Therefore, we called Mike Boyd into the meeting and chatted with him about potentially raising the forecasts, as they seemed to currently be set rather too low. He agreed and was actioned to do this ASAP.

We then called Dave Metters, one of the key salesmen in to the meeting and asked him whether it would be possible to check each product he sold to see whether any non-forecasted items were needed for it before he quoted a lead time. His answer was entertaining and informative rather than sensible. It turned out that he was unable to see whether any item in a product was forecasted or non-forecasted, a scenario that Mike could barely believe and took it upon himself to ensure that the situation was remedied by one of the technicians in the next week. Dave M also said that although the screen he uses will provide a lead time based on the availability of forecasted parts (but he had no view of non-forecasted items) if this seemed excessive, he would simply ignore it and quote a lead time he felt that the customer would accept. As he said "If the screen tells me that we can give a promise date of 6 or 7 weeks, I just immediately take that down to 3-4 weeks because otherwise they'll turn around and say 'ok we'll get back to you' and they never do." When I pointed out that this was probably causing problems, he simply said that he would rather promise a short lead time to get the order and then smooth things over when the goods were not delivered on time, than quote a realistic lead time and risk losing the sale.

Although I could see his point, there was one thing I was unsure of. Peter had said on many occasions that some of the parts had long lead times. Therefore, if a customer wanted a product which contained one of these parts (and they were sometimes specified on the drawings that this particular part was required) they had to wait until the part was in first. As he had said on previous occasions, some of the parts are so rarely ordered, that the suppliers do not keep them in stock and have to make them to order each time. There are so many parts for which this happens that it would be unrealistic for Company L to keep one of each component part in stock. Therefore, although Dave M was certain that if he quoted a long lead time he would lose the deal, I wanted to know where he thought the customer might go to get hold of those parts quicker. Therefore, I suggested that he did a benchmarking exercise, calling three or four of the company's main competitors and getting quotes for some of the more awkward items, which Company L would have difficulty getting parts for within the standard lead time. This, I felt would achieve 2 things: it would give Dave the confidence to quote realistic lead times, as he would be able to tell his customers that they would be unable to get it any faster from companies x, x, and x (the competition), or if, for some reason the competitors were able to supply it faster, some subtle questioning might get them to reveal who they were able to source these difficult-to-come-by parts from so quickly, thereby giving them a new supplier lead. This suggestion went down well with everyone in the meeting, and Dave M was actioned to do this over the next couple of weeks.

Finally, a general discussion revealed that the company has started outsourcing some of its products, which had helped reduce congestion in the machine shop. In addition, the practice of running full batch sizes was having a positive impact on the arrears

lists, which was what had been expected. The full effect of this was expected to come through in the next 6 weeks. In addition, some small-scale investigations had been carried out recently, looking at machine breakdowns, quality (product failure in test) and labour. However, there was not enough time left to go into these in any detail, so we decided that we would talk about it at the next meeting, which was arranged for two weeks time.

21/6/01
Had an email from Dave Richardson, pointing out that, as no one had done anything towards the project since the last meeting it should be postponed until the beginning of July, when they would have the next period's data collated. Therefore, arranged to meet on 6th July.

6/7/01
Met up with the project team and was informed that since the last meeting, MB had gone through the product database and identified the top 500 items by sales value. These are all now being forecasted – which is an increase of 40% - from 300 to 500 items are now being forecasted. The effect of this change on delivery performance should come through in the next period's figures. DR then showed the previous period's figures and pointed out that 17% of the late orders were on forecasted items. Hopefully the increase in the forecast will reduce this next month, as the target is that no forecasted items go out late – there is no excuse for this!

The lists of all forecasted items have now been distributed around the customer services team. This is so that they can more accurately check the available to promise date which appears on the screen. Now, if the date is in the future, then it should be an accurate lead time, whereas if the system shows today's date, then this indicates that a non-forecasted item has been ordered and therefore the promise date must be obtained by speaking and agreeing it on the shop floor so that awkward parts can be sorted.

Another initiative, which has been decided since the last meeting, is that it might be worth making-to-stock for their more critical customers. So far, the Company have got to the stage of aggregating all orders from critical customers and they are currently analysing them to try to agree a limited amount of stock holdings with them. This has arisen because they have realised that breakdowns require 24 hr turnaround to satisfy the customer- they are not prepared to have a truck off the road for longer than this – an example cited was of a new part for a fire engine, which, when they missed a 24 hr deadline, meant that there was a risk of an area having no fire engine cover. The plan, therefore, is to agree with the customers a threshold stock holding, which they agree to buy within a certain negotiated time period, so that in emergencies, the stock can simply be dispatched to the customer, rather than having to build it from scratch.

I asked about the benchmarking exercise I had set DM, so we called him in and he defensively said that he was never informed of such a task. I once again explained that the purpose of this was to help him to have more confidence in the lead times he could quote, and he promptly pointed out that their 2 biggest competitors offered a 24 hr service. At this point we called in a marketing executive, Chris Welsh, who explained that the competition, Lincoln and Gruneveld, generally cornered the OEMs, designing lube systems specifically for their new chassis'. Therefore, as they limited

the amount of differentiation in their product range, they could offer an off-the-shelf service. This led to a wider marketing debate, during which it was pointed out that the bread-and-butter business for Company L is standard products – which means that they have to compete with both competitors, who are able to offer substantially shorter lead times than they are. However, their differentiation strategy is that they will also make lube systems to fit virtually any bit of plant or truck. This business is the attraction for their customers, who need the variety that they can offer and therefore have to live with the longer lead times.

As it turns out, Company L have 20-30 reasonably regular customers, 4-5 of which would really hurt them if they took their business elsewhere. This means that by making to stock for these customers, to enable them to hit the so far elusive 24 hr delivery on standard products, they will be in a stronger position to keep these customers happy and be able to offer them the best deals on the more awkward components, when they are required.

They tried to get me to start doing a benchmarking exercise – going undercover and posing as a prospective customer to the 2 big competitors, but I declined on the basis that I don't know enough about lube systems to be convincing and also, as it is their company that the information will be useful to, they really should own the process themselves. I got the distinct impression from this that they wouldn't get around to doing anything about it, but can always hope I guess.

We arranged the next meeting for the middle of August, being as holidays and the Company summer shutdown are coming up soon. Hopefully, the period results from this month will show an improvement as the various improvements to date really start to kick-in. But we shall see.

17/8/01

The penultimate meeting was not quite as positive as I would have liked. I started working through the various initiatives we had been running as part of the process and asking for feedback on each of them. Unfortunately, it appears that the two main changes – increasing the forecasted items and running full batch sizes, has increased stock levels dramatically. Although this was expected, the problem is that the Company is currently very low on orders and therefore the stock is not moving, but just building up in the warehouse – increasing their inventory by some 100k over the last 3 months. Despite this, there was a strong feeling that the changes were necessary and useful as far as delivering the products on time to their customers were concerned, but the feeling was that if the stock levels continued rising at their current rates, both these initiatives would have to be put on hold until sales picked up to a level which would even out the inventory. One problem is that the forecast is derived from old data – i.e. the pattern in previous months.

I asked why the sales had taken such a downturn and was told that it appears to be an across the board slowdown in demand – it is not simply one or two customers – but all and it is not just one or two products, but all the lines which are affected. The current data shows that the previous months sales were down dramatically on every line and current orders are down on all but one lines – typically the only line with plenty of orders has the lowest margin. The feeling was that it appeared to be a

general slowdown in manufacturing in general, which they had been, until now, just assuming was a blip – but are now realising that it seems to be a trend. There is a strategy to increase sales – by entering overseas markets in India and Mexico, where they are currently setting up partnership programmes which enable them to export components to local companies in these countries for mutual profitability. The problem is that these aren't due to start for another 6-9 months.

Moving on to other areas we had identified for improvements, DR confirmed that certain lines had been outsourced to reduce costs and congestion in the manufacturing area. In addition, the IT systems and general understanding/ co-operation between sales and manufacturing had been dramatically improved. This has helped to ensure that appropriate lead times are quoted which are acceptable to both customers and manufacturing.

However, due to a lack of time to analyse the data, the machine efficiency measure had been dropped. In addition, as predicted, the benchmarking exercise was never undertaken, despite my best efforts. Finally, the plan of making –to-stock for major customers had changed. This was because, with the increase in stock levels from the forecasting and batch sizing, manufacturing are currently able to build and dispatch standard kits within 24hrs of the order being received. Therefore there is no need to hold completed stock. However, when orders increase, this situation will be reviewed and may be implemented to ensure continued on-time delivery.

Before I left I asked for feedback on the process, asking whether they had found it useful / usable and whether they would use it again in the future. The responses I received were positive, despite current short-term problems, with comments such as:

"Focusing on delivery helped concentrate our minds on the needs of the customer – its just unfortunate that the order book hasn't kept up!"
"It worked – the forecasting has worked, the batch sizing worked – if sales were there it would be fantastic – I would be a happy man."
"It has driven down delivery problems – but unfortunately it has also driven stock up when we can least afford it."
When discussing whether they found the process too time consuming or resource intensive, DR commented "It wasn't a problem – basically that is what we are here for – sorting out improvements and making them happen" However, he did note that they had experienced some problems "setting up the implementation of everything."

Overall, they found the process useful and said that "it is a good problem-solving approach – which we will use again." However, "the basic principles are good – but we needed to be a lot better at monitoring the results and checking the market. We need to have a better idea of what the consequences of our actions will be in relation to what is happening outside – knowing the effects of outside influences on our decisions really."

We planned a final meeting for 3 weeks time to assess the situation and find out what the final consequences of the changes are – whether they have levelled or whether they are still causing stock levels to rise. I suggested that either way, if inventory levels are causing concern it might be a good idea to look at using the process again to try to reduce it.

7/9/01

Met up with Dave Richardson, who informed me that the IT department is finally trying to link work in progress to the computer – to track it and to enable easily obtainable information on delivery performance. This, he hoped, would keep delivery performance on the agenda and prevent it slipping back into obscurity. However, the upgrade had meant that he was unable to access the system to identify what had happened in the last month. He assured me, however, that delivery performance had improved considerably during the life of the project.

A further improvement was also being considered to improve delivery; to hold a small number of finished, standard products. The cost of this was calculated for the 10 most popular products and agreement is currently being sought to keep 10 of each in store for fast dispatch to customers. Hopefully, this will help improve delivery performance and improve customer responsiveness.

We then started discussing what they had decided to do regarding inventory levels. The good news was that the increase in stocks were levelling out at just over 800K (see attached sheet 'Brief manufacturing review') – as hoped. However, Dave had taken my advice and had started another cycle of the process looking at the 'stock difference report' – which shows stock levels in each area, over time. From this, he had identified several problem areas, which he highlighted in red, and causes for concern, highlighted in yellow (see attached sheet 'stock difference report'). Investigating the reasons for stock levels going up, several were accounted for through new product introduction – he pointed out that one new product added £18k in new parts – but finished goods and raw materials needed to be sorted out. Two supervisors were brought in to help establish exactly what was in the finished goods area. This resulted in finding somewhere in excess of 400 finished goods with no orders attached to them. It was suspected that these had built up through orders being cancelled, as no outstanding orders could be traced to account for them. Therefore, measures were being put in place to ensure that any cancellations had to be authorised by Dave to ensure that WIP would not continue on that order and to ensure that special orders were not cancelled.

The problem of existing finished goods without orders was planned to be dealt with over the next three months. Dave walked me around to show me how all the goods had been moved out of the finished goods area, as they had been taking up all the space in there – meaning that orders were stacking up at the end of production lines causing chaos in the production area when dispatches occurred. They were now being stored separately until they are all assessed and either stripped down for re-use, or where this is not possible, the last customer to order the goods is contacted and offered the batch for cost price, to get it off their hands. This is expected to reduce inventory by c£30+k.

Raw material inventory has also been investigated and the company is currently negotiating deals with suppliers so that when they place an order, the goods are dispatched in weekly batches, rather than in bulk. This reduces the storage required as well as inventory levels, as only the amount required per week is delivered. It should also be beneficial to suppliers as it will help level their production, rather than producing full orders immediately. The predicted inventory savings from this

improvement are expected to be in the region of £20k. It is hoped that these improvements and measures, will continue to improve Company L, as they continue using through the process to develop a balanced, practical and useful set of measures through which they can drive their strategically aligned improvement efforts.

Brief Manufacturing review P5.

Manufacturing Arrears.

Arrears / Period	5	6	7	8	9	10	11	12	1	2	3	4	5
Company arrears.	£44,477	£68,214	£34,700	£31,374	£69,340	£37,690	£46,189	£20,589	£42,015	£19,900	£23,201	£44,394	£28,036
Manufacturing arrears.	£41,654	£33,385	£27,754	£20,717	£33,551	£31,783	£43,226	£15,985	£40,898	£19,900	£21,057	£21,169	£26,453

Stock Values.

Stock value / Period	5	6	7	8	9	10	11	12	1	2	3	4	5
Recorded Stock value.	£1,001,601	£934,479	£896,211	£907,386	£934,958	£882,731	£882,092	£830,753	£710,347	£726,444	£762,663	£814,753	£826,787
Difference.	+£6,639	-£67,122	-£38,268	+£11,175	+£27,572	-£52,227	-£639	-£51,339	-£120,406	+£16,097	+£36,219	+£52,568	+£12,034

Head Count.

Head count / period.	5	6	7	8	9	R10	11	12	1	2	3	4	5
Total head count.	112	113	116	120	117	101	101	102	100	97	96	92	93
Direct head count.	73	72	73	74	71	60	59	60	60	61	59	57	57
Indirect head count.	39	41	43	46	46	41	42	42	40	36	37	35	36

Stock Difference Report.

[redacted] Investigate differences.
Cause for concern.

Date	QC	ELC	ELT	PIS	Auto Stock	EBR	ECP	EDHTR	EDI	EDT	EE1	EE2	EFF	EFIN	EFL	EGF	EGP	EGR
28/04/01	8,135	49	100	9	338	18,398	5,638	3	[redacted]	27,416	[redacted]	20,550	22,986	[redacted]	[redacted]	7,872	26,474	1,556
26/05/01	13,855	29	100	9	338	18,126	6,079	3	[redacted]	32,544	[redacted]	21,908	19,843	[redacted]	[redacted]	6,431	26,863	1,282
30/06/01	10,350	29	100	9	338	17,802	6,479	54	[redacted]	31,863	[redacted]	22,845	19,081	[redacted]	[redacted]	6,640	25,487	831
21/07/01	10,851	29	100	9	338	17,327	7,072	64	[redacted]	33,991	[redacted]	21,490	27,016	[redacted]	[redacted]	5,769	27,675	671

Date	EHC	EIF	EIN	EKT	ELB	EPAINT	EPU	ERP	ETC	ETH	ELCslow	GAslow	INFAST	MDESP	MDT	MFL	MRM	MQhold	TOTAL
28/04/01	13,573	17,264	11,394	16,301	266	6,882	7,102	8,719	60,243	225	24	20,580	29,662	6,469	22,072	2,585	89,990	4,380	718,347
26/05/01	16,335	15,768	11,081	17,039	443	5,857	8,104	8,676	67,256	225	21	20,714	28,956	6,123	21,567	4,143	97,145	5,882	740,439
30/06/01	14,403	22,096	11,024	16,348	48	7,106	6,482	7,953	61,705	225	28	20,551	29,076	5,703	21,960	2,822	87,529	9,444	762,185
21/07/01	15,402	22,256	11,495	17,471	69	7,013	7,043	7,607	66,190	225	27	20,862	30,011	5,617	21,424	2,785	92,738	4,064	814,753

		STOCK INCREASE	
E-DI			
PART No.	QTY	comments	VALUE
44003-151	75000	BATCH SIZE	£6,200.00
44402-303	26000	FORECAST	£5,000.00
43103-612	12000	FORECAST	£2,000.00
		TOTAL	£13,200.00
E-DT			
PART No.	qty	comments	VALUE
40181-611	732	FORECAST	£900.00
41391-306	2660	FORECAST	£1,850.00
45910-281	474	BATCH SIZE	£3,500.00
		TOTAL	£6,250.00
E-E1			
PART No.	qty	comments	VALUE
27423-170	958	NEW AC3& SL	£1,100.00
83415-102	1040	800 STOCK LEVEL	£21,313.00
		TOTAL	£22,413.00
E-IF			
PART No.	qty	comments	VALUE
34446-622	2759	FORECAST	£1,335.00
34446-625	4898	FORECAST	£2,144.00
		TOTAL	£3,479.00
E-TC			
PART No.	qty	comments	VALUE
25121-202	2126	BATCH SIZE	£871.00
27832-307	444	FORECAST	£1,265.00
31432-257	461	FORECAST	£7,873.00
31485-208	405	FORECAST	£5,042.00
31485-216	236	FORECAST	£2,687.00
32453-101	359	BATCH SIZE	£840.00
32453-105	528	BATCH SIZE	£1,473.00
32472-817	1069	BATCH SIZE	£3,643.00
32473-522	206	BATCH SIZE	£1,048.00
33226-615	1120	BATCH SIZE	£2,150.00
		TOTAL	£26,892.00
E-FF			
PART No.	qty	comments	VALUE
25713-312	666	FORECAST	£1,711.00
27675-642	289	FORECAST	£1,803.00
38785-661	1257	FORECAST	£4,412.00
83115-201	331	FORECAST	£2,343.00
83115-204	283	FORECAST	£1,507.00
83341-803	794	FORECAST	£2,509.00
		TOTAL	£14,285.00
E-FL			
PART No.	qty	comments	VALUE
21175-540	108	NEW PUMP (NOT REQ)	£1,046.00
23411-108	911	FORECAST	£1,038.00
27675-104	75	FORECAST	£1,033.00
33244-603	1914	FORECAST	£1,832.00
34532-223	405	FORECAST	£1,273.00
37250-021/09	159	FORECAST	£2,448.00
38580-127	1052	FORECAST	£1,373.00
28580-129	995	FORECAST	£1,409.00
83344-101	283	FORECAST	£4,893.00
83344-531	38	FORECAST	£1,290.00
		TOTAL	£17,635.00

INCREASE IN STOCK LEVELS
DUE TO NEW PRODUCT REQUIREMENTS

[redacted] = UNIQUE PART TO NEW PRODUCT

Part No.		Qty	Value Each	Total Value
102257		3039	£0.56000	£1,701.84
136552		1890	£0.20800	£393.12
136782		755	£0.12000	£90.60
1348-321		816	£0.02000	£16.32
1348-325		215	£0.03200	£6.88
1348-362		192	£0.04600	£8.83
1348-368		283	£0.04800	£13.58
163659/1		2600	£0.11000	£286.00
21171-806		916	£0.00500	£4.58
21171-844		2355	£0.00400	£9.42
21173-740		58	£0.38000	£22.04
21175-537		982	£0.10000	£98.20
21175-723		8011	£0.00100	£8.01
21175-724		8256	£0.00079	£6.52
21181-722		4825	£0.00100	£4.83
21181-723		4957	£0.00100	£4.96
21252-076		29627	£0.00900	£266.64
21813-023		61	£0.01400	£0.85
21813-066		563	£0.01800	£10.13
21815-804		5052	£0.01500	£75.78
21815-810		1051	£0.01600	£16.82
21815-816		432	£0.01600	£6.91
21831-227		2393	£0.00400	£9.57
21861-230		1307	£0.00850	£11.11
21861-978		2965	£0.04900	£145.29
21881-504		2045	£0.00300	£6.14
21885-810		461	£0.31100	£143.37
22327-152		963	£0.25600	£246.53
22333-107		2577	£0.07000	£180.39
23113-001		172	£1.83000	£314.76
23133-059		42	£2.00000	£84.00
23177-705		219	£0.05000	£10.95
23313-651		112	£0.00010	£0.01
23733-107		125	£0.00500	£0.63
23733-128		203	£0.03100	£6.29
23737-352		4500	£0.01600	£72.00
23757-088		1362	£0.20300	£276.49
25111-015		5831	£0.05900	£344.03
25131-003		1462	£0.05000	£73.10

25131-610		466	£0.36000	£167.76
25131-636		500	£0.33000	£165.00
25145-600		565	£0.07000	£39.55
25153-013		647	£0.01200	£7.76
25153-200		165	£0.13500	£22.28
25153-241		476	£0.16900	£80.44
25153-965		430	£0.20000	£86.00
25153-966		454	£0.14900	£67.65
25153-967		454	£0.06000	£27.24
25153-969		463	£0.29000	£134.27
25471-107	Quick Coupling	213	£2.49000	£530.37
25471-108		183	£1.82000	£333.06
27151-416		9539	£0.15400	£1,469.01
27215-628		288	£0.57000	£164.16
27233-509		439	£0.01400	£6.15
27331-499		505	£0.44000	£222.20
27411-154		28	£0.31000	£8.68
27415-706		527	£0.29000	£152.83
27421-187		600	£0.54000	£324.00
27423-170	Din Connector.	956	£1.19000	£1,137.64
27461-125		226	£0.20000	£45.20
27463-017	Push button Switch	289	£4.08000	£1,179.12
27613-729		358	£0.65000	£232.70
27675-101	12V Motor.	23	£23.95000	£550.85
27675-102	24V Motor	55	£17.05000	£937.75
27675-103	12V Stepper Motor	37	£15.00000	£555.00
27675-104	24V Stepper Motor	65	£15.00000	£975.00
31432-260		1086	£0.31000	£336.66
31432-261		571	£0.39000	£222.69
31833-349		88225	£0.01200	£1,058.70
31833-358		400	£0.01200	£4.80
31833-802		4635	£0.06400	£296.64
31867-111		6	£0.01800	£0.11
31867-657		794	£0.09000	£71.46
31867-832		412	£0.14800	£60.98
32367-238		1000	£0.22000	£220.00
32472-953		58	£1.72000	£99.76
32478-221		4	£4.71000	£18.84
32478-222		25	£6.52000	£163.00
32478-223		19	£7.68000	£145.92
32478-224		33	£9.51000	£313.83
32478-225		32	£11.13000	£356.16
32631-096		46	£0.22000	£10.12
32814-703		60	£2.88000	£172.80
32814-715		59	£2.83000	£166.97

32814-716		66	£2.83000	£186.78
32814-717		76	£2.84000	£215.84
32814-718		55	£2.84000	£156.20
33228-302		55	£0.08800	£4.84
33244-603		1642	£0.98000	£1,609.16
33283-502		54	£0.30000	£16.20
33414-603		22	£2.90000	£63.80
33644-230		50	£0.19000	£9.50
33644-231		56	£0.06800	£3.81
33666-291		45	£0.58000	£26.10
34274-682		50	£0.62000	£31.00
34432-706		50	£2.44000	£122.00
34432-707		17	£2.05000	£34.85
34432-708		45	£1.84000	£82.80
34432-709		77	£1.19000	£91.63
34432-710		41	£0.70000	£28.70
34432-711		109	£0.68000	£74.12
36234-257		151	£0.61000	£92.11
36251-605		9	£0.13000	£1.17
37250-017		26	£10.08000	£262.08
37516-202		1252	£1.62000	£2,028.24
37532-034		20	£2.58000	£51.60
38477-609		961	£0.04600	£44.21
38528-303		988	£0.07000	£69.16
38580-123		92	£0.60000	£55.20
38580-124		91	£0.47000	£42.77
38580-126		92	£4.07000	£374.44
38580-127	Reseooir Moulding	1039	£1.30000	£1,350.70
38580-128	Motor housing	384	£1.72000	£660.48
38580-129	Motor Cover	984	£1.41000	£1,387.44
38580-130		70	£3.59000	£251.30
38585-228		3200	£0.10000	£320.00
38785-801		1138	£0.06000	£68.28
44005-601		1020	£0.03500	£35.70
7223-003		345	£0.04200	£14.49
7835-014		767	£0.81000	£621.27
83344-105		28	£8.85000	£247.80
83344-106	12V Contol Board	36	£15.00000	£540.00
83344-107	24V Control Board.	60	£15.00000	£900.00
LM206		94	£0.06600	£6.20
LM306		2254	£0.08200	£184.83
			TOTAL =	£30,685.41
COMPONENTS UNIQUE TO NEW PRODUCTS TOTAL =				£18,950.20

AC3. 500 Motors £14K.
SL 320 Motors £17K. } end of Aug.

Appendix 4: Refereed Publications

Journal Papers

Hudson, M. Smart, P.A. and Bourne, M. (2001) "Theory and Practice in SME Performance Measurement Systems," *International Journal of Operations and Production Management*, Vol 21, No 8, pp1096-1115.

Hudson, M. Lean J. and Smart, P.A. (2001) "Improving Control Through Effective Performance Measurement in SMEs," *Production Planning and Control*, Vol 12, No 8.

Conference Papers

Hudson, M. and Lean, J. (2001) "Developing a Continuous Strategic Improvement Capability in SMEs," *Proceedings of the 16th International Conference on Production Research (CD-ROM)*, Czech Ass. Scientific and Technical Societies, Prague.

Hudson, M. and Smith, D. (2001) "Little and Often Works Best: Developing Integrated Performance Measurement in SMEs," *What Really Matters in Operations Management (EurOMA Conference Proceedings)*, Vol 2, University of Bath, Bath, pp1015-1023.

Hudson, M. Lean, J. Smart, P.A. and Bourne, M. (2000) "A Question of Context: The Barriers to Strategic Performance Measurement Development in SMEs," *POM Facing the New Millennium (POM Sevilla CD-ROM Conference Proceedings)*, DEFDO / University of Seville, Seville.

Hudson, M. Smart, P.A. Bourne, M. and Lean, J. (2000) "Only Just Managing – No Time to Measure," *Performance Measurement – Past, Present and Future (PM2000 Conference Proceedings)*, Cranfield University, Cranfield, pp243-250.

Hudson, M. and Smith, D. (2000) "Running Before Walking: The Difficulties of Developing Strategic Performance Measurement Systems in SMEs," *Operations Management (EurOMA Conference Proceedings)*, Academia Press Scientific Publishers, Gent. pp292-298.

Hudson, M. Bennett, J. Smart, P.A. and Bourne, M. (1999) "Performance Measurement for Planning and Control in SMEs," *Global Production Management (IFIP WG5.7 APMS Conference Proceedings)*, Kluwer Academic Publishers, Berlin, pp219-225.

Theory and practice in SME performance measurement systems

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Keywords *Strategy, Performance, Small- to medium-sized enterprises*

Abstract *Describes research undertaken to evaluate the appropriateness of strategic performance measurement (PM) system development processes for small- and medium-sized enterprises (SMEs). An evaluation is undertaken of ten PM approaches found in the literature. To facilitate this evaluation a typology is presented which synthesises current theory. This evaluation resulted in the identification of a process, based on its congruency to the theoretical model, which is used for an empirical investigation. Empirical data from SMEs is collected and analysed using the typology. This indicates a discontinuity between current theory and the requirements of practitioners in small companies. The paper concludes with a number of recommendations to facilitate the development of appropriate PM processes for SMEs.*

Introduction

The need for companies to align their performance measurement (PM) systems with their strategic goals is well documented in the literature (Kaplan, 1983; Eccles, 1991; Gregory, 1993). To address this need a number of frameworks and processes (approaches) for the development of PM systems have emerged. The most popular of these is the balanced scorecard (Kaplan and Norton, 1992), which emphasises a balance between the use of financial and non-financial measures to achieve strategic alignment. The popularity of the balanced scorecard has acted as a catalyst for further research into the characteristics of, and approaches for developing, strategic PM systems (Neely *et al.* 1996a; 1996b; Bititci *et al.*, 1997; Oliver and Palmer, 1998). These approaches have been designed primarily for use in a medium to large company context. Small- and medium-sized enterprises (SMEs) exhibit distinct characteristics that differentiate them from the majority of their larger counterparts (Storey, 1994). Therefore, there is a need to establish the relevance of existing PM approaches for SMEs and to identify an appropriate process for the design and implementation of strategic PM systems in this context.

This paper describes the research that has been undertaken to specify a set of requirements for a SME focused, strategic PM development process. A typology is presented that synthesises the characteristics of PM development

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processes, for this purpose. There is also a need to ensure that the outputs of the process are appropriate. Therefore, the typology also identifies the characteristics of well designed performance measures and appropriate dimensions of performance. This framework is used to evaluate current strategic PM development approaches found in the literature. A survey is used to establish current PM practice in SMEs and a case study is undertaken to assess the relevance of an existing PM development process in a SME context. Ten existing approaches are evaluated using the typology. This evaluation highlights an appropriate PM development process, with respect to current theory, for empirical analysis. The empirical data is analysed using coding techniques. The codes, which are pre-selected from the typology, are used in an attempt to identify any discrepancies between the empirical and theoretical data. The results obtained are used to characterise SME PM systems, and to inform the development of a practical development process within a SME context.

Research methodology

The research presented in this paper is specifically concerned with the investigation of the following question: Are current approaches for the design and implementation of strategic PM systems appropriate for SMEs? An initial literature survey was undertaken to establish the status of current knowledge in the area of strategic PM for SMEs. This survey revealed that while there has been increased attention on PM *per se*, current literature is inadequate in respect of the specific SME context.

The research falls into two phases: theoretical and empirical. The theoretical phase of the research approach may be conceptualised in more detail as two stages:

(1) the formulation of a typology; and

(2) the analysis of current PM approaches.

Stage one focused on the deduction of a typology that embodied the findings of previous research on process methodologies, the characteristics of well designed strategic performance measures and appropriate dimensions of performance. The typology resulting from the synthesis of these areas was used to evaluate ten PM development approaches found in the literature (stage two). This evaluation, although constrained by existing theoretical frameworks, resulted in the selection of a process based on its coverage (completeness) of the criteria within the typology, and indicated the need for an empirical study.

The second phase of the research approach focused on the collection, verification and analysis of empirical data, and was divided into two stages:

(1) semi-structured interviews with managers of SMEs;

(2) participant observation of strategic PM system development, in a SME, using the selected process.

The semi-structured interviews were conducted with managers from eight SMEs, drawn from a sample of companies who had recently undertaken programmes focusing on strategic improvement. This is consistent with "judgement sampling" (Sekaran, 1992), which was used because there is a distinct scarcity of strategic planning in the majority of SMEs (Mintzberg *et al.*, 1998; Cagliano *et al.*, 1998; Barnes *et al.*, 1999). The rationale for the selection of this sample was that companies actively seeking strategic improvements would be most likely to view PM as a strategic improvement tool. Company size ranged from 12-240 employees, which is consistent with current SME definitions (European Commission, 1996). The interviews were taped and transcribed. Summaries of the transcripts were produced and were verified by both the original interviewees and an additional manager. This enabled multiple source triangulation (Denzin, 1978). The interviews were then analysed using thematic coding (Flick, 1998) and were compared against the formulated typology. The rationale for this approach was to highlight any discrepancies between theory and practice.

The second stage of phase two was based on the observation of the PM development process identified in phase one. The process was facilitated by a member of the original development team and focused specifically on the development of a set of top-level strategic measures. This was planned as a series of five workshops. The study utilised a case study approach that focused on the accumulation and interpretation of qualitative data. As Gummesson (1991) states:

> The general reason for doing case study research is to better understand complex phenomena such as change processes. Innumerable factors, and entangled interconnections between them, do not allow simple unambiguous research designs and quantifications.

Data collection was based on both participant observation and on face-to-face interviewing methods. An observational method was identified as appropriate for the collection of both processual and behavioural data that would emerge from the application of the process. In an attempt to overcome any observer bias, face-to-face interviews were also undertaken. This included structured interviews with each of the SME participants at the beginning of the intervention and a set of semi-structured interviews at the end of the intervention. As Sekaran (1992) states:

> Because almost all data-collection methods have some biases associated with them, collecting data through multimethods and from multisources lends rigor to research.

Data analysis of the observational data was undertaken using thematic coding (Flick, 1998). This facilitated the identification of a set of issues that were verified and validated with workshop participants and with the process facilitator. Using the classification of Denzin (1978), the data triangulation undertaken was multiple data source, multiple method, and multiple researcher involvement.

The interview data relating to the SME PM systems, together with the issues identified from the observational data, were compared against the typology.

This facilitated the identification of discrepancies between the empirical and theoretical data. This approach has the advantage of informing theory, through the enhancement of theoretical frameworks, and improving practice, through the identification of the key constraining issues.

A typology of strategic PM system development process characteristics

The concept of strategic PM was developed in response to the criticisms that traditional PM systems are financially driven and historically focused (Kaplan and Norton, 1993). According to Neely (1999), this change in emphasis represents a revolution in the field of PM, evidenced by the increasing body of research that has been developed over the last decade. This plethora of information included many different proposals and guidelines that attempt to explain the characteristics of strategic PM. These may be divided into two broad categories: appropriate dimensions of performance for which measures might be developed and the characteristics that these measures should display. These categories, however, focus only on the content of strategic PM systems, rather than identifying the requirements of effective processes for developing them.

Previous research has failed to address explicitly the features of PM development processes that enhance the likelihood of successful implementation. This makes the evaluation of existing approaches problematic. This problem has been addressed by the identification of features of typical process methodologies, which can be applied to the PM development process. The three resulting categories are described in the following sections and are synthesised to form a typology for evaluating the PM approaches that have emerged in the literature.

Development process requirements

In order to develop a strategic PM system, it is critically important to identify the properties of an effective development process. Without this, there can be no practical value for business from the concept of strategic PM. As the PM literature is deficient in addressing this issue a wider review was undertaken looking at process methodologies. The objective of this review was to identify general principles of effective development and implementation, which could be applied to strategic PM system development processes.

Mills *et al.* (1995) suggest that:

> To be useful, a process should specify how an organisation might be attracted to implement the process; who should participate in the process and how the project of implementing the process should be managed.

Their subsequent examination of the manufacturing strategy development process used the generic process framework identified by Platts (1990, 1994):

- point of entry;
- participation;

- procedure;
- project management.

Applying this framework to PM development processes, an effective point of entry would necessarily involve an evaluation or audit of the existing PM system, to highlight areas of deficiency and indicate a need for improvement. Furthermore, participation in the process, according to the PM literature, should include the staff who will be the key users of the performance measures developed (Globerson, 1985; Lynch and Cross, 1991; Neely *et al.*, 1996a). Identifying the procedures for developing strategic PM systems is rather more problematic, as these will vary between processes. However, to ensure strategic alignment, a procedure for identifying strategic objectives should be included. In addition, a method for developing the measures is necessary, along with a procedure for maintaining the new PM system. Slack *et al.* (1998) identify nine rules for the effective project management of strategy implementation. In addition, Smith and Tranfield (1989) present a similar set of guidelines for the effective implementation of advanced manufacturing technology (AMT). From these, the key principles for effective management of the PM development process have been identified as:

- top management support;
- everybody on board;
- clear explicit objectives;
- time framed project management.

In addition to identifying the features of an effective PM development process, it is also vital to conceptualise the content of such a process in terms of performance measure characteristics and appropriate dimensions of performance. This is important because a development process needs both structure and relevant content to deliver value effectively to businesses.

Characteristics of performance measures

Globerson (1985) and Maskell (1989) present sets of guidelines detailing the characteristics of performance measures, which have often been reiterated in more recent literature (Dixon *et al.*, 1990; Lynch and Cross, 1991; Neely *et al.*, 1996a). A comprehensive review of this literature was undertaken by Neely *et al.* (1997), and a set of 22 characteristics was identified. However, a review of these sets revealed that many of the characteristics are duplicated or are deemed to be desirable. The removal of duplication and a focus on critical characteristics resulted in the following set (Table I).

Dimensions of performance

The dimensions of performance for which measures, within a strategically aligned PM system, should be developed have been defined using a variety of terms in the literature. This has caused a degree of replication. Time, quality

Characteristics	Reference
Derived from strategy	Globerson, 1985; Maskell, 1989; Dixon *et al.*, 1990; Lynch and Cross, 1991; Neely *et al.*, 1996a
Clearly defined with an explicit purpose	Globerson, 1985; Neely *et al.*, 1996a
Relevant and easy to maintain	Maskell, 1989; Lynch and Cross, 1991
Simple to understand and use	Maskell, 1989; Lynch and Cross, 1991; Neely *et al.*, 1996a
Provide fast and accurate feedback	Globerson, 1985; Dixon *et al.*, 1990; Maskell, 1989; Neely *et al.*, 1996a
Link operations to strategic goals	Lynch and Cross, 1991
Stimulate continuous improvement	Lynch and Cross, 1991; Maskell, 1989; Neely *et al.*, 1996a

Table I.
Critical characteristics of performance measures

and flexibility are commonly cited as the main operational dimensions which should be measured (Kaplan, 1983; Lynch and Cross, 1991; Schmenner and Vollmann, 1994; Neely *et al.*, 1995; Collier, 1995; White, 1996; Laitinen, 1996; Slack *et al.*, 1998; Medori and Steeple, 2000). Finance, in various different forms, is also considered to be a critical dimension of performance (Keegan *et al.*, 1989; Sink and Tuttle, 1989; Jones *et al.*, 1993; Meyer, 1994; Bititci, 1994; Ghalayini *et al.*, 1997). In addition, customer satisfaction and human resources are repeatedly cited as critical measurement areas (Eccles, 1991; Kaplan and Norton, 1992; Fitzgerald and Moon, 1996). Table II illustrates the grouping of the terms found within the literature into six general dimensions.

These six dimensions can be seen to cover all aspects of business: the financial results, the operating performance (through the dimensions of time, quality and flexibility), the way the company is perceived externally (through its customers) and the cultural aspects of the working environment (through the human resource dimension). It is, however, important to note that these dimensions are not prescriptive. Instead, they are intended to encourage the holistic consideration of these areas when developing measures to support the company strategy.

Analysis of current PM development processes

The synthesis of the requirements of effective development processes, the characteristics of performance measures and the dimensions of performance, provide a typology that may be used to evaluate current approaches for the development of strategic PM systems (Table III).

Using the typology as a basis for analysis, ten PM development approaches, as described in the available literature (see Table IV), were evaluated. The objective of this analysis was to identify the completeness of existing approaches with respect to the theoretically derived framework. Table IV illustrates the outcomes of this activity and shows that while the majority of

Quality	Time	Flexibility	Finance	Customer satisfaction	Human resources
Product performance	Lead time	Manufacturing effectiveness	Cash flow	Market share	Employee relationships
Delivery reliability	Delivery reliability	Resource utilisation	Market share	Service	Employee involvement
Waste	Process throughput time	Volume flexibility	Overhead cost reduction	Image	Workforce
Dependability	Process time	New product introduction	Inventory performance	Integration with customers	Employee skills
Innovation	Productivity	Computer systems	Cost control	Competitiveness	Learning
	Cycle time	Future growth	Sales	Innovation	Labour efficiency
	Delivery speed	Product innovation	Profitability	Delivery reliability	Quality of work life
	Labour efficiency		Efficiency		Resource utilisation
	Resource utilisation		Product cost reduction		Productivity

Table II.
Critical dimensions of performance

Development process requirements	Performance measure characteristics	Dimensions of performance
Need evaluation/existing PM audit	Derived from strategy	Quality
Key user involvement	Clearly defined/explicit purpose	Flexibility
Strategic objective identification	Relevant and easy to maintain	Time
Performance measure development	Simple to understand and use	Finance
Periodic maintenance structure	Provide fast, accurate feedback	Customer satisfaction
Top management support	Link operations to strategic goals	Human resources
Full employee support	Stimulate continuous improvement	
Clear and explicit objectives		
Set timescales		

Table III.
Typology for the evaluation of strategic PM development approaches

the sample covered all the dimensions of performance, few exhibited properties that also mapped to the characteristics of performance measures and to the requirements of an effective development process.

The balanced scorecard (Kaplan and Norton, 1992) has good coverage of the dimensions of performance, but provides no mechanism for maintaining the relevance of defined measures. An additional deficiency of this approach is the lack of integration between the top level, strategic scorecard, and operational-level measures (Ballantyne and Brignall, 1994) potentially making execution of strategy problematic. Furthermore, it fails to specify a user-centred development process. In contrast, the performance pyramid (Lynch and Cross, 1991) provides an explicit link between strategy and operations, and also encourages a user-centred design. The key problem with this approach, however, is that it fails to specify, in any detail, either the form of the measures or the process for developing them.

Theoretical model	BSC	PP	R&DM	IDPMS	IPMF	IPMS	CPMP	IMM	CPMS	FSBPM
A strategic PM development process should:										
Evaluate existing PM system		✓		✓	✓	✓	✓	✓		
Enable strategic objective identification	✓		✓	✓	✓	✓	✓	✓		
Enable performance measure development	✓		✓	✓	✓	✓	✓	✓	✓	
Provide a maintenance structure				✓	✓	✓	✓	✓	✓	
Involve key users		✓				✓	✓	✓	✓	✓
Have top management support	✓	✓	✓			✓	✓	✓	✓	✓
Have full employee support	✓	✓	✓			✓	✓	✓	✓	✓
Have clear and explicit objectives	✓		✓	✓	✓	✓	✓			
Have set timescales	✓			✓			✓			
The measures in a strategic PM system should be:										
Derived from strategy	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Link operations to strategic goals		✓	✓	✓	✓	✓	✓	✓	✓	
Stimulate continuous improvement	✓		✓	✓	✓	✓	✓	✓	✓	✓
Provide fast, accurate feedback			✓	✓	✓	✓	✓	✓		✓
Clearly defined/explicit purpose	✓		✓	✓	✓	✓	✓	✓	✓	✓
Relevant and easy to maintain				✓	✓	✓	✓	✓	✓	
Simple to understand and use	✓	✓	✓		✓	✓	✓	✓	✓	✓
A strategic PM system should measure:										
Quality	✓	✓	✓	✓	✓	✓	✓	✓		✓
Flexibility	✓	✓	✓	✓	✓	✓	✓	✓		✓
Time	✓	✓	✓	✓	✓	✓	✓	✓		✓
Finance	✓	✓	✓	✓	✓	✓	✓	✓		✓
Customer satisfaction	✓	✓		✓	✓	✓	✓	✓		✓
Human resources	✓	✓		✓		✓	✓	✓		✓

Notes: BSC = balanced scorecard (Kaplan and Norton, 1992, 1993, 1996); PP = performance pyramid (Lynch and Cross, 1991); R&DM = results and determinants matrix (Fitzgerald *et al.*, 1991; Fitzgerald and Moon, 1996); IDPMS = integrated dynamic PM systems (Ghalayini *et al.*, 1997); IPMF = integrated PM framework (Medori, 1998a, 1998b, Medori and Steeple, 2000); IPMS = integrated PM systems (Bititci, 1994, 1995; Bititci *et al.*, 1997, 1998); CPMP = Cambridge PM process (Neely *et al.*, 1996a, 1996b, 1997, Bourne and Wilcox, 1998; Bourne *et al.*, 1998); IMM = integrated measurement model (Oliver and Palmer 1998); CPMS = consistent PM systems (Flapper *et al.*, 1996); FSBPM = framework for small business PM (Laitinen, 1996)

Table IV.
Analysis of current PM approaches

The main strength of the results and determinants matrix (Fitzgerald *et al.*, 1991) is that it specifies, in reasonable detail, what the measures should look like and provides a useful development process. However, it does not include customers or human resources as dimensions of performance and cannot, therefore, give a truly balanced view of performance. Ghalayini *et al.* (1997), in their framework for integrated dynamic PM, build on several different concepts to develop a system which has an explicit process for maintenance and for ensuring fast and accurate feedback. The use of the PM questionnaire (Dixon *et al.*, 1990) as an initial audit tool, also ensures that all the dimensions of performance are adequately covered. However, as this approach consists of several different tools it is potentially complicated to understand and use. In addition, it also fails to provide an explicit process for developing the PM system and is inadequate with respect to the human resource dimension (Medori, 1998).

The integrated PM system methodology (Bititci *et al.*, 1997) covers many of the criteria required for a comprehensive PM system. However, the method fails to provide a structured process that specifies objectives and timescales for development and implementation. The Cambridge PM process (Neely *et al.*, 1996a) fulfils all the criteria in the typology and is, therefore, a comprehensive process for the development of strategic PM systems. The development of operational measures, however, is described as an optional process. For it to be classified as *comprehensive, both strategic and operational measures need* to be developed. The integrated measurement model (Oliver and Palmer, 1998) is also a comprehensive approach, defining the dimensions of performance and providing a mechanism for designing the measures. The unsatisfactory aspect of this approach is the lack of a structured process for overall development. In contrast to this, the consistent PM system (Flapper *et al.*, 1996) gives a very detailed process for developing and implementing PM systems, but fails to specify a balanced approach for critical dimensions of performance. Finally, the framework for small business PM (Laitinen, 1996), differs from all the other approaches in that it adopts a purely bottom-up perspective on performance. This means that although the framework is very capable of measuring and improving performance, it is not based on any form of strategy.

Most of the frameworks and processes within this analysis provide explicit guidance about what to measure, and provide some information about how to design the PMs. However, only the Cambridge PM process offers explicit guidance on how to develop and implement a strategic PM system effectively. While this process emerges from the analysis as the most complete, further evidence is required to establish its appropriateness in a SME context. The remainder of the paper describes this context and provides empirical evidence of current PM practice in SMEs. A case study describing the application of the Cambridge process in a SME is also provided.

Theoretical relevance of strategic PM for SMEs

Current literature suggests that SMEs may be differentiated from larger companies by a number of key characteristics. These are generally described (Addy *et al.*, 1994; Burns and Dewhurst, 1996; Ghobadian and Gallear, 1997; Appiah-Adu and Singh, 1998; Berry, 1998; Marri *et al.*, 1998; O'Regan *et al.*, 1998; Haywood, 1999) as:

- personalised management, with little devolution of authority;
- severe resource limitations in terms of management and manpower, as well as finance;
- reliance on a small number of customers, and operating in limited markets;
- flat, flexible structures;
- high innovatory potential;
- reactive, fire-fighting mentality;
- informal, dynamic strategies.

The significant differences in the structure and philosophy of SMEs indicate a need to assess the relevance of the strategic PM development process, as described in the typology, for use in this context.

To illustrate the importance of an effective development process for introducing new systems into SMEs, a case study on the development of TQM in SMEs was studied (Ghobadian and Gallear, 1997). This case study highlighted the critical issues when developing a new system within a SME. The main finding was that resource implications – particularly that of management time – means that the implementation process is markedly more taxing for SMEs than larger companies. Therefore, a well designed development process, with a clear focus and effective project management, would improve efficiency and increase the likelihood of success.

The resource limitations associated with SMEs indicate that the dimensions of quality and time are critical to ensure that waste levels are kept low, and that a high level of productivity performance is attained. Similarly, the reliance on a small number of customers suggests that to remain competitive, SMEs must ensure that customer satisfaction remains high and that they can be flexible enough to respond rapidly to changes in the market. The financial dimension of performance is critical for both large and small companies, but given the lack of a monetary safety net to absorb the impact of short term fluctuations resulting from change, this dimension is paramount in SMEs. Finally, the flatter structure of SMEs means that employees often have a greater number of job roles and more responsibility. In these circumstances, a well trained and motivated workforce is also paramount and necessitates effective monitoring of the human resource dimension.

Research has shown that SMEs which link operations to their business strategies outperform the competition (Argument *et al.*, 1997). The implication

of this for PM development is that the measures should be strategically aligned and should provide an explicit link back to operations (Greatbanks and Boaden, 1998). An advantage of this is that the PM system would provide data that could input directly into the strategy formulation process. In addition, given the resource and time constraints imposed on SMEs, performance measures should be clearly defined, have an explicit purpose, be relevant and easy to maintain and be simple to understand and use.

PM practice in SMEs

The general characteristics of SMEs that have been described suggest that an effective process for strategic PM development is imperative for the competitiveness of the smaller firm. However, little empirical evidence currently exists which describes current PM practice in SMEs or which evaluates the appropriateness of current processes within this context. The following sections describe phase two of the research approach and focus explicitly on these issues. A survey of eight companies is described to establish whether these SMEs currently measure performance strategically. A case study describing the application of the selected PM process (the Cambridge process) is also provided. The empirical data from both the survey and the case study is evaluated using the typology criteria: requirements of PM development processes, performance measure characteristics, and dimensions of performance.

Survey analysis

The survey data was collected from managers of eight SMEs using semi-structured interviews. Each of the SMEs had recently undertaken a programme of strategic improvement. Transcripts from the taped interviews were analysed using coding techniques. An example of the type of codes that were developed is illustrated below:

Codes	Transcript (excerpt)
lead times delivery date process efficiency feedback/ improvement	"When we receive an order we quote a delivery date. The customer gives a date that they would like it by and we give a realistic date that might be better or it might be worse. Then when we don't reach that delivery date we have statistics that tell us how efficient we have been. So we can say 'well 10% of what we have done has been delivered late'. Then we can look back and see what the cause was. Design new processes so it doesn't happen again. That works best and that is as and when – that is not taken every month."

The codes were then grouped into appropriate categories using the areas for analysis already identified (Table V).

The results from this survey were used to build a picture of the use of PM within SMEs. It is interesting to note that none of the companies had measures covering all the areas identified in the typology. The only common attribute in this area was that all of the companies had a plethora of financial measures. None of the companies attempted to measure flexibility, and while three of the

Codes and categories	PM development process	Performance measure characteristics	What is measured
	How	*Scope*	*Quality*
	through brainstorming	department specific	product quality
	through experience	lack of company-wide measures	process quality
	Who	not strategic	defects
	managers, some staff and customers design measures	*Type*	scrap
	staff action measures	historically focused	suppliers
	Issues	some out-of-date measures	*Time*
	lack of understanding of new measures	*Format*	work in progress
	blame culture	simple	output
	explanation essential to ensure support	small number	lead times
	management support essential	practical	delivery time
	Internal triggers	flexible measurement	*Finance*
	problem recurrence prevention	too much info	inventory
	for visibility	complex data	orders/receipts
	to gain control	untimely data	profit
	for planning purposes	unclear data	turnover
	External triggers	*Use*	costs
	customer requirements	managerial use	cash flow
	government legislation	no formal feedback	sales/value added
	national standards/awards requirements	non-specific informal feedback	quotes converted
		reviews to act on data	income
			productivity
			expenditure
			Customer satisfaction
			user problems
			product usage
			service
			returns
			complaints
			Human resource
			safety
			staff turnover
			personnel

Table V. Results of coding and categorising the survey data

companies had human resource measures, these were very rudimentary and only covered, for example, staff turnover.

Many of the measures in use in each company were acknowledged to have significant flaws by all the interviewees. The most significant of these flaws was a lack of reference to strategy. The measures differed from company to company, with some maintaining a small number of simple and practical measures, and others having a majority of measures which were either obsolete or designed essentially for monitoring historical data. Interestingly, all the interviewees complained that the measures produced an overload of data which was either too complex or outdated and therefore unusable. Even where the data was usable, only one SME reported a formal feedback system, via monthly review meetings.

The introduction of new performance measures in these companies was initiated both internally and externally. The main internal trigger was as a reaction to problems that had occurred. This supports the reactive management style found in the majority of SMEs. Other internal triggers focused on attaining a greater level of control, particularly for resource planning. External triggers mainly originated from customers that requested or imposed specific measures. This conforms with the emergence of a number of supplier development programmes on the managerial agenda of large companies. Measures were usually developed in an ad hoc fashion, and difficulties were identified when staff were asked to start collecting data for which they could see no use. This would lead to poor quality data, or, in certain circumstances, a culture of blame would develop in an attempt to justify poor performance. All the interviewees who experienced these problems advocated better communication as a potential method for resolution.

A gap analysis was carried out to compare the identified SME PM characteristics against the typology. This clearly illustrated a lack of congruence between them (Table VI). A discrepancy between theory and practice was identified in the development processes employed. This included a lack of strategic forethought, a lack of communication between managers and the lack of a structured process for development. However, the majority of measures were developed by users. The characteristics of the PMs in use in the SMEs were dramatically different to those specified in the typology. The only commonalities were that the measures were both simple and practical. Two main gaps were identified in the dimensions of performance category; flexibility and human resources. Although there were human resource measurements identified, they were concerned only with the monitoring of safety or staff turnover.

Case study analysis

This stage of the research was undertaken to investigate whether the process identified as most complete, in respect to the typology, was appropriate within a SME context. The application of the Cambridge process in a SME, facilitated by a member of the original development team, was observed over a period of six months. The observations collected were coded and categorised using the same methods as for the survey data. In addition to the categorisation of the data the process was also analysed in terms of planned activities and actual activities undertaken. The results of this coding and categorisation are presented in Table VII.

The perception of PM as an under utilised management tool was the driving force behind the case company's participation in the development of a strategic PM system. The results of the coding and categorisation show that although the process was not completed, the draft measures that were produced were strategically aligned and covered all the dimensions of performance identified by the typology. The process used for developing the PM system led to some interesting observations that question its applicability for SMEs. The use of

Theoretical model	SME PM system characteristics	Gaps
The strategic PM development process should:	*Performance measures in SMEs are developed:*	
Evaluate existing PM system	With little reference to any existing measures in place	x
Enable strategic objective identification	With no reference to strategy	x
Enable performance measure development	In an ad hoc fashion by individual managers/staff	x
Provide a maintenance structure	Without deleting obsolete measures	x
Involve key users	By managers, occasionally staff and customers	
Have top management support	With management support	
Have full employee support	With a lack of employee understanding of new measures	x
Have clear and explicit objectives		x
Have set time-scales		x
Measures in a strategic PM system should be:	*SME performance measures are:*	
Derived from strategy	Not strategic	x
Clearly defined/explicit purpose	Often unclear with complex or obsolete data produced	x
Relevant and easy to maintain	Historically focused with some outdated measures	x
Simple to understand and use	Small numbers of simple practical measures	
Provide fast, accurate feedback	No formal feedback with non-specific informal feedback	x
Link operations to strategic goals		x
Stimulate continuous improvement		x
A strategic PM system should measure:	*SME PM systems measure:*	
Quality	Quality	
Flexibility		x
Time	Time	
Finance	Finance	
Customer satisfaction	Customer satisfaction	
Human resource	Human resource (v limited)	x

Table VI.
Gap analysis of SME PM against the typology

Table VII.
Results of case study analysis

Performance measure development process			
Planned	Achieved	Performance measures	Performance measure characteristics
Workshop 1 introduction to the process business needs for a new PM system identified	Workshop 1 completed 100 per cent	*Quality* scrap levels actual vs planned performance *Finance* sales growth	*Strategic* developed from strategic objectives not operational *Balanced* finances
Interviews with general manager operations manager marketing manager manufacturing manager production manager quality assurance manager finance manager	All interviews completed successfully	fixed cost expenditure return on sales return on capital *Flexibility* production volume responsiveness production capability *Time* actual vs promised delivery times pre-emptive product development	customers internal/ops innovation *Practical* explicit purpose set targets explicit formula feedback mechanism
Workshop 2 ID product groups customer/stakeholder needs analysis carried out	Workshop 2 completed 100 per cent	*Customers* products delivered on spec + on time contacts with outside companies service satisfaction *Stakeholders*	
Workshop 3 ID strategic objectives ID PM developers	Workshop 3 completed 100 per cent	employee/ manager satisfaction group contacts	
PM development sessions	Only five PM development sessions completed		
Workshop 4 agree PMs conflict analysis on new PMs	Workshop 4 cancelled		
Workshop 5 sign off PMs implement review mechanism	Workshop 5 cancelled Final PM development sessions held		
Interviews final interviews with all managers	Four final interviews held with available managers		

workshops for group consensus building and debate was new for the company but was regarded as an invaluable exercise. As one manager commented "We have a group of very experienced managers who get involved in everything due to our fire-fighting approach – which works well, but doesn't allow us to get involved in anything else. We don't spend enough time looking to the future". In the early stages of the process the enthusiasm for the workshops contributed to their success with the key outcome being the identification of a balanced set of strategic objectives that provided a foundation for the development of specific measures. However, when individual managers were allocated responsibility for developing a preliminary set of performance measures difficulty was encountered in establishing specific, defined targets for the objectives. In addition, tasks allocated to individuals, which were to be completed between workshop sessions, were met with resistance. Severe resource constraints combined with a reactive management style left little room for additional developmental activities. One manager commented: "The meetings were great – but as soon as people get out, the fire-fighting begins again and everything is forgotten until next time."

Staff turnover and the re-allocation of management to new roles, resulting from a restructuring programme, provided an unstable environment for the development of the PM system. The restructuring programme eventually became a higher priority than the PM development process for all the managers concerned. The process had originally been championed by the operations manager. During his interview at the end of the process, he commented that it "needs customising to include day-to-day operations, rather than just the strategic stuff. We need to focus our attention on basics – how we can improve customer perceptions is the main one at the moment – we aren't quite at the stage for top-level PMs yet." The stage at which the process faltered was directly after the identification of the top-level objectives and it is apparent that it was at this stage that the operations manager regarded the process unsuitable to address the company's immediate needs.

The main benefits of the process were that it highlighted an imbalance in the current PM system, which was almost entirely financial. However, because the process was not completed, the company did not achieve the implementation of a more balanced system. The process of analysing the company's strategic position and the identification of strategic objectives were acknowledged by the participants to have fostered consensus and focused their improvement effort. However, the main drawbacks of the process from a SME perspective were that it was both resource intensive and time consuming, requiring resources which were not readily available. Furthermore, the emphasis on strategic measures and the exclusion of the development of operational measures led to a perception that the approach was a future planning activity rather than one which facilitated improvements in current performance.

Conclusion

The research presented in this paper has investigated the appropriateness of current strategic PM development processes, for SMEs. A typology was formulated which synthesises current theoretical developments with respect to strategic PM. This typology contributes to current theory and attempts to facilitate a convergence of theory and practice. A series of interviews with SME managers investigated current practice, illustrating that their PM systems shared few characteristics with those in the typology. A strategic PM development process that exhibited congruity to the typology was used to explore the issue of developing PM systems in SMEs, from which some conclusions may be drawn.

Although there was widespread acceptance of the value of strategic PM evident among the managers of the SMEs studied, none had taken steps to redesign or update their current PM systems. This suggests that there are substantial barriers to strategic PM system development in SMEs. The failure of the implementation in the case study was attributed primarily to the development process being: too resource intensive and too strategically oriented. This concurs with the limited resources and the more dynamic, emergent, strategy styles found in SMEs. These issues are acutely problematic because developing a strategic PM is necessarily long term and it explicitly requires the resulting measures to be strategically focused.

If these barriers are endemic in SMEs, then the requirements for a strategic PM development process for SMEs are clear: it must be very resource effective and produce notable short term, as well as long term benefits, to help maintain the momentum and enthusiasm of the development team. In addition, it must be dynamic and flexible enough to accommodate the strategic changes which are a feature of emergent strategies. In practical terms, this means that the process should be iterative, as an important feature would be the regular surfacing of current strategy, in order to maintain the strategic relevance of the performance measures.

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Improving control through effective performance measurement in SMEs

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Keywords performance measurement, SMEs, strategic improvement, process development

Abstract. Research has demonstrated that the use of performance measures in SMEs (small to medium sized enterprises) is limited. Financial measures, which are required for examination by external stakeholders, are generally well developed. However, operational measures are typically *ad hoc* and lack formal structure. A structured approach to measuring performance in SMEs should improve strategic control. Current approaches, however, have proved inadequate for the specific requirements of the SME sector. A new process is presented for developing effective performance measurement in SMEs, which is tested through a case study. The aim of the process is to develop measures that drive operational performance towards the achievement of strategic objectives. The results of the case study demonstrate the potential of the process for improving strategic control and stimulating continuous improvement in SMEs.

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1. Introduction

Financial performance measurement (PM) has long been criticized for failing to help managers cope with the pressures of today's competitive environment (Eccles 1991, Barker 1995, Ghalayini and Noble, 1996). This dissatisfaction has led to the development of a number of new approaches to PM, which integrate financial measures, operational measures, incorporate the needs of various stakeholders, and align these with company strategy (Fitzgerald *et al.* 1991, Lynch and Cross 1991, Kaplan and Norton 1992). These approaches, however, have been designed for, and tested in, large companies. Relatively little research has been carried out to assess the needs of SMEs in this area. This paper specifically addresses the PM requirements for SMEs. The following sections review existing literature, to identify how SMEs typically use performance measures, and highlight the problems associated with implementing PM systems in SMEs. The findings from the literature are used to develop a new process for designing strategically aligned performance measures in SMEs. Case study results, from the application of this new process, are presented, and managerial implications are considered. Finally, the key findings from the research are summarised and a plan for future work is discussed.

2. Background literature

Although there has been much research carried out into the needs and use of PM in large organizations, this is not reflected in the SME sector, where there is a distinct lack of published research on these issues. From the literature that is available, however, a broad picture of the way PM is used in SMEs can be obtained.

According to Jarvis *et al.* (2000) SMEs predominantly focus their performance measures on cash flow. This view is supported by Webb *et al.* (1999), who carried out a study on the type of measures typically in use in manufacturing SMEs. This contrasts with the accepted wisdom in larger firms that the primary performance indicators should be focused on profit maximization. However, a study carried out by CIMA (1993) found that there were no significant differences between the way large and small companies measure performance. In addition, Masalla (1994) concluded that Italian SMEs paid little attention to management accounting information, instead confining their measurements almost exclusively to financial figures about income and sales. This leaves a confused picture about how SMEs typically measure business performance.

Although business level PM in SMEs is typically minimal and financially focused, Hynes (1998) points out that SMEs cannot effectively manage performance on this basis. CIMA (1993) states that there is an increasing realization of the importance of nonfinancial measurement among SMEs, although it concedes that there is still a disparity between practice and theory, which emphasizes nonfinancial measures. This disparity can be explained by the indistinct understanding of the importance of performance indicators in general, particularly operational indicators (Walley *et al.* 1994, Webb *et al.* 1999). As a result, it is not surprising to find that studies on the use of PM typically state that operational measures are *ad hoc* and informal (Addy *et al.* 1994, Hudson *et al.* 1999), with no real understanding of key performance drivers (Greatbanks and Boaden 1998). This might explain why SME PM systems are ineffective in supporting the achievement of strategic goals (CIMA 1993, Barnes *et al.* 1998, Hudson *et al.* 1999, 2000, Veitch and Smith 2000).

In cases where PM is used to drive performance, problems can also occur. Studies have shown that output volume is a very common operational measure in SMEs (Close *et al.* 1998, Webb *et al.* 1999). In some companies, this measure is perceived as being the primary performance measure amongst both staff and managers. However, having one overriding measure driving performance can induce extremely strong behavioural responses in staff, which can inhibit the ability of a company to change (Close *et al.* 1998). This is because many firms do not change their performance measures when they change their strategies (Walley *et al.* 1994). In this case, unstructured PM could not just make achieving strategic objectives difficult, but could potentially prevent any strategic development occurring within the company.

3. Structured PM system development in SMEs

The previous section identified that the PM systems in use in SMEs are typically financially focused, informal and unstructured. This approach is considered to have several drawbacks, the most important of which is that these performance measures are more likely to inhibit, rather than to facilitate, the achievement of strategic objectives. To overcome this problem, a number of approaches for assessing and designing SME PM systems have been developed. The following review identifies the strengths and weaknesses of each approach. These strengths and weaknesses are used to formulate a more appropriate approach for use in the SME sector.

Several studies have focused on a single PM perspective in the SME sector. One such study presents a framework for auditing PM use in small, growing firms (Hynes 1998). The findings from this study support those already

discussed, showing that firms with an explicit growth strategy are still likely to plan in an *ad hoc* and informal fashion, relying primarily on financial measurements, required by external stakeholders, as their key measures of success. Other studies examine the implications of customer orientation on performance (Appiah-Adu and Singh 1998), and identify the types of quality models that are suitable for a number of different SME environments (Noci 1995). Although none of these studies present a holistic perspective of PM in SMEs, they do provide some useful guidelines for managing these issues in this sector. These guidelines include highlighting the importance of regular measurement and feedback to managers (Hynes 1998) and introducing company changes on a gradual, incremental basis (Appiah-Adu and Singh 1998).

There are also a number of studies which investigate appropriate methods for developing PM in SMEs. Barnes *et al.* (1998) present the results of a number of PM audits carried out in SMEs. The key recommendations from this study were that structured PM and more formal business planning would increase managerial understanding and control of the business. A number of specific recommendations for developing this system were also presented. These have been developed into a new PM framework (Chennell *et al.* 2000). However, although this framework has been tested successfully in the private and public sectors, none of these tests appear to have been carried out in SMEs. This precludes the derivation of any results for the SME context.

Two studies evaluate the use of the Balanced Scorecard (BSC) for use in the SME sector (Hvolby and Thorstenson 2000, McAdam 2000). The BSC was developed by Kaplan and Norton (1992) to improve measurement by focusing of four performance perspectives; customers, finance, internal business processes and learning and future growth. Both studies suggest the likelihood of significant difficulties implementing such a resource intensive system in SMEs, where resources are typically scarce. McAdam (2000) also comments on the fact that the BSC has a long term focus, which conflicts with the need for many SMEs to remain flexible and adaptable to rapid market changes over which they have little control. Hvolby and Thorstenson 2000) advocate the adoption of Quick Response Manufacturing (QRM) as an alternative to the BSC. The advantage of this approach is that it is much simpler than the BSC, focusing on lead time reduction as the only indicator of performance. The rationale for such an approach is that lead times can be used to facilitate agility and lean production, whilst retaining a customer orientation. In addition, it can help to focus priorities and efforts for improvement. However, as discussed previously, there are significant behavioural drawbacks in implementing one overriding measure of performance, which makes the focus on lead time reduction as the only performance indicator difficult to justify.

Laitinen (1996) presents a framework specifically designed for developing structured PM systems in small companies. This framework is designed for the exclusive use of the Managing Director, implying that it is designed only for very small companies, where the MD has complete control. The approach utilizes Activity Based Costing information (ABC) to improve the quality and usefulness of management accounting information. However, the drawback of this approach is that because ABC is the primary decision making tool, the system has no strategic orientation.

Finally, a process for PM system design which was developed and tested originally in large companies (Neely *et al.* 1996), has been applied in SMEs. This is a comprehensive, step-by-step process which develops structured, strategically aligned PM systems. In the first phase, the company identifies performance measures aligned to each strategic objective. Once these strategic level measures are in place, phase two identifies operational measures to drive performance towards those objectives. Seven SMEs took part in the study (Bourne and Neely 1998), with one company failing to complete phase one of the process, and a further three companies failing to implement the measures they had developed. The three successful companies took between nine and thirteen months to implement the phase one measures (Bourne *et al.* 1998). The length of time required to integrate the system into companies has been identified as a potential reason why the implementation rate was so low (Bourne *et al.* 2000).

A further case study has been carried out using the process, specifically to evaluate its usefulness in an SME context. (Hudson and Smith 2000, Hudson *et al.* 2000). The company in this study also failed to complete the process and implement the measures they had developed. A number of observations about the difficulties encountered were made, suggesting that the process was fundamentally unsuitable for use in the SME context:

> The characteristics of limited resources, limited cash flow coupled with a reliance on few customers, a fire-fighting mentality coupled with an emphasis on current performance, and potential staff turnover coupled with a flat organisational structure, means that SMEs require an alternative approach to strategic PM development. (Hudson *et al.* 2000).

To overcome these difficulties, recommendations for a new PM process for SMEs have been identified. These advise that the process needs to be very resource effective, produce notable short term as well as long term benefits

to maintain the enthusiasm and momentum of the development team and should be dynamic and flexible enough to cope with strategic changes (Hudson *et al.* 2001).

4. Designing a new process for PM development in SMEs

The review has shown that that no current approach to the development of SME PM systems is wholly suitable for use in this sector. This is due to the level of resources required, the lack of flexibility and the orientation of these approaches. However, it has identified a number of recommendations which can be incorporated into a new process for developing PM in SMEs. Therefore, the new process should:

- encourage regular measurement and performance feedback (Hynes 1998);
- introduce changes incrementally (Appiah-Adu and Singh 1998);
- be structured and facilitate business planning (Barnes *et al.* 1998);
- be fast and resource efficient (Hudson and Smith 2000);
- give short as well as long term benefits and be flexible enough to accommodate strategic changes (Hudson *et al.* 2001).

These recommendations were embodied in a new process (figure 1), which was designed to develop performance measures for one strategic objective at a time,

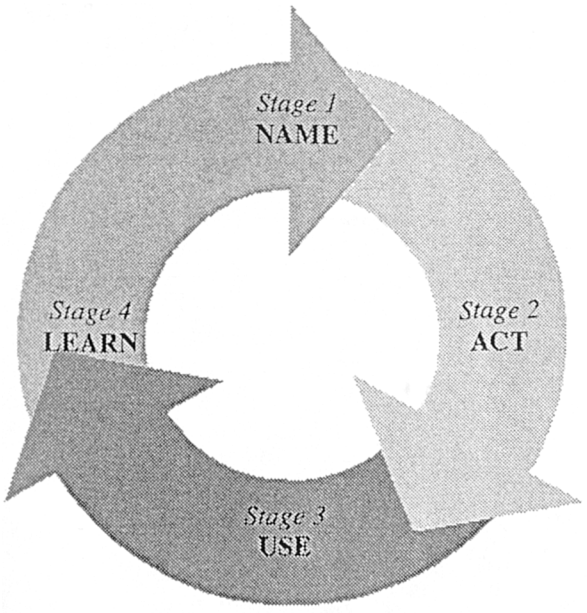

Figure 1. Performance measurement process for SMEs.

with an immediate cascading of the strategic level measure down to the operational level, in order to drive performance towards achieving this objective. This means that the process is incremental, with a number of benefits:

- it makes each increment of the process quicker and more efficient through focusing on just one objective at a time;
- it provides short term as well as long term benefits because all improvement efforts are focused on one strategic objective at a time;
- it ensures that even if the process stops after one or two iterations, a complete and usable set of company-wide measures for those strategic objectives would have been produced and implemented;
- it enables performance measures to be updated regularly to reflect strategic changes;
- each iteration adds to the development of a comprehensive, strategically aligned performance measurement system.

The planning stage of the process involves identifying and naming the current top priority business objective, in order to focus improvement efforts and eliminate communication problems (*Name*). This is followed by the development of a small number of performance measures to drive progress towards the named objective (*Act*). Using the performance measures helps to evaluate the success of any improvement efforts and to monitor progress towards the named objective (*Use*). Reviewing the performance data regularly gives an early warning of potential problems and ensures that the measures remain relevant. This may result in updating existing measures and removing inappropriate, or obsolete, measures (*Learn*). The process was then expanded into a draft workbook, to enable information and advice for each stage to be clear and accessible. This also ensured that the tools and techniques which had been chosen or developed for each stage could be illustrated and described in detail, for ease of use.

5. Research method

To ensure the usefulness of the new process, a case study was conducted in a SME to test its practicality and usability. Data collection was based on the 'action science' method (Gummesson 1991), with the researcher acting as the process facilitator. The process was applied through three workshops and two meetings involving a number of managers and supervisors. Processual and behavioural data was accumulated through the workshops. The workshop participants were also asked to

give feedback after each stage of the process. Data triangulation was achieved through the use of multiple data sources and multiple researcher involvement. Data analysis was carried out using Pettigrew's (1988) three dimensional model of strategy formulation: *Process, Content, Context*. This model was appropriate because it enabled the evaluation of the process itself, the outputs of the process (the content) and how it worked in a SME context. The evaluation enabled the process to be refined and simplified to increase its effectiveness in the SME sector.

6. Case study

The Case Company is a SME based in the South West of the UK. It designs and manufactures electromechanical winches and gearboxes, primarily for use in the automotive recovery industry. The Company has been established for 25 years and currently employs 96 people.

In 1999 the Company went through a major period of change, initiated by its Sister Company in the United States. Pressure was exerted on the Company to reduce costs and to improve overall profitability. To help achieve this, the company employed a new Operations Director. One of the major problems he found was that there was very little control over the manufacturing operation and staff were powerless to make even obvious improvements.

The Operations Director felt that the PM process could be used to help eliminate some of the problems in the order fulfilment process. Two preliminary meetings were held which enabled the researchers to build a relationship with the Company and to explain the process to them. At these meetings, the Company agreed to give feedback and suggest possible refinements at each stage of the process.

6.1. *Stage 1: NAME*

The process began with a two hour meeting between the Operations Director, the Finance Director and two researchers, one of whom acted as a process facilitator. The aim of the session was to identify the Company's current strategic objectives and name one objective as the main focus for improvement. This was achieved by using the tools and techniques described in the draft workbook and led to the objectives being identified as follows:

- reduce manufacturing and raw material costs;
- Introduce a global warranty service;
- introduce modular design and standardize products;
- increase manufacturing capacity;
- deliver products on time;
- improve flexibility;
- improve reject rates and accuracy of reject data;
- simplify/improve engineering design;
- improve manufacturing processes and systems.

Two of these objectives were identified as being critically important to the Company: increasing manufacturing capacity and on-time delivery. The Company decided to focus their efforts on the latter, as they recognized that until they had made their production process efficient enough to cope with current capacity, there would be little point in increasing it.

6.2. *Stage 2: ACT*

At the end of Stage 1, a project team consisting of five people was identified, who would be responsible for identifying appropriate improvements and performance measures to support the named objective.

The team were offered two possible methods of gaining input from the other members of staff, either via a survey or brainstorming sessions. Due to a lack of time and resources to devote to brainstorming sessions, they decided that a survey to all staff was the best option. The survey was sent out to every employee with their payslips, and they were given just 3 days to return them. The response rate was 22%, which was considered acceptable given the limited time-scale.

The issues identified from the surveys were prioritised to highlight the key issues and activities which were needed to achieve the named objective. A summary of the key issues and activities identified are given below:

- kanban system needs to be completely revised and used properly;
- stock information to be reviewed and updated;
- better communication required–particularly between purchasing and manufacturing;
- improved teamwork and training systems needed across the company;
- reliable equipment needed;
- Better credit and debt control required;
- more production planning and control;
- quality equipment to be made more accessible;
- IT system needs to be used fully and effectively;
- implement feedback loop on corrective actions throughout company;
- manage labour resources effectively.

Unfortunately, due to time constraints, the team were unable to develop performance measures during this workshop and another meeting was arranged for a week later. However, this was cancelled and the performance measure development meeting was eventually held almost a month later. The reason for this delay was later confirmed by the participants as being because the process did not have an explicit section which dealt with implementing the improvements. Therefore, the Company had spent the previous month trying to resolve the problems that had been highlighted by the improvement survey. This meant that in addition to identifying suitable improvement measures, the meeting also reviewed the progress of those improvements which had already been implemented.

Improvements that had already been made included setting up a group to co-ordinate IT usage across the Company and dedicating two members of staff to maintaining the kanban system and improving stock control. However, there was still a lack of understanding of where the specific production problems lay which affected delivery performance. This led to the decision to start measuring delays in the production process. This was achieved by developing a checklist to record the reasons for machine downtime in both production and assembly.

6.3. *Stage 3: USE*

The Production Manager developed the machine downtime checklist (figure 2). This was implemented immediately and is used by supervisors in both the machine shop and the assembly room to record reasons for machine downtime in each area. In addition, the Sister Company in America, with more human resources available, developed the measures further, producing graphs to monitor both delivery performance and the reasons for missed deliveries (figures 3 and 4). These measures are now being implemented in the UK Company.

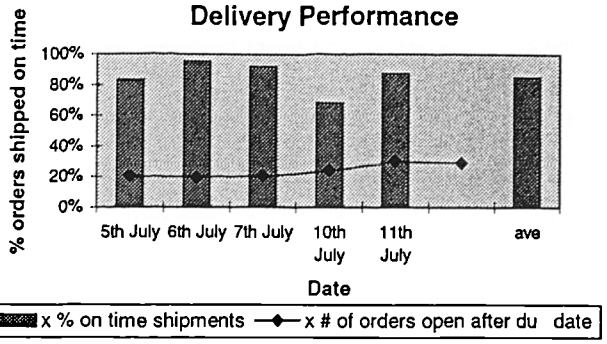

Figure 3. Measuring delivery performance.

6.4. *Stage 4: LEARN*

The measures help identify the main reasons for missing due date delivery. Each month, the reasons are collated and the primary problem becomes the focus for improvement actions. To date, this has led to a number of improvements being made in the machine shop, as a major problem was that assembly were not receiving parts on time. It has also highlighted a number of supplier–Company communication issues, which are now being investigated.

Machine Downtime Record (G50) Monday					
M/C No	Setting Time	Machine Downtime	Reason for Downtime	Material I/D & Part No	Standard Hrs Available 45:00:00
S04		7:30:00	material shortage	H/Y	
S05		3:00:00	parts required	H/2	Overtime Worked 1:00:00
					Total hrs Worked 46:00:00
					Total Hrs Running Machines 31:00:00
					Total Downtime 15:00:00
					% of Downtime 32.61%
					07-Aug-00

Figure 2. Downtime checklist.

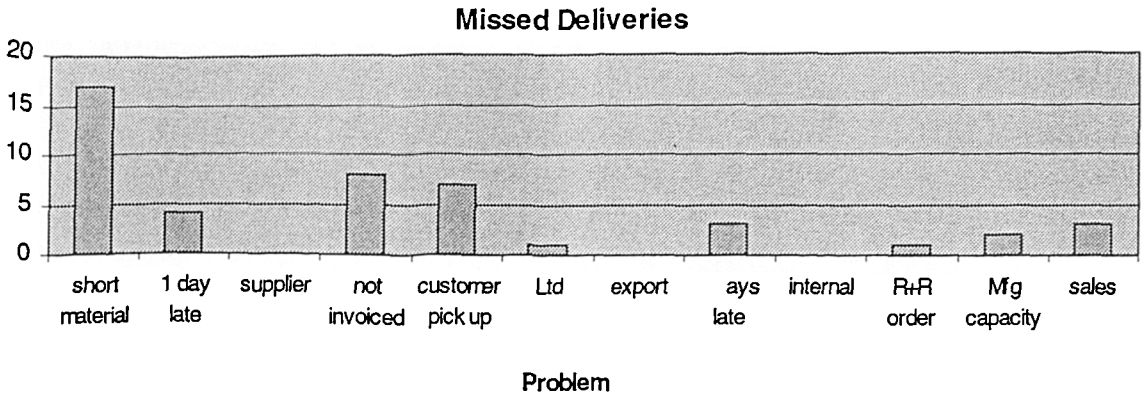

Figure 4. Monitoring the reasons for missed deliveries.

7. Process evaluation

The case study has demonstrated the usefulness of the process in helping managers to identify the critical areas for improvement in the Company. The tools used helped gain consensus among staff on the changes required to implement necessary improvements. The measures developed have proved to be essential for identifying the primary factors which contribute to poor performance, thereby stimulating a number of ongoing operational improvements.

The tools used in Stage 1 were modified during the process to make them more relevant to the business and reduce scope for confusion, thereby making them more user friendly. Feedback from the survey used in Stage 2 was extremely positive. The project team found the responses both useful and enlightening and they were keen to use surveys again to help them develop a more pro-active workforce and improve employee morale. However, a gap was identified in the original process at this point, because there was no mechanism for implementing the improvements identified from the surveys. It was recognised that this was an important step, as the performance measures would only be useful if they could monitor the improvements that were being carried out. Finally, the performance measures developed were seen as being a key way of identifying and monitoring improvements in the Company, facilitating a move towards continuous improvement.

The main problem which was surfaced during the case study was that although it was a relatively simple task, given the enthusiasm of the operations director, to use the process to identify improvements, it was much more difficult to persuade the Company of the value of monitoring those improvements over time. The purpose of the process is to drive improvement efforts towards the achievement of strategic objectives, using performance measures as the vehicle for achieving this. Missing out this link runs the risk of losing the connection between strategy and operational improvements, which is problematic. In an attempt to alleviate this problem for future use, the workbook was modified to link improvements and performance measures more closely together.

Overall, the case study helped identify a number of improvements which have been incorporated into the process. These improvements enabled the Company to identify a number of areas for improvement, through strategically aligned performance measures, and has also facilitated a change of culture in the Company, towards continuous improvement. The process has, therefore, been substantially rewritten and updated to reflect these improvements and its continuous improvement potential. The updated process, which has been published in workbook format (Hudson 2000), is illustrated in figure 5.

8. Content and context evaluation

The process was developed to be usable and useful in a SME context. The Case Company exhibited many of the characteristics typically attributed to SMEs:

- severe resource limitations and a limited customer base (Burns 1996);
- reactive (fire-fighting) mentality (Oakes and Lee 1999);
- lacking in formal planning and strategic thinking (Pelham 1999).

Therefore, the results from the case study provide a useful indication of how the process might typically work in a SME context.

The feedback from the workshops, along with the observational data collected, showed that the process had a positive effect on the Company. Although one of

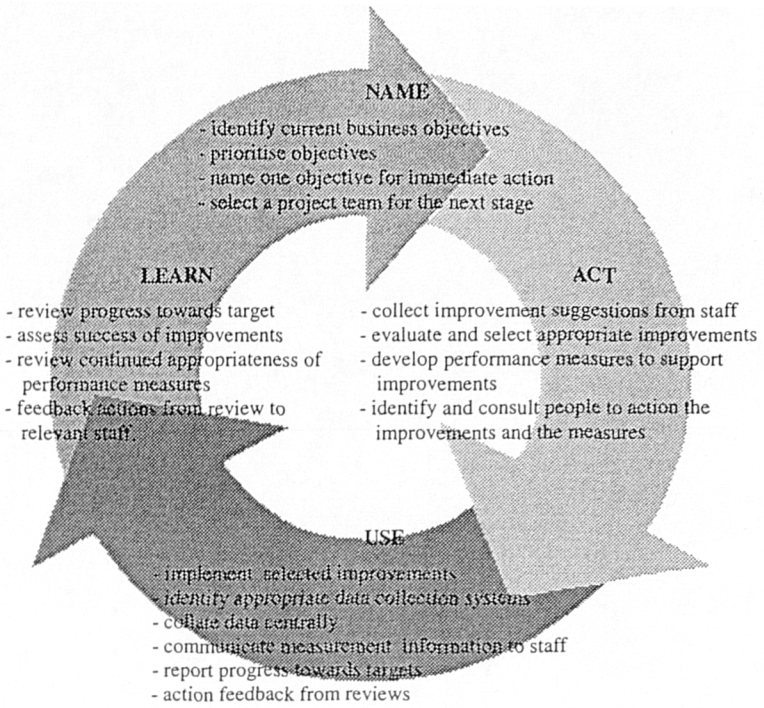

Figure 5. Continuous strategic improvement process for SMEs.

the workshops had to be postponed for three weeks, the level of time and resources required were not considered too great, even though the project team consisted entirely of managers or supervisors. In addition, the use of surveys as a method of gaining fast access to employees' views was particularly well received. The practice has helped to improve employee morale throughout the company, as well as providing useful input into the improvement process.

The outputs of the process – the content – also proved useful in the SME context. By focusing the entire Company's improvement efforts on one area, delivery performance, a number of poor performing operational factors were identified. Measuring has helped identify the root causes of poor delivery performance, which are now being systematically eliminated through a programme of continuous operational improvement, monitoring and learning. As these improvements take place, an improvement in delivery performance is expected to follow.

The literature review identified significant problems associated with focusing on one single measure of performance, because it could inhibit change capabilities. This has been avoided in this case, because the process is iterative. Therefore, when the delivery performance measures had been successfully embedded in the Company, the management team worked through the process again, this time to improve the staff training and performance appraisal system. The results of this iteration of the cycle have been more immediate, seeing the number of complaints about the system drop from over 40 in 1999 to just 3 in the year 2000. The company are currently preparing to use the process again, to improve the way that orders are prepared, in order to eliminate unnecessary costs and improve the effectiveness of the order fulfilment process.

9. Conclusions

This paper has presented a new process for developing strategically aligned performance measures, which can help stimulate continuous improvements. It differs from other approaches because it is specifically designed to accommodate the requirements of SMEs. It achieves this by linking performance measures to specific improvement efforts, to help drive performance towards critical strategic objectives, which are designed to be revisited and updated regularly.

The process was developed from theory and tested and refined in practice in a SME. The feedback from the case study was extremely positive. Since the original project was carried out looking at delivery performance, the Case Company has customised the process and made it part of their management system. The benefits of using the process in the Company are that they now have a structured process for continuous strategic improvement, which is

fast and resource efficient, helps to surface important strategic issues and facilitates strategic flexibility. The limitations of the study lie in the fact that the process has only been tested in one company. Although the process is designed to be flexible and adaptable to specific companies needs, this has yet to be proved in practice. Owing to the heterogeneity of SMEs, it is necessary for further research to be carried out to validate the process. This will initially be within the manufacturing sector and will seek to identify the types of SME which might benefit from applying this process.

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DEVELOPING A CONTINUOUS STRATEGIC IMPROVEMENT CAPABILITY IN SMES

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Introduction

The 1990's saw the development of a number of methods and processes for designing integrated performance measurement (PM) systems. The primary focus of all these methods was to link PM to the strategic objectives of the company, thereby reducing reliance on purely financial measures and driving performance towards the achievement of strategic objectives. However, such methods can only be used effectively in companies which have an explicit strategy. Previous research has demonstrated that small and medium sized enterprises (SMEs) typically have a more dynamic, emergent strategy style (Hudson et al, 2000a). This suggests that potential problems could be experienced when using these methods in a SME context. Two studies on the use of the Neely et al (1996) PM development process, which appears to be the only comprehensive process to have been applied in SMEs, have concurred with this view (Bourne & Neely, 1998, Bourne et al, 1998, Hudson et al, 2000). The purpose of this paper is, therefore, to address this issue by presenting a new process for developing integrated PM effectively in a SME environment.

SME Characteristics

It is well documented that SMEs have different characteristics from larger organisations. These differences are commonly perceived as being a consequence of the internal and external environments these firms operate in, which are distinguished by their highly turbulent nature. The characteristics can be divided into three broad categories,: *Competitive Environment*; *Organisational Environment* and *Management Practices,* which will now be explored in detail.

Competitive Environment

SMEs are considered to be flexible and adaptable to market changes (Ghobadian and Gallear, 2000; Yusof and Aspinwall, 2000). This responsiveness is generally viewed as a positive characteristic. However, the root cause of this attribute is that SMEs have no control over the markets in which they operate. They are unable to drive the market, but instead, must react and adapt to market changes over which they have no influence (Burns, 1996; Storey and Sykes, 1996; Hyvarinen, 1990). This is exacerbated by the fact that many SMEs have only a limited overview of the markets in which they operate (Wiklund and Wiklund, 1999; Huang and Brown, 1999; Pelham, 1999).

SMEs' relationships with their customers are also fraught with uncertainty. Although there is an acknowledged advantage in small firms of being closer to the customer, enabling more personal relationships to develop (McAdam, 2000), there is also the danger that having a limited customer base (Ghobadian and Gallear, 1997; Yusof and Aspinwall, 2000) facilitates the development of deferential supplier-customer relationships. Rainnie (1991) categorised SMEs into groups, according to their relationships with larger companies; "*Dependant firms, Dominated firms, Staid firms and Innovative firms*". It is interesting to note that, with the exception of staid firms, which operate only in very low profit, or niche markets, SMEs are consistently viewed as being subservient to their larger counterparts. This view is supported by Oakes and Lee (1999) who suggest that SMEs have a lack of control over their futures because of demands made by stronger customers throughout the supply chain. An additional burden for SMEs is a lack of power to leverage payment of debts from these customers, as noted by McCulloch and Lewis (1986), who point out that many smaller firms are *"afraid to press customers too hard for payment for fear of loss of future business."* It is this scenario which most severely affects SMEs as their limited resources cannot cope with the fluctuations in cash flow that late payment inevitably brings.

The overall effect of the fiercely competitive environment in which SMEs operate is that, very often, strategic planning becomes a seemingly pointless exercise. Pelham (1999) points out that unless the internal structures and the external competitive environment of the SME are effectively aligned with its strategy, it is unlikely that it will ever be implemented successfully. The difficulties associated with aligning strategy to the external competitive environment led Argument et al (1997) to conclude that the majority of SMEs in the automotive sector are not concerned about future strategic developments, as survival in the supply chain requires them only to maintain a reactive strategy. In addition, Harris and Ogbonna (1999) found that it is not unusual to find firms which have never updated their strategy since it was originally developed by the founder, thereby leading to a *"strategic hangover,"* which, if the competitive environment or the company structure have changed, may be detrimental to future business success.

Furthermore, there is evidence to suggest that many established SMEs rely solely on internal or financial planning as their main approach to preparing for the future (Waalewijn and Segar, 1993; O'Regan et al, 1998). This might be due to the fact that accountancy information has been shown to be the most important factor in determining survival or failure in SMEs (O'Neill and Duker, 1986). However, financial information alone is limited as it fails to

give a true overview of the competitive environment in which the SME operates and the fact remains that companies which make strategic business plans perform significantly better financially, than those which do not (Smith, 1998).

Organisational Environment

The most widely acknowledged factors that distinguish SMEs from larger companies relate to the organisational environment in which they operate. They are considered to have flat structures with few management layers, be flexible and adaptable to changing market needs and have a high potential for innovation (Ghobadian and Gallear, 1997; McAdam, 2000; Yusof and Aspinwall, 2000; Wiklund and Wiklund, 1999; DTI, 1994; Jennings and Beaver, 1997; Burns, 1996; Gunesekaran et al, 2000). However, they are also seen as suffering from *"resource poverty"* (Welsh and White, 1981), both in terms of human resources and financial stability and security (Abdul-Nour et al, 1998; Pelham, 1999). In addition, it is commonly noted that SMEs are loosely structured, with informal operating practices and a distinct lack of bureaucracy (Jennings and Beaver, 1997; Hyvarinen, 1990).

Culturally, however, SMEs are less well defined. This is understandable as culture is rather more subjective and it is therefore more difficult to define patterns in this area. However, there is a broad consensus that smaller companies have a more unified culture, with a high degree of personal authority among staff, and management who are visible and involved in the operations of the company (Storey and Sykes, 1996; Jennings and Beaver, 1997). Conversely, there is also a recognised skills shortage amongst staff, along with a deficit in management expertise (McAdam, 2000; Curran, 1987; Huang and Brown, 1999). There are also differences in the way that businesses are managed, with highly personalised management styles typical (Storey and Sykes, 1996).

Management Practices

The organisational environment in which many SMEs operate can have a profound effect on the way that they are managed. A key factor in this is the personalised management styles which are a feature of firms where control rests primarily with one person, typically the owner-manager.

According to Hannon and Atherton (2000) there are four types of owner-manager, with each type likely to have a distinct effect on the business. The first type are owner-managers who have low strategic awareness and low planning capabilities. Companies managed by such people are dubbed *"un-navigated ships"* and are likely to be poor performers. Where the owner-manager has good planning capabilities, but little strategic awareness, the company is seen as a *"myopic innovator"*, having potential, but remaining vulnerable to unforeseen events. The *"visionary under-achiever"* is the term given to firms where the owner-manager has a high level of strategic awareness, but fails to plan well enough to see good ideas thrive. Finally, some firms are driven by people with good strategic awareness and effective planning capabilities. These firms are typically successful due to their ability to identify potential threats and act upon appropriate opportunities, they are therefore known *as "successful orienteers"*.

The idea that the driving force in a company significantly affects a company's strategic success is echoed by Berry (1998). Her study of high tech firms concluded that *"the technical entrepreneur's strategic awareness will determine the nature of planning used within the firm."* In addition, Brouthers et al (1998) suggest that planning in SMEs is typically less political, less controlled, less rational and more intuitive than in large companies.

Frese et al (2000) take the link between managerial capabilities and business success one stage further. Their study investigates the link between the personal strategies of the managing director and the success or failure of the business strategy. They identify five personal strategic approaches:

"Complete Planning" where a comprehensive set of plans are produced which actively structure given situations;

"Critical Point Planning" which concentrates on one goal at a time, aiming to solve the most difficult problem first, thereby making strategy an iterative process (Zempel, 1994 cf. Frese et al, 2000);

"Opportunistic Strategy" – where strategy is largely dictated by the new opportunities which arise and basic planning is easily sacrificed to them;

"Reactive Strategy" where no forward planning is undertaken, but the person simply reacts to current demands;

"Routine / habit" this is not actually a strategy at all, but simply a standard approach to problems, which has been used before and is therefore both familiar and undemanding.

From this typology, the study illustrates that a combination of Critical Point and Opportunistic Strategies is most likely to bring business success, whereas Reactive / Opportunistic is the least successful combination. Interestingly, although the reactive strategy was negatively correlated with business success, there was no evidence to support the idea that complete planners were any more likely to succeed.

Overall, the primary difference between large companies and SMEs in terms of management practice lies in the fact that SMEs have fewer senior managers, meaning that the capabilities of just one person can have a profound effect. Perhaps it is due to a lack of management expertise that strategic business planning in SMEs appears to be generally limited and short term in focus, with a fire-fighting 'react and adapt' philosophy prevalent (Ghobadian and Gallear, 1997; McAdam, 2000; Yusof and Aspinwall, 2000; Burns, 1996; Oakes and Lee, 1999), as summed up by Jennings and Beaver (1997) who state *"[In SMEs]...strategic management becomes primarily an adaptive process concerned with manipulating a limited amount of resources, usually, in order to gain the maximum immediate and short term advantage."*

SME Defining Characteristics: A Summary

From this review of the literature, it can be seen that there are a number of key characteristics of SMEs. In conjunction with the basic numeric definition in which a SME constitutes a company with 250 employees or less, as defined by the European Commission (1996), these characteristics are able to provide an overview of the particular group of firms that are termed SMEs. Therefore, for the purposes of this research, SMEs are classified as companies with 250 employees or less, which exhibit the characteristics defined in table 1.

Competitive Environment	Organisational Environment	Management Practices
Reliance on a small number of customers; Lack of market influence; Reactive, fire-fighting mentality;	Flat, flexible organisational structures; Unified culture; Severe resource limitations in terms of manpower and finance; Skills shortages and lack of training; High potential for innovation.	Highly personalised management styles; Informal, dynamic strategies; Lack of management expertise.

Table 1: SME characteristics as defined for this research project

Advantages and Disadvantages of Integrated PM in SMEs

The term 'integrated PM' has been coined to describe PM systems which aim to present an integrated view of business performance. This differs from the traditional use of PM as a purely financial monitoring tool. Previous research has developed a conceptual model of integrated PM, derived from the literature (Hudson et al, 2000b). This model provides a clear explanation of what the term means, both in terms of the competitive dimensions for which measures should be developed (the dimensions of performance) and appropriate characteristics of performance measures. The conceptual model is presented in Table 2.

Dimensions of Performance	Performance Measure Characteristics
Customer Satisfaction	Derived from Strategy
Operational Effectiveness	Developed by Key Users
Stakeholder Satisfaction	Link Operations to Strategic Goals
Supplier Effectiveness	Stimulate Continuous Improvement
	Clearly defined with an explicit purpose
	Simple to Understand and Use
	Relevant and Easy to Maintain
	Provide Fast and Accurate Feedback

Table 2: Conceptual Model of Integrated PM (Hudson et al 2000b)

The characteristics of SMEs, as previously defined, have several implications for the use of integrated PM, as described by the conceptual model, in this environment. The severe resource limitations facing SMEs, along with a general lack of skills and training means that any integrated PM system would have to be extremely well managed. This means that there is a greater need in SMEs for measures to be clearly defined, have an explicit purpose, be relevant and easy to maintain, provide fast and accurate feedback and be simple to understand and use. Displaying these characteristics would ensure the efficiency of the system and make it more likely to be used appropriately in a hectic SME environment.

The informality and dynamism of SME strategies, along with their potential for fire-fighting, also means that it is likely to be considerably more difficult to derive measures from strategic plans in SMEs than it would be in larger companies. This could be a major problem, as it also affects the ability of the system to link operations to strategic goals and therefore to stimulate continuous improvements within the company. In addition, the importance of measuring across all four dimensions of performance cannot be underestimated in the SME environment. The reliance of SMEs on a small customer base suggests that to remain competitive, they must ensure that customer satisfaction remains high and they can be flexible enough to respond rapidly to changes in the market. This can only happen if the company has effective suppliers and is operationally effective. Finally, stakeholders, particularly those who have a financial interest in the firm, are critical to the success of both large and small companies, but given the lack of any other monetary safety net to absorb the impact of short term fluctuations resulting from change, stakeholder satisfaction is paramount in SMEs.

Requirements for a SME focused Integrated PM Development Process

The previous section illustrates that, for SMEs, integrated PM is equally, if not more important than it is for larger organisations, despite the fact that SME characteristics make it more challenging to implement in this

environment. Therefore, in order for SMEs to reap the benefits of integrated PM, it is necessary to establish how it can be introduced effectively into such a turbulent environment.

A process for integrated PM system design (Neely et al, 1996), which was developed and originally tested in large companies, has also been applied in SMEs. This process was evaluated against the conceptual model of integrated PM and was found to conform to all the features identified, whilst also providing a comprehensive, structured process for development. However, several studies have shown that the process was rarely completed in SMEs (Bourne et al, 1998; Bourne et al, 2000, Hudson and Smith 2000). These difficulties were linked to the time-consuming and resource intensive nature of the development and implementation process, along with the fact that the SMEs studied did not have an explicit strategy from which to derive their measures.

From the applications of the Neely et al (1996) process, a number of requirements have been identified for a SME focused integrated PM development process, reflecting the additional constraints facing SMEs. These are as follows:

- very resource efficient development;
- short term as well as long term benefits;
- measures aligned with SME strategy models;
- dynamic and flexible development process.

These requirements form the basis for the development of a new process for introducing integrated PM into SMEs. The rest of the paper will describe how the new process was designed and then use case studies to examine how it works in practice.

Process Design

According to Rowe (1987) there are three distinct types of design problem, well defined problems, ill defined problems and 'wicked' problems. Well defined problems are deemed to have straightforward solutions, whilst ill defined problems have awkward solutions. However, wicked problems are so called because they represent problems with no perfect solutions, making any attempt at a solution only an improvement on what went before, rather than a wholesale solution. The problem of designing a method of introducing integrated PM into SMEs is one which falls into this category. This is because, as every SME is different, there will never be a panacea for PM development which will work in all situations. Therefore, the design will attempt to create a 'best fit' process, which conforms to the requirements that have been described and solves some of the problems associated with introducing integrated PM into SMEs. This process can then be used to enhance current knowledge in this area, paving the way for future improvements.

According to Slack et al (1998) there are two fundamentally different methods of introducing change in an organisation. These are 'breakthrough' changes, which are dramatic, one-off changes, or continuous improvement, which is an ongoing, incremental method of change. Due to the lack of resources and the need for ongoing benefits required in for the SME PM process, the latter option was considered most appropriate and the process was developed with an incremental structure. This way, it would be possible to develop an integrated PM system over time, with each increment focusing on just one strategic business objective and developing a strategic level measure and its constituent operational measures. The benefits of this approach are that:

- each increment of the process is faster and more efficient, because it focuses on just one strategically aligned measure at a time;
- it produces short term as well as long term benefits, due to the fact that all improvement efforts are focused around just one objective at a time;
- it ensures that even if the process stopped after one or two iterations, a complete set of measures for each objective addressed will have been produced and implemented;
- it enables performance measures to be maintained and updated regularly, to reflect strategic changes.

Four basic stages were identified for the process, which would ensure that the measures produced would conform to the characteristics described in the conceptual model. These were; a stage for identifying strategic business objectives, a stage for developing performance measures, an implementation stage and a review stage. Activities for each stage were identified and the appropriate tools and techniques for completing each activity were collated. The process was then written up in workbook format, as a draft, to enable all the information and advice to be clear and easily accessible. Figure 1 illustrates the activities at each stage, along with how the stages fit together to create the new integrated PM process for SMEs.

Testing the New Integrated PM Process for SMEs

Having developed the new process, it was necessary to test it in a SME environment, to investigate its usefulness and practicality in this environment. Two SMEs were selected using a purposive sampling strategy (Patton, 1990), with the aim of identifying companies that were perceived to be 'typical' cases according to the characteristics of SMEs defined previously. As Maxwell (1996) notes "*A small sample that has been systematically selected for typicality and relative homogeneity provides far more confidence that the conclusions adequately represent the average members of the population than does a sample of the same size that incorporates substantial random or accidental variation.*"

However, an additional criterion of selection was also deemed necessary for these cases. As the purpose of the sample was to investigate the use of the new process to implement integrated PM in SMEs, it was essential that the senior managers from each company were willing to undertake this commitment.

An *"action science"* approach was adopted for the data collection (Gummesson, 1991). This was appropriate because it allowed the researcher the freedom to get actively involved in applying the process, in order to gain an in-depth understanding of the way it worked within the companies. Acting as process facilitator also enabled the researcher to ensure that the process was applied appropriately, with a thorough understanding of the differences and similarities encountered in each company.

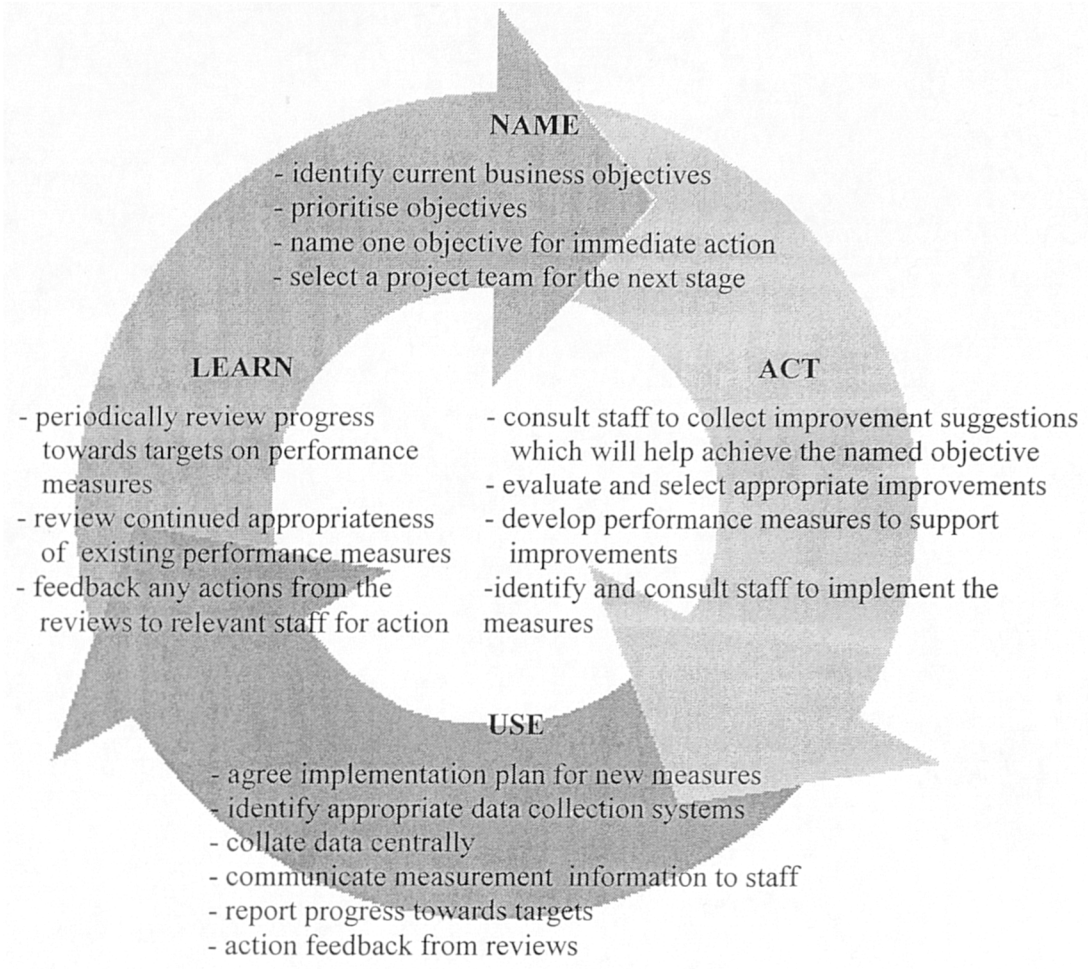

Figure 1: The Integrated PM development Process for SMEs

The process was applied through a variety of meetings and workshops with managers, supervisors and shop-floor employees, from which processual and behavioural data was accumulated. These meetings were supplemented, where appropriate, with informal discussions with various staff, usually those who were actively involved with the process. The function of these discussions was invariably to gain a better understanding of, or a particular perspective on, how the activities that were being carried out as part of the process were affecting the company. This facilitated data triangulation, which was achieved through the use of multiple data sources and multiple researcher involvement, according to the classification of Denzin (1978).

Results

The results of the cases may be divided into two distinct areas. Firstly, did the process achieve what it set out to achieve, in terms of being a useful and practical process for introducing integrated PM into SMEs? Second, what effect did the process have on the companies involved? The former may be answered by assessing whether the process adequately conformed to the four key requirements for a SME focused integrated PM development process. The latter may be answered by looking at the benefits and drawbacks the process had on the case companies.

The Process

Both companies worked through just one iteration of the process for the purposes of this study. Company A took three months to complete the cycle, whilst Company B took just over four months to do this. In both cases, there

were resource issues which slowed the project down; Company A had a number of visits from their American sister company, which prevented any progress being made for approximately a month while they prepared for and looked after their guests. After the project had been running for six weeks, the Operations Director of Company B was 'headhunted' by another firm and left the project, which caused considerable problems because he was the project champion. However, despite these difficulties, the cycle was completed in both companies, with improvements made and useful measures having been implemented. The Manufacturing Director in Company A, who was the project champion commented that *"it helped us focus on the critical problems"* and *"its a useful process for any company – I would recommend it."* This demonstrates that, with minimal input and without sacrificing other projects, the process can be completed in a reasonable amount of time. However, a good deal of enthusiasm for the project is required from the companies to ensure that this happens. Therefore, the process conforms to the requirements of being resource efficient and being dynamic and flexible.

The fact that the process highlighted, in both companies, a number of immediately actionable improvements helped ensure that the enthusiasm levels of the participants remained high. This feature of the process was the key to ensuring that the cycle was completed, as it gave tangible benefits to the companies early on. However, the drawback of this was highlighted by Company A, who, after identifying a number of improvements, sent a message stating *"Could we please postpone the next visit for a couple of weeks. We have a couple of internal issues we are trying to resolve, which will mean that the team members involved will not be available until then."* When the next meeting was finally held, it became apparent that these 'internal issues' involved the implementation of a number of the immediately achievable improvements identified in the previous workshop. Although it was good to see that the project team were keen to move forward on the improvements, the way they chose to do this precluded any measures being developed to ensure that the improvements were having the desired effect. Therefore, in Company B, the process was modified slightly to emphasise the importance of developing measures which can act as benchmarks to assess the impact of improvements. However, despite this difficulty, the process did conform to the requirement to provide short term as well as long term benefits, as it helped identify immediate, short term, improvement opportunities which were directly linked to the achievement of long term strategic objectives.

The process was specifically designed to ensure that the measures developed were aligned to SME strategy models. The first stage of the process (Name) explores current strategic needs in detail and then names the most important objective as the focus for that iteration of the process. In practice, this was not quite as straightforward as it seemed. Both companies nominated just two managers to be present for this stage, but it was apparent that in Company B, the managers had their own ideas about what should be chosen as the focus for improvement, as productivity improvement was their highest priority. This made it difficult to know whether they were assessing their needs accurately through this stage, or whether they were biased because of this preconception. After a lot of discussion, they were persuaded that, in addition to productivity, delivery performance deserved a considerable amount of attention. This was because productivity is a purely operational measure, whereas delivery affects customer satisfaction as well, and they had already discussed how customer satisfaction was low as a result of their poor record of delivery performance.

This problem did not occur in Company A as they freely admitted that they had so many seemingly important problems which needed attention, that they did not know where to start. Therefore, they found the identification and prioritisation of their strategic business objectives extremely useful. From this they identified two critically important objectives, delivery performance and increased capacity. They eventually chose delivery performance as the focus of the process, assuming that increasing capacity would cause more problems than it would solve unless they had some method of ensuring that goods left the factory on time.

Although the process did fulfil the requirement to align measures with strategy, it was apparent that, without the presence of an independent facilitator, Company B would have overlooked the importance of delivery performance at this time. Interestingly, during the second workshop, the company were far more focused on delivery performance, as one of their four major customers had just reduced its contract with them because of their poor record of delivering products on time.

The Companies

The process had a positive effect upon Company A, both in physical outputs and cultural aspects. The tools used helped gain consensus among staff about the improvements required to achieve the chosen objective. A survey, completed by all staff, identified a number of poorly performing operational factors which inhibited on-time delivery. This was seen as a useful method of empowering staff to suggest improvements. The company were keen that they should be seen to act on the suggestions, as this would send out a positive message to the workforce and generally help to improve morale. Two measures were identified; 'on-time delivery' and 'reasons for delivery failures'. Measuring helped identify the root causes of delivery performance, which are being systematically eliminated through a programme of continuous operational improvement, monitoring and learning. As these improvements take place, delivery performance is expected improve. The main drawback of the process in Company A was that, although it was relatively straightforward to use the process to identify improvements, it was much more difficult to persuade them to measure the effect of those improvements on delivery performance. However, with some encouragement from the facilitator, measures were developed and implemented and once the managers had seen the potential use of the data, they realised the value of the measurements.

Company B also gained a number of benefits from the process, but in this case, they were almost entirely output related. A survey of staff was poorly completed, leading to the conclusion that a brainstorming workshop was the only way to glean the necessary improvement information from the staff. This led to some useful outputs, but also highlighted the low morale of the workforce, particularly regarding the gap between managerial and shop floor staff. This was illustrated through a comment by the production manager, who, when informed of the plan to select shop floor employees, supervisors and managers for the session, stated *"well, it might work, but don't call it brainstorming. They'd need to have a brain for that."*

The company already measured delivery performance, but two further measures were developed as a result of the workshop, one to help improve scheduling information and another to monitor re-work levels. The purpose of these measures is to help identify quality and production planning issues, which can then be dealt with through continuous improvements on the shop floor. However, although the measures themselves have the potential to be very useful, due to the poor communication and a generally felt lack of respect between management and shop floor employees, Company B appears not to have gained any of the cultural benefits that Company A managed.

Conclusions

This paper has described the rationale for, and development of, a SME focused, integrated PM development process. The process has been tested in two companies which exhibited the characteristics of SMEs, as defined in the literature. The benefits of the process were that both companies were able to use it to focus and monitor their improvement efforts around strategically important objectives. However, there were some notable issues which arose from the case studies. Managers in Company B were reluctant to carry out a strategic evaluation of the business, wrongly assuming that they already knew the key area for improvement. This problem could be overcome by more managers being involved in this stage of the process, as this would reduce the effects of bias from any individual managers. A further issue was that it was difficult to persuade either company of the need to monitor the results of the improvements they were making. Despite the apparent success of both cases, there was an underlying reluctance to develop formal measures in these SMEs. Neither company appeared to fully understand that the key to achieving a continuous strategic improvement capability was to measure the effect of improvements on the strategic objectives. If this process is to be truly useful for SMEs, more education is needed to inform managers of the potential benefits that can be gained from linking continuous improvement to strategy, through effective PM.

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Little and Often Works Best: Developing Integrated Performance Measurement in SMEs

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Abstract

The aim of this paper is to describe the design of a new process for developing integrated performance measurement (PM) in SMEs (small and medium sized enterprises). It examines the differences between SMEs and larger companies, highlighting how they place constraints on SMEs' ability to introduce integrated PM effectively. Specifications for a SME focused PM development process are presented and an appropriate design approach is selected, which is used to develop a new process. Finally, a developmental case study is undertaken to assess the usability and appropriateness of the new process in a practical SME environment.

Keywords: Process Design; SMEs; Performance Measurement.

Introduction

SMEs (small and medium sized enterprises) have long been recognised as having different characteristics from larger companies. These characteristics have been shown to act as constraints which inhibit the development of effective performance measurement (PM) systems in this sector. This is because currently available PM system development approaches have been almost exclusively developed in, and for, use in large companies (Hudson et al, 2000). Previous research has suggested a number of requirements for a new PM development process specifically designed for use in SMEs. The purpose of this paper is, therefore, to describe how these recommendations have been used to design a new PM process and develop it in a SME environment. The result is an incremental process that can potentially use PM as a catalyst for continuous improvement in SMEs. Further applications of the process are now being carried out to validate these findings.

SME Characteristics

Although most researchers agree that SMEs are a particularly heterogeneous group, there are certain characteristics which are acknowledged as being common in this environment. The most widely acknowledged factor that distinguishes SMEs from larger companies is the organisational environment in which they operate. They are considered to have flat structures with few management layers, be flexible and adaptable to changing market needs and have a high potential for innovations (Ghobadian and Gallear, 1997; McAdam, 2000; Yusof and Aspinwall, 2000; Wiklund and Wiklund, 1999; DTI, 1994; Jennings and Beaver, 1997; Burns, 1996; Gunesekaran et al, 2000). However, they are also seen as suffering from "*resource*

poverty" (Welsh and White, 1981), both in terms of human resources and financial stability and security (Abdul-Nour et al, 1998; Pelham, 1999). In addition, it is commonly noted that SMEs are loosely structured, with informal operating practices and a distinct lack of bureaucracy (Jennings and Beaver, 1997; Hyvarinen, 1990).

The cultural and management practices in SMEs are less well defined than the organisational environment. This is understandable as culture is rather more subjective and it is therefore more difficult to define patterns in this area. However, there is a broad consensus that smaller companies have a more unified culture, with a high degree of personal authority among staff, and management who are visible and involved in the operations of the company (Storey and Sykes, 1996; Jennings and Beaver, 1997). Conversely, there is also a recognised skills shortage amongst staff, along with a deficit in management expertise (McAdam, 2000; Curran, 1987; Huang and Brown, 1999). There are also differences in the way that businesses are managed, with highly personalised management styles typical (Storey and Sykes, 1996). In addition, business planning is normally limited and short term in focus, with a fire-fighting 'react and adapt' philosophy prevalent (Ghobadian and Gallear, 1997; McAdam, 2000; Yusof and Aspinwall, 2000; Burns, 1996; Oakes and Lee, 1999), as typified by the following statement:

> *[In SMEs]...strategic management becomes primarily an adaptive process concerned with manipulating a limited amount of resources, usually, in order to gain the maximum immediate and short term advantage* (Jennings and Beaver, 1997).

As previously discussed, SMEs are typified by being flexible and adaptable to market changes. This responsiveness is generally viewed as a positive characteristic. However, the root cause of this attribute is that SMEs have little control over the markets in which they operate. They are unable to drive the market, but instead, must react and adapt to the changes that occur over which they have no influence (Burns, 1996; Storey and Sykes, 1996; Hyvarinen, 1990). This is exacerbated by the fact that few SMEs have more than a limited overview of their target market (Wiklund and Wiklund, 1999; Huang and Brown, 1999; Pelham, 1999).

SMEs' relationships with their customers are also fraught with uncertainty. Although there is an acknowledged advantage in small firms of being closer to the customer, enabling more personal relationships to develop (McAdam, 2000), there is also the danger that their typically limited customer base (Ghobadian and Gallear, 1997; Yusof and Aspinwall, 2000) facilitates the development of deferential supplier-customer relationships. Rainnie (1991) categorises SMEs into groups, according to their relationships with larger companies. His groupings consist of *Dependant* firms, *Dominated* firms, *Staid* firms and *Innovative* firms. It is interesting to note that, with the exception of staid firms, which operate only in very low profit, or niche markets, SMEs are consistently viewed as being subservient to their larger counterparts. This view is supported by Oakes and Lee (1999) who suggest that SMEs have a lack of control over their futures because of demands made by stronger customers throughout the supply chain.

From this review of the literature, it can be seen that there are a number of key characteristics of SMEs, as follows:

- Flat, flexible organisational structures;
- Severe resource limitations in terms of management and manpower, as well as finance;
- High innovatory potential;

- Unified culture with personalised management;
- Skills shortages and lack of training at all levels;
- Informal, dynamic strategies;
- Reactive, fire-fighting mentality;
- Reliance on a small number of customers;
- Lack of market influence.

Integrated PM and the SME Environment

The characteristics of SMEs described illustrate that they differ substantially from the traditional large company model in virtually every area. Several studies have been carried out to identify the effect that these differences have on the introduction of PM in this environment (Barnes et al, 1998; McAdam, 2000). In addition, a process for integrated PM system design which was developed and tested originally in large companies (Neely et al 1996), has been applied in SMEs.

The Neely et al (1996) process is designed to be user-friendly and comprehensive, aiming to develop structured, strategically aligned PM systems in two phases. In the first phase, the company identifies performance measures aligned to each strategic objective. Once these strategic level measures are in place, phase two identifies operational measures to drive performance towards those objectives. Seven SMEs took part in the study (Bourne and Neely 1998), with one company failing to complete phase one of the process, and a further three companies failing to implement the measures they had developed. The three successful companies took between nine and thirteen months to implement the phase one measures (Bourne et al 1998). The length of time required to integrate the system into companies has been identified as a potential reason why the implementation rate was so low (Bourne et al 2000).

A further case study has been carried out using the same process, specifically to evaluate its usefulness in an SME context. (Hudson and Smith 2000, Hudson et al 2000). The company in this study also failed to complete the process and implement the measures they had developed. A number of observations about the difficulties encountered were made, suggesting that the process was fundamentally unsuitable for use in the SME context:

> *The characteristics of limited resources, limited cash flow coupled with a reliance on few customers, a fire-fighting mentality coupled with an emphasis on current performance, and potential staff turnover coupled with a flat organisational structure, means that SMEs require an alternative approach to strategic PM development.* (Hudson et al 2000).

Specifications for a SME Focused Integrated PM Development Process

The difficulties associated with introducing integrated PM into SMEs suggest that the currently available PM development approaches are unsuitable for use in this environment. Recent research (Hudson et al, 2001) has suggested a number of generic properties and recommendations for PM development processes, which are as follows:

- Need evaluation (why is this necessary?);

- Key user involvement;
- Strategic objective identification;
- Performance Measure development;
- Periodic maintenance structure;
- Top management support;
- Full employee support;
- Clear and explicit objectives;
- Set timescales.

The Neely et al (1996) PM development process conformed to all of these recommendations, yet rarely reached completion in a SME environment. This suggests that the additional constraints on SMEs demand additional requirements for PM development to be effective. From the applications of the Neely et al (1996) process, these additional requirements have been identified as follows:

- Very resource efficient development;
- Short term as well as long term benefits;
- Measures aligned with SME strategy models;
- Dynamic and flexible development process.

These requirements, together with the generic requirements identified above, provide the basis for the development of a new, SME focused PM development process.

The rest of the paper will describe the process of designing the new PM development process for SMEs. This includes the identification of an appropriate design strategy, a description of the initial stages of development and a developmental case study, through which the final refinements were made to the process.

Process Design Strategy

According to Rowe (1987), there are three distinct types of design problem: *well defined* problems, *ill defined* problems and *wicked* problems. Well defined problems are so called because they have straightforward solutions. Similarly, ill defined problems have convoluted or awkward solutions. However, wicked problems are so named because they are problems which do not have perfect solutions. Therefore, any solution put forward can only ever be partial and will always have room for improvements. The problem of designing a SME PM system is one that falls into this category. This is because, as every SME is different, there will never be a perfect PM system which will work in all situations. Instead, the design will attempt to create a 'best fit' process, which fulfils the problem as it has been described in SMEs. The aim of the process is, therefore, be to enhance the current state of knowledge in the area of SME PM systems, rather than attempt to create a panacea for PM development in SMEs.

As the problem of SME PM is naturally complex, the design was undertaken in two phases, theoretical and practical. Once the initial design was developed from the theoretical recommendations, the design was improved through empirical testing in a SME. The emphasis throughout the design process was to establish the three qualities described by Laseau (1989) of *Firmness*, in terms of valid construction, *Commodity*, by satisfying its functional needs and *Delight*, through aesthetic appeal.

The New PM Process for SMEs

One of the primary problems with the Neely et al PM Process (1996) was that it was structured so as to allow all the top level performance measures, aligned to each strategic objective, to be developed before attempting to identify the operational measures, which would drive performance towards those objectives. In the case study, this led to the process collapsing and no usable measures being implemented. To avoid this, and to ensure strategic flexibility, the new process should develop performance measures for one strategic objective at a time and then immediately cascade the top level measure down to operational level. This means that the process would be incremental in structure, with a number of benefits:

- it would make each increment of the process faster and more efficient, through focusing on just one objective at a time;
- it would provide short term, as well as long term benefits, because all performance improvement efforts would be focused on just one strategic objective at a time;
- it would ensure that even if the process stops after one or two iterations, a complete and usable set of company-wide measures for those strategic objectives would have been produced and implemented;
- it would enable performance measures to be updated and added to, to reflect strategic changes.

Having decided on an incremental structure for the new process, it was necessary to populate it with the various stages which make up the process of developing integrated performance measures. The requirements state that the new process requires an explicit stage for identifying strategic objectives, developing appropriate performance measures and maintaining the measures. The benefit of identifying strategic objectives in each iteration of the process is that it will help to surface any strategic changes, thereby ensuring all the measures remain relevant and useful. However, there is also a need for prioritising the objectives, because the nature of the process is such that only one objective will be focused on at a time. In addition, although not explicitly stated in the recommendations, the measures have to be implemented before they can be classified as being useful. Therefore, a key stage in the process should be the implementation of the measures developed.

From an in-depth analysis of the problem area, a preliminary diagram of the process was produced (figure 1). The diagram illustrates the four basic iterative stages of the process. However, there is also a requirement to make sure that companies understand the value of the process, through evaluating how it can be of benefit to individual companies. As this is where companies would 'buy in' to the process, it should not be an iterative stage, but a one off stage, carried out before the process is used.

Figure 1: The SME PM Process

Other recommendations for the process were focused around who should be involved and how the process should be managed. These were incorporated into the process as the detail was added to each stage. However, two of the recommendations were difficult to incorporate into the process without making it too didactic. Top management support is not something that can be built into a process, but it is possible to advise why it is important. Timescales are difficult to put absolute values on, although the recommendations state that they are necessary. This problem was solved by building in target dates, set by each company, for the key tasks within the process.

The process was written up in workbook format, as a draft, to enable all the information and advice to be clear and easily accessible. In addition, it ensured that each of the tools which had been chosen or developed for each stage could be illustrated and described in detail, for ease of use.

Process Development in a SME

The primary purpose of the new process was for it to be practical and usable in a SME environment. This meant that the paper-based, and so far entirely theoretical, process needed to be applied in the environment for which it was designed, to check that it was relevant and usable in this context. Therefore, a developmental case study was carried out in a SME, to complete the design process by enabling practical refinements to be made to the PM process.

Data collection was based on the 'action science' method (Gummessonn 1991), with the researcher acting as the process facilitator. The process was applied through three workshops and two meetings involving a number of managers and supervisors. Processual and behavioural data was accumulated through the workshops. The workshop participants were also provided with feedback sheets, which they were asked to complete after each stage of the process. Data triangulation was achieved through the use of multiple data sources and multiple researcher involvement (Denzin 1978).

The case company worked through the cycle, during which a number of improvements to the process were identified. The primary problem identified was that performance measures were

only perceived to be useful in the context of helping the company to improve its operations to achieve its strategic objectives. The process initially had no explicit link between the development of performance measures and improvement activities. Therefore, it was adapted so that before performance measures were developed, a number of improvements were identified to facilitate the achievement of the priority objective. In this way PM could monitor improvement activities and stimulate continuous improvements in the company.

The feedback from the workshops, along with the observational data collected, showed that the process had a positive effect on the company. The tools used helped gain consensus among staff on the changes required to implement necessary improvements. Although one of the workshops had to be postponed for three weeks, the level of time and resources required were not considered too great, even though the project team consisted entirely of managers or supervisors. The measures developed have proved to be essential for identifying the primary factors which contribute to poor performance, thereby stimulating a number of ongoing operational improvements in the company. The company have since customised the process and used it to identify improvements and develop performance measures for further objectives, finding it useful as a strategically oriented continuous improvement tool.

The refinements made to the process through the case study considerably enhanced its practicality and usefulness in the case company. This resulted in the process being updated to reflect these changes and ensure its practicality in a SME environment (see Figure 2).

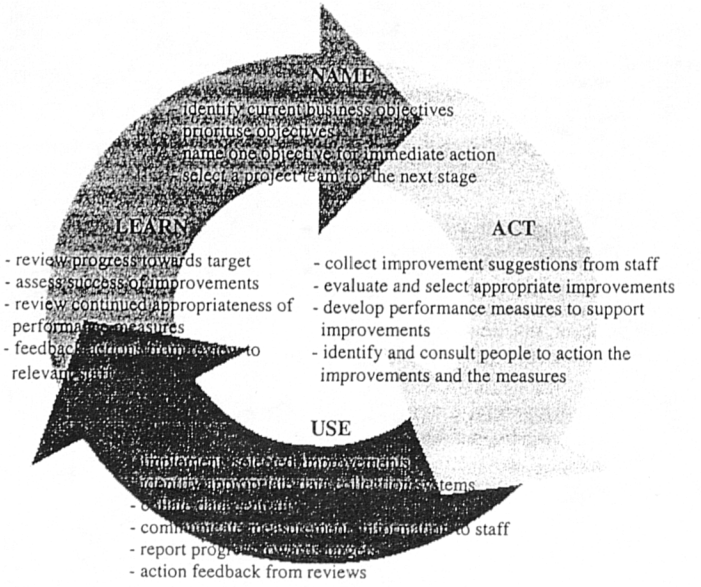

Figure 2: The Integrated PM Process for SMEs

One of the primary concerns when designing the new PM Process was that it should conform to the design precepts of *firmness*, *commodity* and *delight* postulated by Laseau (1989). Firmness and commodity of design was achieved by developing the Process from theory, with specific reference to previous research, and then applying it in a practical environment, to ensure valid construction and that it satisfied functional needs. Delight, in terms of aesthetic appeal, was achieved through the use of a simple, four stage cycle to illustrate of the process, which was expanded in the workbook into clearly explained sections which mapped to the different stages of the cycle.

Conclusion

The paper describes how a new process for integrated PM development in SMEs was formulated. The initial design was developed from theory and then a practical application of the process in a SME was used to enhance its practicality and usefulness. Work to date suggests that this cyclic development process is more appropriate than a one-off application for SMEs. It appears that a frugal 'little and often' approach to integrated PM development is better suited to the SME constitution than the expansive PM feasts enjoyed by their larger counterparts. Further research is now being carried out to validate this process in a wider SME environment.

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A QUESTION OF CONTEXT: THE BARRIERS TO STRATEGIC PERFORMANCE MEASUREMENT SYSTEM DEVELOPMENT IN SMES

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ABSTRACT

Research interest in performance measurement (PM) over the last decade has led to the development of a number of approaches to (re)designing PM systems to align them with company strategy. The few tests of these approaches that have been carried out in SMEs (small and medium sized enterprises) have highlighted that there are barriers to the development of strategic PM systems in this sector. This paper seeks to identify possible reasons for these barriers, using data collected during a case study investigating the application of one of these approaches in a SME.

Keywords: SMEs; strategic performance measurement; theoretical model; process design.

INTRODUCTION

Throughout the 1980s and early 1990s, the capability of performance measurement (PM) as a tool to help achieve strategy was recognised and became a major focus for research. This resulted in the development of various frameworks and methodologies for the design and implementation of strategically aligned PM systems (e.g. Kaplan & Norton 1992, Lynch & Cross 1991, Neely et al 1996a, Bititci et al 1997). The majority of these tools have been developed in, and for, large companies. However, tests in SMEs using the Neely et al (1996a) methodology (the Cambridge Process), highlighted that there are barriers to the development of strategic PM systems in this sector (Bourne et al 1999, Hudson et al 1999, 2000).

In this paper, possible reasons for these barriers are explored using data from a case study investigating the application of the Cambridge Process in a manufacturing SME based in the South West of England. The company, employing 54 staff, was selected because the management had expressed a desire to improve their current PM system and saw the Cambridge Process as an effective method of achieving this. The Cambridge Process is split

into two distinct phases, with phase 1 focusing on the development of strategic level PMs and phase 2 developing operational level measures to support them. The company only undertook phase 1 of the process. However, difficulties were encountered and they withdrew before completion.

Data analysis is carried out using De Wit and Meyer's (1994) three-dimensional model of strategy formulation: *process*, *content* and *context*. The model is appropriate for this purpose because it encapsulates the generic dimensions of formal change processes. It therefore provides a useful method of exploring the potential barriers, to determine whether the root cause of the failure can be attributed to the process used, the measures produced, or the SME context in which it was applied.

The rest of the paper focuses on analysing *content,* in terms of the PMs produced, to assess their relative usefulness in a SME environment. The Cambridge Process is also examined, along with the SME *context* in which it was applied, to assess its effectiveness as a *process* for developing strategically aligned PMs in SMEs, and to identify whether it has contextual limitations, in terms of the size of company which might use it effectively.

RESEARCH METHOD

The investigation was based on a case study approach, which focused on the accumulation and interpretation of qualitative data (Gummesson 1993). Data collection was based on participant observation of the process, along with face-to-face interviews with the company participants. These methods were used because they enabled accumulation of both the processual and behavioural data which emerged from the application of the Cambridge Process. Using the classification of Denzin (1987) the data triangulation undertaken was multiple data source, multiple method and multiple researcher involvement. The *process, content, context* model was used as the primary basis for analysing the data.

As the case company did not complete the process, they did not have a formal set of PMs produced. Therefore, the *content* investigation is carried out via a literature review to identify precisely what a strategic PM system should cover. This is achieved by identifying what should be measured, along with the characteristics that the PMs produced should exhibit. The identified criteria are then evaluated for their usefulness in the SME sector.

The *process* and *context* analysis uses the case study data to assess how effectively the Cambridge Process worked in a practical SME environment, compared with previous successes in larger companies (Bourne and Wilcox 1998). The context in which the Cambridge Process was applied is examined by comparing the empirical data collected through the case study against a set of typical SME characteristics, which have been derived from the literature. This is done to identify whether the difficulties encountered in the case study were due to its position as a SME, or were simply due to unfortunate circumstances in the case company.

CONTENT EXAMINATION

Before the Cambridge Process was tested in the SME, the assumption that the *content* (i.e. strategically aligned PMs) would be of benefit to the company, was made by the company managers and the researchers involved. However, this assumption needed to be re-examined in the light of the subsequent failure of the process. To achieve this, it was necessary to define what is meant by the term 'strategic PM'. This would provide a

theoretical model of strategic PM, which could be used to assess its use in a SME environment.

Building a Theoretical Model of a Strategic PM System

Strategic PM was developed in response to criticisms that traditional PM systems are financially driven and historically focused (Kaplan and Norton 1993). Its aim, therefore, is to enable proactive measurement to facilitate the identification of opportunities for future improvements. The last decade had seen an increasing body of research into this concept, with many different proposals and guidelines attempting to explain what strategic PM systems should cover in terms of the dimensions of performance for which measures should be developed, and the characteristics that these PMs should display. The synthesis of this research into a comprehensive theoretical model helps to clarify the term 'strategic PM'.

Dimensions of Performance

The dimensions of performance for which measures in a strategic PM system should be developed have been defined in various terms in the literature. Time, Cost, Quality and Flexibility are repeatedly cited as the primary operational dimensions (Kaplan 1983, Lynch and Cross 1991, Meyer 1994, Neely et al 1995, Collier 1995, White 1996, Laitinen 1996, Slack et al 1998, Medori 1998), whilst Finance and Customer Satisfaction are also considered to be critical measurement areas (Keegan et al 1989, Eccles 1991, Jones et al 1993, Schmenner and Vollmann 1994, Bititci 1994, Ghalayini et al 1997). In addition, Stakeholders, including Employees, Investors and Suppliers, along with wider societal considerations such as the Community and the Environment, are increasingly cited as important dimensions of performance (Sink and Tuttle 1989, Kaplan and Norton 1992, Fitzgerald and Moon 1996, EFQM 1999, Waggoner et al 1999, Neely and Adams 2000). Figure 1 illustrates how the terms found in the literature were classified into four overall dimensions of performance:

- Stakeholder Satisfaction
- Customer Satisfaction
- Operational Effectiveness
- Supplier Effectiveness

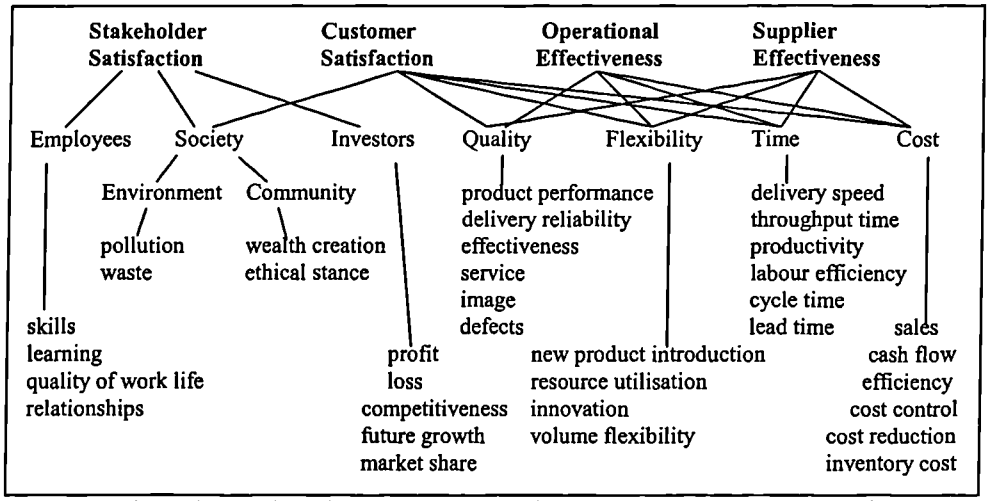

Figure 1: Relationships Between Dimensions and Sub-Dimensions of Performance

These dimensions allow the holistic consideration of both the internal and external aspects of business, ensuring smooth operations and production internally, whilst making the goodwill and loyalty of the all people who have an interest in the company, both internally and externally, a high priority.

PM Characteristics

As early as the mid '80s, Globerson (1985) and Maskell (1989) had identified sets of guidelines detailing the preferred characteristics of PMs. These guidelines have often been reiterated in more recent literature(Dixon et al 1990, Lynch and Cross 1991, Neely et al 1996b). Subsequently, a comprehensive review of this literature was undertaken by Neely et al (1997) and a set of twenty-two characteristics were identified. These were evaluated to ensure a focus on critical, rather than desirable, characteristics. The resulting characteristics are presented in table 1.

Characteristics	Reference
Derived from strategy	Globerson 1985, Maskell 1989, Dixon et al 1990, Lynch & Cross 1991, Neely et al 1996b
Clearly defined with an explicit purpose	Globerson 1985, Neely et al 1996b
Developed by key users	Globerson 1985, Lynch & Cross 1991, Neely et al 1996b
Relevant and easy to maintain	Maskell 1989, Lynch and Cross 1991
Simple to understand and use	Maskell 1989, Lynch & Cross 1991, Neely et al 1996b
Provide fast and accurate feedback	Globerson 1985, Dixon et al 1990, Maskell 1989, Neely et al 1996b
Link operations to strategic goals	Lynch & Cross 1991
Stimulate continuous improvement	Lynch & Cross 1991, Maskell 1989, Neely et al 1996b

Table 1: Critical Characteristics of PMs

Evaluating the Use of Strategic PM in a SME Environment

Having identified the critical dimensions of performance and characteristics of PMs, a theoretical model of a strategic PM system may be proposed (table 2). Using this model, it is possible to assess the relative usefulness of such a system in a SME environment.

Dimensions of Performance	PM Characteristics
Customer Satisfaction	Derived from Strategy
Operational Effectiveness	Clearly defined/ explicit purpose
Stakeholder Satisfaction	Developed by key users
Supplier Effectiveness	Relevant and easy to maintain
	Simple to understand and use
	Provide fast and accurate feedback
	Link operations to strategic goals
	Stimulate continuous improvement

Table 2: Theoretical Model of a Strategic PM System

Current literature suggests that SMEs are not simply little 'big' companies, but exhibit distinct characteristics which differentiate them form the majority of their larger counterparts. These characteristics include:

- flat, flexible structures;
- severe resource limitations
- reliance on few customers (Burns and Dewhurst 1996).

The resource limitations associated with SMEs indicate that Supplier and Operational Effectiveness are critical to ensure that products are made on time, within budget and to a high quality. Similarly, the reliance on a small number of customers suggests that to remain competitive, SMEs must ensure that Customer Satisfaction remains high and that they can be flexible enough to respond rapidly to changes in the market. It is always important to take care of investors in any size company, but given that in this sector they are the only monetary safety net to absorb the impact of short term fluctuations resulting from change, this is paramount in SMEs. In addition, the flatter structure of SMEs means that employees often have a greater number of job roles and more responsibility. In these circumstances, a well trained and motivated workforce is critical and necessitates effective monitoring of employee satisfaction.

Research has shown that SMEs which link operations to their business strategies outperform the competition (Argument et al 1997). The implication of this for PM development is that the PMs should be strategically aligned and should provide an explicit link back to operations (Greatbanks and Boaden 1998). In addition, given the resource and time constraints imposed upon SMEs PMs should: be clearly defined, have an explicit purpose, be relevant and easy to maintain and be simple to understand and use. Finally, the flatter structure of SMEs, and the greater scope of responsibility, suggests that the concept of user-developed measures, that are capable of producing fast and accurate feedback, is appropriate.

The characteristics of SMEs as previously described, illustrate that the concept of strategic PM is wholly appropriate, and theoretically would be beneficial, for use in this sector. Therefore, the fact that the case company failed to complete the development of a strategic PM system using the Cambridge Process, can be attributed to either *process* or *context* difficulties, according to the three dimensional model.

PROCESS AND CONTEXT ANALYSIS

The case study provided an insight into the way the Cambridge Process worked in a SME context. To assess its effectiveness, managerial perceptions were tracked throughout the six month intervention period. This fell into four main phases: the initial interviews which were held with each of the seven managers involved; observational data from each workshop session; observational data from the individual PM development sessions; and the final interviews, which were held with the four available managers. Interestingly, the perceptions were different in each phase, with a distinct downward trend in perceptions apparent as the study progressed. Table 3 shows the results of the analysis at each phase.

The case study showed that although the company were full of enthusiasm about what the Cambridge Process could help them achieve initially, when it came to actually developing the PMs, the interest levels dropped dramatically. This was particularly apparent in the senior managers. Two explanations for this were derived from the final interviews. The first was that the managers felt that they did not have time to complete any of the tasks outside the workshops, due their hectic, day-to-day schedules. This meant that the

individual PM development sessions were met with a distinct lack of enthusiasm and contributed to the feeling of disillusionment which was becoming apparent at this point.

Phase	Perceptions	Comments and Observations
Initial Interviews	Enthusiastic Pre-process Assumptions	Cambridge Process is simple and straightforward PMs will help gain control of operations Will deliver predictive capability to company Practical, usable process
Workshops (To identify strategic objectives)	Initial Enthusiasm	High level of co-operation for organising workshops Lively discussions about current PM shortcomings High expectations about the value of new PMs Good participation from most managers Serious debates to resolve conflicting opinions Willingness to take responsibility for tasks
PM Development Sessions	Waning Enthusiasm	Less co-operation to arrange sessions Lack of communication between managers on sessions High enthusiasm from some individual managers Difficulty gaining access to some managers All sessions delayed at least once Low level of enthusiasm for the task Unwillingness to do preparation work outside sessions
Final Interviews	Collapse of Process	Some managers unsure why the process had stopped Too resource intensive – particularly individual tasks Company unable to cope with implication of new PMs Too strategically oriented – need practical PMs now Company fire-fighting was always the top priority

Table 3: Tracking Enthusiasm Levels Throughout the Intervention

The second explanation was that the process was developing strategic PMs for a company where there was no explicit strategy. This led to a discrepancy between the outputs of the workshops and what was actually happening in the company. The Operations Manager, who had initially championed the process, commented in his interview that *"the process needs customising to include day-to-day operations, rather than just the strategic stuff."* It seemed that it was only after the managers has agreed the strategic objectives and were trying to develop PMs to support them, that they realised that the process was unsuitable to address the company's immediate needs.

Although the Cambridge Process has been applied successfully in large organisations (Bourne and Wilcox, 1998), when it has been applied in SMEs, a majority have failed to complete the process (Bourne and Neely 1998). This concurs with the results found in this case study. This implies that although the process may be valid in large companies, it is not appropriate for use in the SME context. The difficulties that caused the process to fail in this case were limited resources and a lack of explicit, long term strategic planning. According to previous research, these qualities are prevalent in SMEs (Burns and Dewhurst 1996, Ghobadian and Gallier 1996, Gunesekaran et al 1996). It may be assumed, therefore, that these difficulties would arise in a majority of SMEs that tried to develop strategic PMs using the Cambridge Process.

CONCLUSION

In this paper, theory has been used to demonstrate the usefulness of using strategic PM in a SME environment. This validates the *content* of the process. As the Cambridge Process has previously been tested, with some success, in larger companies, it may also be assumed that the *process* itself is valid. Therefore, the failure to develop strategic PM in the case company, using the Cambridge Process, may be attributed to the change in company *context.*

The reasons for the collapse of the process in the case company were attributed primarily to the Cambridge Process being too resource intensive and too strategically oriented. This concurs with the limited resources and the more dynamic, emergent strategy styles typically found in SMEs. It is likely, therefore, that these difficulties are not limited to the case company, but would be major barriers in any SME which exhibited these characteristics. If this is the case, then a process designed specifically for use in the SME context is required. From the initial evidence presented in this paper, such a process may be achieved by focusing on 'depth' rather than 'breadth'. A 'breadth' based approach, such as the Cambridge Process, requires the holistic consideration of a set of strategic objectives and measures prior to the development of supporting, operational measures. A 'depth' approach would seek to identify and prioritise one strategic objective at a time and then focus on the development of a set of operational measures to support that one objective. The benefit of such an iterative approach would be that it would help to surface, and keep track of, current strategy and reduce development time, enabling completion in shorter, discrete episodes. The development of such a process would enable further investigation into the SME context and go some way towards establishing an effective process for developing strategic PM in this sector.

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ONLY JUST MANAGING – NO TIME TO MEASURE

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Abstract

This paper describes a case study carried out to investigate the application of existing approaches for the development and implementation of strategic performance measurement systems in Small and Medium sized Manufacturing Enterprises (SMEs). The selection and application of a specific methodology in a SME is described highlighting both the successful and unsuccessful elements of the approach. An explanation of the unsuccessful elements is offered by examining the different pressures and constraints affecting SMEs. The re-design of performance measurement approaches, which have typically been developed for larger organisations, is suggested to accommodate the specific needs of small manufacturing companies.

Introduction

The need for companies to measure performance strategically has been well documented in the literature (Eccles 1991, Kaplan & Norton 1992, Gregory 1993, Neely et al 1997, Neely 1999). However, the majority of approaches adhering to this view have been focused on large companies. As the majority of businesses in the UK are classified as SMEs (Burns & Dewhurst 1996), there is a need to investigate the applicability of these approaches for the smaller firm. SMEs are not simply little 'big' companies, but have distinct characteristics that differentiate them from the majority of their larger counterparts. Burns & Dewhurst (1996) and Haywood (1999) describe these key characteristics as:

- flat, flexible structures;
- severe resource limitations;
- reliance on few customers;
- fire-fighting mentality.

To identify how these characteristics might affect the development of strategic performance measurement (PM) systems, an empirical study was initiated. This study involved participant observation of a facilitated methodology, together with a series of face to face interviews

To identify an appropriate PM approach, current frameworks and methodologies were identified (for example, Kaplan & Norton 1992, Lynch & Cross 1991, Bititci et al 1997, Neely et al 1996, Oliver & Palmer 1998) and assessed against criteria derived from the literature that can be broadly classified into three areas:

- dimensions of performance (e.g. quality, finance, flexibility, time, human resource, customer satisfaction);

- characteristics of the PMs (e.g. simple, relevant, strategically aligned, improvement focused, user centred);
- developmental approach (e.g. defined targets and scope, tangible outcomes, top management support, end user involvement).

These criteria form a theoretical model of a strategic PM system, which will be examined in more detail in a forthcoming paper.

From the assessment, the Neely et al (1996) methodology emerged as the one that most closely adhered to the criteria (see table 1). This methodology is presented as a structured workbook and is designed to be a facilitated process. The process has two distinct phases, with five stages in each phase. Phase One is concerned with the development of a set of top level, strategic PMs, whilst Phase Two attempts to cascade the top level measures down through the company to ensure that operational measures are strategically aligned.

Theoretical Model	BSC	PP	IPMS	CAPM	IMM
A strategic PM system should measure:					
Quality	√	√	√	√	√
Flexibility	√	√	√	√	√
Time	√	√	√	√	√
Finance	√	√	√	√	√
Customer Satisfaction	√	√	√	√	√
Human Resources	√	√	√	√	√
PMs in a strategic PM system should be:					
Derived from strategy	√	√	√	√	√
Clearly defined / explicit purpose	√		√	√	√
Developed by key users		√	√	√	√
Relevant and easy to maintain			√	√	√
Simple to understand and use	√	√	√	√	√
Provide fast, accurate feedback			√	√	√
Link operations to strategic goals		√	√	√	√
Stimulate continuous improvement	√		√	√	√
The development approach should:					
Have top management support	√	√	√	√	√
Be business driven	√	√	√	√	√
Focus on strategy rather than technology	√	√	√	√	√
Have full employee support	√	√	√	√	√
Have clear and explicit objectives	√		√	√	
Have set timescales	√			√	

KEY: BSC = Balanced Scorecard (Kaplan & Norton 1992, 1993, 1996)
PP = Performance Pyramid (Lynch & Cross 1991)
IPMS = Integrated PM Systems (Bititci 1994, 1995, Bititci et al 1997, 1998)
CAPM = Cambridge Approach to PM (Neely et al, 1996a+b, 1997, Bourne et al 1998a+b)
IMM = Integrated Measurement Model (Oliver & Palmer 1998)

Table 1: Assessment of Five PM Approaches

The application of the approach, facilitated by a member of the original development team, focused specifically on the development of a set of top-level strategic measures. This approach, which correlates to Phase One of the methodology, was planned as a series of five workshops. This paper reports on the observations and interview responses which were

accumulated during this period, and highlights a number of issues that contend the applicability of existing PM approaches for the SME environment.

Research Method

The research has been based on a case study approach that has focused on the accumulation and interpretation of qualitative data. As Gummesson (1993) states: "*The general reason for doing case study research is to better understand complex phenomena such as change processes. Innumerable factors, and entangled interconnections between them, do not allow simple unambiguous research designs and quantifications.*" Data collection was based on both participant observation and on face-to-face interviewing methods. An observational survey was identified as being an appropriate method to collect both processual and behavioural data that would emerge from the application of the methodology. In an attempt to overcome any observer bias face-to-face interviews were also undertaken. This included structured interviews with each of the SME participants at the beginning of the intervention and a set of semi-structured interviews at the end of the intervention. As Sekaran (1992) states: "*Because almost all data-collection methods have some biases associated with them, collecting data through multimethods and from multisources lends rigor to research.*" Data analysis was undertaken using coding and memoing techniques (Loftland & Loftland 1995). This facilitated the identification of a set of issues that were verified and validated with workshop participants and with the process facilitator. From the research design phase to the data analysis phase a conscious attempt was made to ensure the validity of data. Using the classification of Denzin (1978), the data triangulation undertaken was multiple data source, multiple method, and multiple researcher involvement.

Case Study

The Case Company manufactures advanced technological coatings for a variety of different uses, a common example of which are the anti-UV coatings used in glasses, visors and windows. The Company employs 54 staff and although it began as an independent company, it has been through two separate take-overs. It is currently a subsidiary of a large Singapore based Group, to which the Company reports financial returns every quarter. It competes by offering an individualised service for its customers. The Company has no standard products. Instead, coatings are specifically produced to conform to customer requirements.

Previous strategic change initiatives highlighted a deficiency in the Company's existing PM system. Existing performance was based purely on financial measures that were only used for reporting to the Group. However, the Company recognised that its resources were limited and, as they were expanding, PM could provide a useful method for improving both marginal costings and efficiency.

The intervention plan was based on a five month schedule, with one development workshop to be held each month. Table 2 illustrates the intervention plan and highlights actual activity which was undertaken against the plan.

Date	Workshops	Interviews	Achieved
Dec 98	Workshop 1. Introduction to the process Rationale for the process identified Strengths/ weaknesses of current PM system identified	Interviews held with: General Manager Operations Manager Marketing Manager Manufacturing Manager Production Manager Quality Assurance Manager Finance Manager	Workshop 1 completed 100% All interviews successfully completed
Jan 99	Workshop 2. Identification of product groups Customer and stakeholder needs analysis	N/A	Workshop 2 completed 100%
Feb 99	Workshop 3. Identification of a balanced set of strategic aims Development of strategic objectives Responsibility assigned to individual managers for PM development	N/A	Workshop 3 completed 100%
March 99	PM development sessions conducted Workshop 4. Agree PMs between all managers Carry out conflict analysis on PMs	N/A	PM development sessions delayed – only 5 completed after the delay Workshop 4 cancelled
April 99	Workshop 5. Sign off top level, strategic PMs Implement review mechanism	Final interviews with all managers involved	Final PM development sessions held Workshop 4 cancelled again Workshop 5 cancelled
May 99			Process abandoned by Company Final interviews held with the 4 available managers

Table 2 - intervention plan and actual activity

Results

The observation of the development process produced information that may be interpreted from two perspectives. The first perspective is based on the developmental approach advocated by the methodology, that is, the means by which the new PM system was developed through the workshops. The second perspective is based on the PM system that was produced as the end result of the process. This distinction is important, because although individual stages of the methodology may be successful, it is important to take a systemic view of the whole process and to evaluate its effectiveness in relation to the resulting PM system that emerges.

The process of developing the PMs led to some interesting observations about the way the company worked. It was apparent that the managers were unused to the concept of group consensus building and debate through workshops. However, the opportunity to engage in this type of activity was regarded as invaluable. As one manager commented "*We have a group of very experienced managers who get involved in everything due to our fire-fighting approach – which works well, but doesn't allow us to get involved in anything else. We don't spend enough time looking to the future.*" In the early stages of the approach the enthusiasm for the workshops contributed to their success with the key outcome being the identification of a balanced set of strategic objectives that provided a foundation for the development of specific PMs (Table 3).

Perspective	Objective	PM (draft)
Financial	Achieve sales growth of £2.5million; Control fixed costs; Increase return on sales to 15%; Increase return on capital to 20%;	Sales Growth Fixed Cost Expenditure Return on Sales Return on Capital
Internal Operational	Reduce scrap levels To maintain speed of production responsiveness; To solidify Group links;	Review of Quality stats, targeting scrap levels Manpower, equipment utilisation & services to production capability Number of face to face meetings with Group personnel
Customer	100% conformance to specification; To deliver a fast, flexible and capable response to the customers; To achieve 100% delivery on-time and in full (including prototypes); To provide production volume responsiveness; To raise the company profile;	Quality performance against original order Customer satisfaction with service Actual delivery against contractual obligations *To provide production volume responsiveness* Number & quality of contacts to outside companies
Innovation / Learning	To develop the current technical and commercial capability; To develop a capability to create new products and services in advance of customer needs; To identify and communicate goals and objectives to the whole company; To devolve responsibility and authority throughout the company & have a committed and motivated workforce	Products delivered according to spec and on time No of sale /contracts generated by having a new capability /product in advance of customer needs Manager & employee satisfaction with goals and objectives Employee attitudes towards responsibility and authority

Table 3 – The Company's strategic objectives and draft PMs

Having established a set of balanced strategic objectives the subsequent activity was to develop a preliminary set of PMs. It was at this point that the process began to falter.

Several reasons were identified for the abandonment of the approach. Tasks allocated to individuals, which were to be completed outside of the workshop sessions, were met with resistance. This was identified as a resource issue. The perception of the managers was that they did not have the time to complete these tasks given their hectic day-to-day schedule. This

issue was surfaced in the final interviews, where comments were received such as: "*The meetings were great – but as soon as people get out, the fire-fighting begins again and everything is forgotten until next time.*" In addition, some of the measures proved extremely difficult to develop from the objectives. It seemed that the greatest difficulty was in establishing specific, defined targets from relatively vague objectives. This made the task of developing the measures even more arduous.

A second reason was that the company was going through an extended period of change, which resulted in a full restructuring programme being undertaken. This became a higher priority than the PM development process for all the managers concerned. In addition to this, staff turnover and the re-allocation of management to new roles with different responsibilities provided an unstable environment for the development of the PM system. The General Manager became Company Director, promoting the Operations Manager into his position. The Production Manager left the company, and a new Quality Assurance Manager had been appointed. All of these changes affected the impetus and continuity of the process and contributed to its abandonment. However, during the final interviews a third factor that contributed heavily to the collapse of the process was identified. During the early stages of the approach the process had been championed by the Operations Manager. It became apparent that the success of the process hinged heavily on his input. During his interview at the end of the process, he commented that the process "*needs customising to include day-to-day operations, rather than just the strategic stuff. We need to focus our attention on basics – how we can improve customer perceptions is the main one at the moment – we aren't quite at the stage for top-level PMs yet.*" The stage at which the process faltered was directly after the identification of the top-level objectives and it is apparent that it was at this stage that the Operations manager regarded the process unsuitable to address the company's immediate needs.

The case study provides some insight into the application of a strategic PM methodology in a SME context. The difficulties identified were linked to the limited resources available, which meant that the company were reluctant to invest the time required to complete the development process. Although the managers found the identification of a set of strategic objectives a valuable exercise, most struggled when they came to developing the actual performance measures for those objectives. In addition, the lack of operational measures highlighted a discrepancy between the focus of the development process and the needs of the case company.

The main benefits of the process were that it did highlight the skewed focus of the current performance measurement system in the company, which was almost entirely financial. However, because the process was not completed, the company did not achieve the implementation of a more balanced system. The process of analysing the Company's strategic position and the identification of strategic objectives were acknowledged by the participants to have fostered consensus and focused their improvement effort. However, the main drawbacks of the approach from a SME perspective were that it was a resource intensive and time consuming process requiring resource which was not readily available. Furthermore, the emphasis on strategic PMs and the exclusion of the development of operational measures led to a perception that the approach was a future planning activity rather than one which facilitated improvements in current performance.

Conclusion

Previous research (Hudson et al 1999, Greatbanks and Boaden 1998) has shown that SMEs do not measure performance strategically, but that they recognise that their PM systems are inadequate. The case study demonstrated that while SMEs recognise the benefits of having a strategic PM system, current approaches provide them with inappropriate support. These methodologies have been designed for large companies and do not take account of many of the factors affecting SMEs. Using the characteristics of SMEs already given (Section 1), it may be argued that the issues identified were not unique to the case company. It is likely that similar issues would arise in other SMEs if a similar intervention using the methodology is undertaken. The key issues for SMEs are the availability of time and resources, along with the need to develop operational level measures which will support their strategic objectives. The current design of the methodology lacks appropriateness for SMEs because its structure is both resource intensive and the initial focus is on developing strategic level measures, with no links to operations.

The characteristics of limited resources, limited cash flow coupled with a reliance on few customers, a fire-fighting mentality coupled with an emphasis on current performance and potential staff turnover coupled with a flat organisational structure, means that SMEs require an alternative approach to strategic PM development. This may be facilitated by a focus on 'depth' not 'breadth' in the approach adopted. A 'breadth' based approach, such as the methodology tested, requires the holistic consideration of a set of strategic objectives and measures prior to the development and implementation of operational measures. A 'depth' based approach may facilitate the consideration of a specific objective and a focus on implementation at an operational level. The benefit of this approach would be that implementation time is greatly accelerated enabling SMEs to complete implementation in shorter discrete episodes. In addition, it is likely that this approach would require less resource and would be less susceptible to staff turnaround and reallocation. The disadvantage of this approach is that, due to its reductionist nature, conflicts between strategic objectives may arise. This, however, may be resolved by the introduction of a 'conflict resolution' stage in the methodology that would be undertaken at the start of each iteration of the 'depth' cycle.

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RUNNING BEFORE WALKING: THE DIFFICULTIES OF DEVELOPING STRATEGIC PERFORMANCE MEASUREMENT SYSTEMS IN SMES.

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ABSTRACT

The concept of strategically aligning performance measures (PM) has received much attention from researchers and practitioners in recent years. However, there is little work on the formulation of such systems in smaller companies, where formal strategic planning is often difficult to realise effectively. This paper presents evidence which demonstrates that, even in companies that are open to strategically aligning their PM systems, the lack of a formal strategy is a major barrier to development. The paper concludes by proposing a route forward in the formulation of strategic PM systems in companies where dynamic, emergent, strategy models are typical.

INTRODUCTION

The 1990's witnessed the emergence of a number of frameworks and methodologies developed to help companies redesign their performance measurement systems, by linking measures directly to company strategy, to facilitate the achievement of strategic goals (Kaplan & Norton 1992, Lynch & Cross 1991, Neely et al 1996a, Bititci et al 1997). A prerequisite for the effective use of these tools is an explicit company strategy. However, the well documented lack of formal strategic planning within SMEs (small to medium sized enterprises) (Berry 1998, O'Regan et al 1998) suggests that they tend to follow the emergent, rather than explicit, model of strategy formulation (Mintzberg et al 1998). The purpose of this paper is, therefore, to examine the problems associated with introducing strategic PM into SMEs and to propose a possible route for development, using data collected during an eighteen month investigation into SME PM systems. The primary aims of this investigation were; to use semi-structured interviews to investigate the current use of strategic PM in SMEs and to investigate the application of a strategic PM development methodology (Neely et al 1996a), in a SME, using a case study approach.

RESEARCH METHOD

The interviews were carried out with managers from eight SMEs, drawn from a sample that had recently undertaken strategic improvement programmes. This approach is consistent with 'judgement sampling' (Sekaran 1992) and was used because it was felt that companies that were actively seeking strategic improvements would be the most likely to view PM as a strategic improvement tool. Company size ranged from 12-240 employees and were all manufacturing focused. The interviews were taped and transcribed. Triangulation was achieved by verifying summaries of the transcripts with the original interviewees and an additional manager. Thematic coding (Flick 1998) was used to analyse the transcripts and build a model of the PM systems used in SMEs.

The case study company had expressed a desire to improve their current PM system, and agreed to use the Neely et al (1996a) methodology (The Cambridge Approach). The Cambridge Approach is split into two distinct phases, with phase one focusing on the development of strategic level PMs, and phase two developing operational level measures to support them. The company undertook to complete the first phase of the methodology, which was planned as a series of five workshops and facilitated by a member of the original development team. The study utilised a case study approach that focused on the accumulation and interpretation of qualitative data (Gummesson 1993). Data collection was based on both participant observation and face-to-face interviewing methods. Data analysis of the observational data was undertaken using thematic coding. This led to the identification of a set of issues that were verified and validated with workshop participants and with the process facilitator.

STRATEGIC PM IN SMES

The interviews and the case study gave an insight into strategic PM within an SME context. The interviews were used to build a picture of the type of PM systems which SMEs actively seeking strategic improvements would use. In addition, the case study provided the opportunity to examine the use of the Cambridge Approach, which has been tried and tested in larger companies (Bourne and Wilcox 1998, Neely et al 1996b), applied in a SME context.

Interview Results

The results from the interview coding process are displayed in table 1. From these results, it is evident that the main focus for PM in all the SMEs is still financial, although increasingly measures are being introduced at an operational level to address customer satisfaction issues. The measures in use differed from company to company, with some maintaining a small number of simple and practical measures, and others having a majority of measures which were either obsolete, or which produced data that was already out-of-date by the time it was collated. Interestingly, all the interviewees complained that the measures produced an overload of data which was either too complex or outdated and therefore unusable. Even where the data was usable, only one SME reported a formal feedback system, via monthly review meetings.

None of the companies in the sample had developed their measures strategically. Instead, many measures were simply historical ('we have always measured this') or

were imposed either by legislation or customer demands. The primary trigger for introducing new measures had been to eliminate problem recurrence. However, none of the sample had any coherent process for introducing new measures, relying instead on ad hoc identification and development by individuals.

	What is measured	PM characteristics	Development approaches
Codes & Categories	*Quality* -product quality -process quality -defects -scrap -suppliers *Time* -work in progress -output -lead times -delivery time *Finance* -inventory -orders / receipts -profit -turnover -costs -cash flow -sales / value added -quotes converted -income -productivity -expenditure *Customer satisfaction* -user problems -product usage -service -returns -complaints *Human Resource* -safety -staff turnover -personnel	*Scope* -department specific -lack of company-wide measures -not strategic *Type* -historically focused -some out-of-date measures *Format* -simple -small number -practical -flexible measurement -too much info -complex data -untimely data -unclear data *Use* -managerial use -no formal feedback -non-specific informal feedback -reviews to act on data	*How* -through brainstorming -through experience *Who* -managers, some staff and customers design measures -staff action measures *Issues* -lack of understanding of new measures -blame culture -explanation essential to ensure support -management support essential *Internal Triggers* -problem recurrence prevention -for visibility -to gain control -for planning purposes *External Triggers* -customer requirements -government legislation -national standards / awards requirements

Table 1: Results of Interview Coding

Case Study Results

Previous strategic change initiatives had highlighted a deficiency in the case company's PM system, which was heavily financially biased. Using the Cambridge Approach, the company attempted to develop a set of top level, strategic PMs, which would give a more balanced view of company performance. Table 2 illustrates the results of the case study, derived from the coding process. The intervention had originally been planned over five months, with one facilitated workshop being held each month. The first three workshops were completed successfully, but at this point the participants were asked to develop draft PMs in their own time, to bring back to the next workshop. Although the draft measures were eventually developed, a number of delays were incurred and finally, six months after the process had started, the company pulled out, without completing the process.

The breakdown of the development process (after the third workshop) was initially attributed to time and resource constraints on the staff involved. The perception of managers was that they did not have time to complete any tasks outside the workshops, due to their hectic, day-to-day schedules. This was confirmed in the final interviews where comments were received such as *"The meetings were great – but as soon as people get out, the fire-fighting begins again and everything is forgotten until next time."* This reflects the typical SME characterisation of having severe resource constraints and a fire-fighting mentality (Burns and Dewhurst 1996, Haywood 1999). This issue was exacerbated by a restructuring programme that was also being undertaken at the time of the PM development, which added further to the managers' already packed workload.

Performance Measures	PM Characteristics	PM Development	
		Planned	Achieved
Quality -scrap levels -actual vs planned performance *Finance* -sales growth -fixed cost expenditure -return on sales -return on capital *Flexibility* -production volume responsiveness -production capability *Time* -actual vs promised delivery times -pre-emptive product development *Customers* -products delivered on spec + on time -contacts with outside companies -service satisfaction *Stakeholders* -employee/ manager satisfaction -group contacts	*Strategic* -developed from strategic objectives - not operational *Balanced* -finances -customers -internal / ops -innovation *Practical* -explicit purpose -set targets -explicit formula -feedback mechanism	*Workshop 1* -introduction to the process -business needs for a new PM system identified *Interviews with* -general manager -operations manager -marketing manager -manufacturing manager -production manager -quality assurance manager -finance manager *Workshop 2* -ID product groups -customer/ stakeholder needs analysis carried out *Workshop 3* -ID strategic objectives -ID PM developers *PM Development sessions* *Workshop 4* -agree PMs -conflict analysis on new PMs *Workshop 5* -sign off PMs -implement review mechanism *Interviews* -final interviews with all managers	Workshop 1 completed 100% All interviews completed successfully Workshop 2 completed 100% Workshop 3 completed 100% Only 5 PM development sessions completed Workshop 4 cancelled Workshop 5 cancelled Final PM development sessions held Four final interviews held with available managers

Table 2: Results of the Case Study Coding

However, the final interviews revealed that there was a further difficulty which had led to the demise of the PM development process. During the interviews at the end

of the process, the Operations Manager, who had originally championed the process, commented that it *"needs customising to include day-to-day operations, rather than just the strategic stuff. We need to focus our attention on basics – how we can improve customer perceptions is the main one at the moment – we aren't quite at the stage for top-level PMs yet."* The stage at which the process faltered was directly after a draft set of PMs had been developed and it seemed that at this stage the company realised that the measures they had developed did not match their immediate priorities.

The main problem seemed to be that the process was developing strategic measures in a company where there was no explicit strategy. This led to a discrepancy between the outputs of the workshops and what was actually happening in the company. In the workshops, the managers were able to identify a set of strategic objectives that illustrated their vision for the future. However, because of the lack of a company-wide strategy, there was no link back to the 'real world' situation which the company found themselves in. The reason for this was that the Cambridge Approach depends on the provision of an explicit strategy to ensure that the measures developed reflect accurately the needs of the company.

DISCUSSION

The interviews illustrated that even in the sample SMEs, where strategic improvements were actively undertaken, there is no evidence that PMs are developed with a strategic focus. In addition, none of the SMEs had any structured process for developing PMs. These findings indicate a lack of coherence between the actual management practices and strategic planning activities in these companies. This is consistent with the findings of McAdam (2000), who studied a number of SMEs who had implemented the Balanced Scorecard as a form of TQM.

The case study attempted to examine some of the issues obstructing strategic PM development by introducing a structured PM development process into a SME. This would overcome the initial lack of structure identified in the interviews and should, therefore, help to align management control with strategic objectives. However, the level of time and resources required proved difficult to maintain over the six month planned intervention period. Given the constantly evolving strategies common of many SMEs (Gunsekaran et al 1996), it seems unlikely that such a time and resource intensive process would be viable in a SME where regular updating and reviews would be necessary in order to ensure continued relevance. More importantly, the process was unable to cope with the lack of an explicit strategy in the case company. This is problematic because the dynamic nature of many SMEs means that emergent strategy is often the only established option, with a focus on short term goals rather than long term strategy (Ghobadian and Gallier 1996). Again, similarities between this case and the McAdam (2000) study may be drawn. His findings suggest that the Balanced Scorecard can compromise SMEs who are struggling to remain competitive in a dynamic environment. Similarly, the Cambridge Approach proved unable to cope with the fast moving and flexible strategy in use in the case company.

The evidence from this study shows that the ad hoc PM development approach described in the interviews makes aligning PMs with strategy virtually impossible. However, the difficulties encountered through the case study illustrate that using a structured approach can also have significant drawbacks. Current development approaches rely on the provision of an explicit strategy to ensure that the PMs developed are strategically aligned. With the case company, along with many other SMEs which follow the emergent strategy model (Barnes et al 1999), trying to develop strategic PMs without the existence of an explicit strategy is equivalent to trying to run before learning to walk. Add to this the considerable time and resources required to use such approaches and it is clear that they are, at best, of limited applicability in SMEs.

CONCLUSION

The research presented in this paper has illustrated that, although the merits of strategic PM are acknowledged in the literature, this is not reflected in the SME sector where there is still a heavy reliance on financial and ad hoc operational measures, with no coherent reference to strategy. A possible reason for this is that the tools currently available for strategically aligning PM systems require the existence of an explicit strategy in order to be effective, conflicting with typically emergent style of strategy formulation in SMEs. In addition, the constraints on SMEs in terms of time and resources to develop a new PM system may also act as a disincentive. To enable SMEs to cross the boundary between strategy and operations through PM, it is proposed that a new process is developed, which allows the identification of PMs that are aligned to emergent strategy. In order for this new approach to be effective it would need to be both fast and resource efficient, but perhaps more important is the requirement for it to be dynamic and flexible enough to accommodate strategic changes.

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Performance measurement for planning and control in SMEs

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Abstract

This paper explores the concept of strategic performance measurement in SMEs. To provide some depth and breadth for the investigation the research was structured into two phases. The first phase of the research focused on identifying whether SMEs develop and use strategic performance measures. A survey of eight SMEs, in the south west of England, was undertaken using semi-structured interviews. The second phase involved a more in-depth study and was based on observing the introduction of a strategic performance measurement system in a small company. The results gained to date indicate that SMEs have a good understanding of financial measurement, and are moving towards customer focused measures. However, these measures typically lack strategic alignment and many may be questioned in regard of their value for business improvement. The observations made during phase two of the research, the development of a new strategic performance measurement system in an SME, indicated the potential planning and control benefits from the design process that was utilised. However, particular difficulties were evident in the development and implementation of the

performance measurement system. Further research (phase three) is now being undertaken to analyse these difficulties. This paper describes the first two phases of the work. An introduction is provided which establishes both the relationship of this work to existing literature and the context for the study. The key findings from the work are shown following a description of the research methodology that was employed. The paper concludes by summarising the key findings and by presenting a set of propositions that will be used to extend the research into phase three.

Keywords
Strategic Performance Measures, SMEs, Performance Measurement System Design, Forward Planning.

1 INTRODUCTION

This paper describes the initial findings of a three year, collaborative research project into Performance Measurement in SMEs. The aim of this stage of the research has been to identify whether the introduction of a strategic performance measurement system can improve planning and control in SMEs.

The advantages of redesigning traditional performance measurement systems to align them with business strategy have been well documented in the literature (Eccles, 1991; Ghalayini and Noble, 1996). Various frameworks and tools have been developed to facilitate the achievement of a balanced and strategically aligned performance measurement system (Lynch and Cross, 1991; Kaplan and Norton, 1992; Lochamy and Cox, 1994; Neely et al, 1996). However, much of the work that has been undertaken in this area has focused on larger companies. Previous research (Greatbanks and Boaden, 1998) suggests that although a large proportion of British business is made up of SMEs, few measure performance strategically. Therefore, a gap currently exists in this area and to develop it, empirical research is required.

One of the criticisms that has been levelled at many of the strategic performance measurement frameworks is that, while they address strategic issues, they do not explicitly link the strategic dimension with the operational dimension, making successful implementation unlikely (Ghalayini et al, 1997). However, Neely et al (1996) have developed a process for the design of a strategic performance measurement system which addresses this strategic/operational linkage through a two-phased approach. Phase One of this approach is focused on developing strategic measures with Phase Two addressing the development of operational measures to action the strategic measures. Although this methodology was developed in large companies it has now been applied in SMEs, but with limited success. An analysis of the case data resulting from the application of the methodology in SMEs has shown that although the design phase of the process was well received by the companies, few managed to implement the new system effectively (Bourne and Neely, 1998). To extend this work further and to investigate whether the introduction of a strategic performance measurement system can improve planning and control in SMEs, the following questions were formulated:

Do SMEs measure performance strategically?
What are the benefits of strategic performance measurement for SMEs?
Can the Neely et al (1996) methodology for designing performance measures be developed for use in SMEs?

2 RESEARCH METHODOLOGY

To effectively address these questions two complimentary research phases were designed.. The first phase was developed to address question 1 and aimed to gain a broad understanding of the way SMEs currently use performance measures. The second phase predominantly focused on questions 2 and 3, and attempted to obtain some depth of research through a field study. This field study involved observing the practical application of the Neely et al methodology in an SME.

Phase 1 of the research involved semi-structured interviews with managers from 8 SMEs. Due to the scarcity of strategic planning in the majority of SMEs, which is well documented (Mintzberg et al 1998, Cagliano et al 1998, Barnes et al 1999), it was decided to sample companies who had recently undertaken strategic improvement programmes. An additional rationale for this approach was to identify whether these companies, who may be termed exemplars as far as the specific domain is concerned, actually used performance measurement to help achieve their strategic objectives. To ensure consistency in the sample, all the companies were based in Devon and Cornwall and were primarily manufacturing focused. Their sizes ranged from 12 – 240 employees with an average company size of 65 employees.

The interviews were designed to investigate the following broad areas:

- current performance measures;
- performance measure development;
- perceptions of performance measures;
- change management issues.

These areas were chosen to find out what performance measures the company was currently using; whether they were developed strategically, how useful they are perceived to be, and what issues would arise if the company were to change the system. Each interview was taped and subsequently transcribed. Summaries of the transcripts were then produced and were verified by the original interviewees. Triangulation was used to validate the summaries by showing them other managers in the company.

The second phase of the research involved a more in-depth field study which focused on the design of a strategic performance measurement system using the Neely et al (1996) methodology. This phase was designed to help identify the areas where SMEs might experience difficulties with the methodology. In addition to addressing question 1, it was hoped that this study would provide an answer to

question 2, by demonstrating whether there is any benefit in terms of improved planning and control in introducing a strategic performance measurement system.

The field study was undertaken in a manufacturing SME based in Devon, with 54 employees. This was to ensure consistency with the sample that participated in Phase 1. The study was carried out over approximately 6 months and focused on the observation of a series of facilitated workshops involving all the senior managers of the SME. In total five workshops were undertaken, the first three workshops were aimed at developing a set of strategic objectives for the company, with the latter two workshops focused on developing a performance measure for each objective. Interviews with each manager who was involved in the process were also carried out to identify individual commitment to the project, and the perceived importance of having a strategic performance measurement system.

The inductive nature of both the interviews and the field study advocated analysis using a grounded theory approach (Glaser and Strauss 1967). The codes and categories developed from each set of data were reviewed with a view to integrating similar incidents and properties, and a number of propositions were developed from the final data sets.

3 FINDINGS

Three themes emerged from the semi-structured interviews: current useful performance measures; performance measure development; and change management (See table 1). These themes were developed by integrating the categories from the original coding. The main findings were that although all the companies had a plethora of financial measures, which made up the majority of the formal measures used, these were not seen as being directly relevant to the day-to-day running of the business. However, many of the non-financial measures, or measures which had been developed informally by line managers, were invaluable in helping operations run smoothly.

Table 1

Themes	Main Characteristics
Current useful performance measures	some formal and financial measures
	many informal and non-financial measures
	timely and relevant to running the business
Performance measure development	post-problem (to prevent recurrence)
	historical
	responding to external pressures (customer/legislation)
	ad hoc cost reduction
Change management	Consultant led but internally championed
	Full staff backing for change
	Demonstrable benefits of change

In addition, many of the measures were customer oriented and had been developed in direct response to problems that affected the customers. Hence the measures that were perceived as being most useful included lead times; dispatch reliability, on-time delivery and product quality. The only financial measure which was perceived as being useful from an operational perspective was product cost analysis, which could be used to reduce production costs and offer more competitive quotes to customers.

None of the companies in the sample had attempted to develop their measures strategically. Instead, many measures were simply historical ('we have always measured this'), or were imposed either by legislation or customer requirements. The main reason for the introduction of new measures was to address problems that had occurred which, with hindsight, measurement could have prevented. Measures developed in this way were viewed as being the most useful, even though many were informal.

It was agreed that there was room for improvement in the current systems for measuring performance. The main reason given for this was the fact that many of the measures currently in use provided data that was out of date by the time it had been collated, and was therefore providing irrelevant information. When the managers were asked how they might approach this, the consensus was that successful change has to be well thought out and usually consultant led, due to the limited resources available internally. However, it was agreed that change initiatives would fail unless they were championed internally and received full commitment from all of the employees. In addition, to ensure this continued commitment, it was also deemed necessary for change to bring about demonstrable benefits.

The two major themes that were analysed in the second phase of the research were process issues and benefits of introducing the new system. The main findings were that the company commitment to the project hinged heavily on the Operations Manager. Without the Operations Manager's enthusiasm and commitment the completion of the process was doubtful. The facilitator had proposed that only the first section of the process, which aimed to develop the strategic level performance measures, should be completed through the workshops. This was because it was felt that Section Two of the methodology could only be achieved once these measures had been implemented and were being used effectively. However, the company struggled to complete the first section, and it seems unlikely that this will be completed.

The workshops themselves were very successful. All the managers found the identification of a set of strategic objectives a valuable exercise but most struggled when they came to developing the actual performance measures for those objectives. This seemed to be because each manager was assigned a set of objectives for which to develop measures individually, but because of the day-to-

day issues of running the business, little preparatory thought was given to this exercise.

Despite the difficulties in completing the process, there were benefits gained from the development of the new system. The process of analysing the company and identifying the strategic objectives were acknowledged by the participants to have fostered consensus and focused their efforts. The process was also seen as valuable because it identified an effective method for controlling and supporting business planning through the use of critical measures to realise strategy.

4 CONCLUSION

The literature advocates that strategic performance measurement systems are the key to controlling successful business development. However, from this research it is clear that SMEs do not currently use performance measurement to achieve their strategic objectives. From the results of the interviews, several propositions have been developed to explain this:

- SMEs introduce performance measures only through necessity - i.e. for financial reports; government legislation; customer requirements; or to prevent problem recurrence.
- SMEs have a range of performance measures, but many of these are irrelevant.
- Key operational measures are often developed informally and are minimal, but very useful.
- Successful change requires time and effort from the management, which is difficult to maintain.

These propositions attempt to explain why, excluding the smallest company where it was felt that total control had been established, all of the companies expressed a desire to improve their performance measurement systems. However, even though a methodology was used that had been proven in large companies, the observations obtained from the field study indicated that the application of the methodology in SMEs was problematic.

This research has demonstrated that although it is not current practice, designing a strategically based performance measurement system is useful for SMEs, because it enables them to explicitly state the company objectives and facilitates the identification of both problem areas and growth potential. This overview enables the development of performance measures which have the potential to drive the business forward. However, the time and commitment required to develop this new system proved difficult to maintain in the study, making it unlikely that the process will move from the development of strategic measures to those which will link the strategy to operations. At this stage therefore, it cannot be concluded that strategic performance measurement improves planning and control in SMEs. There is a need for more research in this area to identify the specific characteristics and that are required to develop this existing methodology (Neely et al 1996) for successful application in SMEs.

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