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**BUSINESS EXCELLENCE: LESSONS FOR THE CONSTRUCTION
INDUSTRY**

by

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A Doctoral Thesis

**Submitted in partial fulfilment of the requirements for the award of Doctor
of Philosophy of the Loughborough University**

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by Nicola Emma Thompson 2005

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ABSTRACT

The construction industry has been accused of being, at its worst, wasteful, inefficient and ineffective, wasting over £1 billion in 1999 due to errors and rework (Nicholson, 1999). Competitive pressures from within industry, as well as external political, economic and other considerations are forcing the industry to re-examine and improve its modus operandi (Anumba et al, 2000). The message is that to survive and prosper, the industry must change its management and practice. Nevertheless it took the publication of both the Latham (1994) and Egan (1998) Reports, both advocating the use of performance measurement, for the industry to recognise that it needed to modernise in order to tackle the severe problems facing it.

However, in order for it to improve, the Construction Industry is faced with a bewildering range of business improvement models and approaches, all with their unique features, to use on their quality journey, all proclaiming to improve organisational capability and results. Hence, the aim of this research is to provide guidance on how these business improvement models and approaches can be used to support and improve bottom-line results to achieve business excellence.

The scope of this research is to focus on three industry sectors and companies: Construction (Morgan Est Plc), automotive (Lear, a first tier supplier) and aerospace (Rolls Royce), as proof of concepts. An analysis of the overlap between the business improvement models and approaches, conducted in the literature review, confirms the need for this research.

The initial concept adopted in this research is to pursue and evaluate the most popular business improvement models; ISO 9001; the European Foundation

for Quality Management (EFQM) Excellence Model and the American Baldrige Model and the business improvement approaches such as Total Quality Management (TQM), Business Improvement Review (BPIR), Six Sigma and other “tools” that help Managers understand the business, such as Balanced Scorecards and the Process Classification Framework (PCR). Accordingly, a theoretical evaluation model was developed to demonstrate where the approaches support the business improvement models. The model was subjected to the empirical feedback of expert interviews and case studies and to confirm its suitability for use within the construction industry.

The now developed evaluation model demonstrated that these models and approaches are “TQM” with ISO 9001 providing the support and consistency between them all. Furthermore, the results of a questionnaire survey revealed that ISO 9001 can be the starting point for the journey towards world-class performance. It provides the platform for taking the organisation forward by achieving control over leadership, customer focus and continual improvement. However, it needs to be implemented with a view to excellence rather than compliance.

The main finding from this research is that the construction sector still needs to provide major investment in improvement models and approaches to deliver bottom-line results and achieve business excellence.

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DEDICATION

For Richard, if only I had your inimitable style and wit, Socrates

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Chapter One

Introduction

1.1 Background

1.2 Aims and Objectives

1.3 Research Achievements

1.4 A guide to the thesis

Chapter One

INTRODUCTION

1.1 BACKGROUND AND THE NEED FOR RESEARCH

Throughout the 1990's, a succession of management approaches, tools and techniques were in fashion such as multi-skilling, empowerment and re-engineering. Many organisations adopted a variety of them for improving performance, achieving quality or business excellence and bringing about significant change. They gave many organisations a common way of tackling certain types of problems. Consultant methodologies played a major role in transferring them between clients.

This is known as comparative management, where consultants advise clients on what worked elsewhere and why it may or may not work in the client company. Good practices from other companies transfer well when the implementers take full account of the industrial, organisational and cultural context of the receiving company. They fail when they are engineered without sensitivity or responsiveness to the client organisation. This happens when there is a considerable gap between initial expectations and eventual outcomes (Coulson-Thomas, 2004).

Is the problem with the tools or how they are used? Research undertaken by Coulson-Thomas suggested that while many companies do feel frustrated with various tools and change programmes, many are closer to success than they might think. Successful organisations are those which avoid an unhealthy

obsession with standard approaches, tools and techniques such as those provided in corporate manuals for use of all staff regardless of the particular situations and circumstances they find themselves in. It is more fruitful to use these as an aid to thinking, rather than a substitute for it. Equally, the more successful change programmes are those which use the business context as the start point rather than the tools themselves. It's all about relevance.

Organisations taking up management tools tend to focus on the "harder" and more tangible "formal" factors such as process flow diagrams, organisation charts and new technologies. In comparison, the "softer" or "informal" arena of attitudes, behaviours, feelings and values tend to get short changed, and in many cases avoided.

The research conducted by Coulson-Thomas has examined why some companies success in winning business, building customer relationships, creating and exploiting know-how and managing change, while others stagnate. A series of studies has compared the differing approaches of "winners" and "losers" and identified critical success factors. The results suggest that winners and losers adopt very different approaches to the use of management tools and techniques.

Losers are much more likely to import and mechanically work through methodologies provided by others. This notion that "any action is better than no action" puts the emphasis on the tools rather than on the outcomes. Winners conversely, are more likely to be sceptical of slick answers and packaged "solutions" and are willing to develop their own approaches, tools and responses. They put more effort into asking the right questions, and create rather than imitate. When, and where, tools are used is often to stimulate thought and create

value. Tools become enablers rather than constraints, for example a sales support tools developed for Eyretel, a supplier of call monitoring equipment, enabled sales staff to rapidly alter proposed solutions and suggest new options to accommodate changes in the budgets of prospective clients (Coulson-Thomas, 2004)

Many management techniques and tools are neutral. It is how they are applied which cause the changes. For example, processes could be re-engineered to improve the quality of working life, introduce new ways of working or learning, generate new options or create additional value.

Smart companies use support tools to automate routine tasks and free up time for the creative thinking needed for differentiation, tailoring responses to the particular needs of individual customers and creating more value for them. Whereas losers might initiate general cultural change programmes to highlight desired attitudes and behaviours, winners are more likely to look for specific ways of bringing out the best in people.

What are the management approaches that have separated industries winners and losers? In the past two decades, literature has criticised the sole use of financial indicators in performance evaluation because financial ratios themselves might not be reliable due to the use of “creative accounting” practices in some companies, especially failing ones (Arditi, Koksai, and Kale, 2000). Furthermore, researchers have realised that factors other than financial can contribute to company performance. For example Russell and Zhai (1996) realised that economic variables could have a considerable impact on company performance,

especially in construction, and Arditi et al, (2000) attempted to identify the various causes of failure of construction companies and concluded that dominant factors are organisational and environmental, while financial performance indicators are symptoms rather than determinants.

In the general area of managerial accounting, Kaplan and Norton (1992, 1996 and 2001), developed the balanced scorecard as a way to measure a business's performance more proactively, rather than just relying on financial measures. The balanced scorecard (also known as BS, BSC or BBS) requires that organisations measure four key areas of a business, as shown in figure 1.1. The areas selected should be carefully aligned with business strategy and should include targets and ownership. The four areas are usually casually linked. Learning and growth is the engine by which processes are aligned and improved. Business processes are the methods by which customers are served – and satisfied and delighted customers lead to good financial results.

Perspective	Question
Financial	To succeed financially, how should we appear to our shareholders?
Customer	To achieve our vision, how should we appear to our customer?
Internal/business process	To satisfy our shareholders and customers, at which business processes must we excel?
Learning and Growth	To achieve our vision, how will we sustain our ability to change and improve?

Figure 1.1: Kaplan and Norton's Balanced Scorecard

Source: Quality World, November 2004

Although the Balanced Scorecard has been widely accepted and adopted by firms (Roest 1997), it has been criticised as not providing a complete performance measurement system (Sinclair and Zairi 1995), thus indicating the need for a more comprehensive system.

On the other hand, and in the field of quality management, national quality awards emerged in many countries promoting criteria for business excellence. The Malcolm Baldrige National Quality Award in the U.S. (NIST 2004) and the EFQM Excellence Model in Europe (EFQM 2004: Van der Wiele, Dale and Williams 2000) are the most popular of these awards. These models identify the criteria companies need to focus on, and thus measure, and require the use of performance indicators in some of them. Both models have their similarities and differences as they were both derived from core concepts in the ISO 9001 model and the approach of TQM (Tummala and Tang, 1996).

Many other improvement models and approaches have been developed and are discussed in Chapter three. When implemented they lead to world-class performance (Tanner, Bailey and Pertwee, 2004) or when applied to specific tasks provide the building blocks of world-class performance. The existence of these many improvement models and approaches have lead companies to: either choose one of them, and thus miss important performance aspects measured by other frameworks; or use more than one framework at the same time, which can lead to initiative/work overload and confusion (Hobbs and Murphy, 2001). Therefore, a need exists to develop a framework for business excellence and checklist to overcome the difficulties of dealing with more than one improvement model and approach. This has been identified as the first research need. This

requirement has previously been identified in literature and expressed in the attempts to develop comprehensive frameworks or best practice models (Bassioni, Price and Hassan, 2004; Fountain 1998, Kanji 2001; and Neely and Adams 2001).

In order to develop a framework for business excellence and a checklist the most popular models and approaches that recognise “world class” performance, see figure 1.2, have been identified to determine areas of commonality, overlap and conflict.

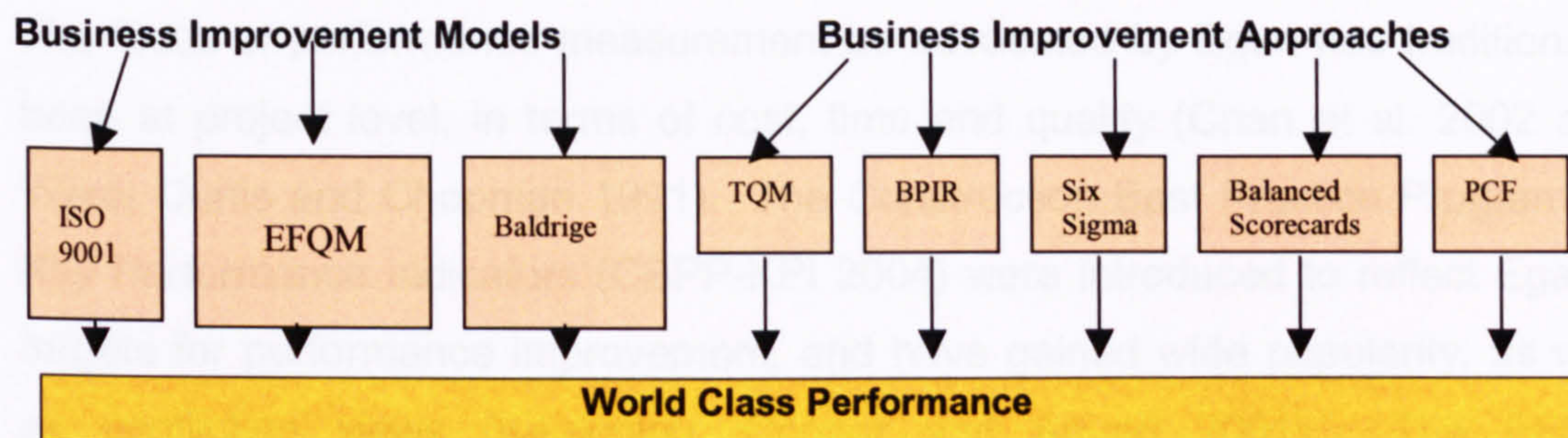


Figure 1.2: Business Improvement Models and Approaches

Source: BSI, 2003

1.1.2 Business Excellence in the Construction Industry

Concerns for the construction industry were brought to the fore by the publication of Rethinking Construction, the report of the Construction Task Force by Sir John Egan, which was preceded by the Latham Report, Constructing the Team by Sir Michael Latham. Latham recommended that a productivity target of 30 per cent real cost reduction by the year 2000 should be launched (Latham, 1994). He

also advocated that Quality Assurance certification should continue to be encouraged within the construction industry as a potentially useful tool for improving corporate management systems. Egan, building on the firm foundations which Latham had laid, recommended seven performance indicators for the scope of sustained improvement, with defined improvements per year.

All of this was against a backdrop of deep concern in the industry and among its clients that the construction industry was under-achieving, both in terms of meeting its own needs and those of its clients.

The focus of performance measurement as advocated by Egan has traditionally been at project level, in terms of cost, time and quality (Chan et al. 2002 and Ward, Curtis and Chapman 1991). The Construction Best Practice Programme Key Performance Indicators (CBPP-KPI 2004) were introduced to reflect Egan's targets for performance improvement, and have gained wide popularity, as well as conflicting views (Kagioglou, Cooper and Aouad 2001). The EFQM Excellence Model and the Balanced Scorecard have also been used within the industry and have been gaining momentum within the past few years (Robinson et al. 2002).

The UK Construction Industry is eminently flexible; its labour force, willing, adaptable and able to work in the harshest conditions. Its capability to deliver the most difficult and innovative projects matches that of any other construction industry in the world. The construction industry comprises different types of organisations, mainly falling under the categories of client, consulting and contracting. The objectives, practices and structure of these types of

organisations can vary. For example, contracting organisations, by the nature of their business, are inclined to be more capital intensive, while consulting organisations might have a higher degree of focus on human resources. Fox and Williams (1995) and Smith (1995) discussed the differences in cost objectives and practices can among project participants. Consequently, the internal management of each organisation type can vary, and can require different information or internal performance measures.

Within this project-oriented focus, each project is unique and can be considered as a prototype, although a similar set of process stages are involved in every project (Wegelius-Lehtonen, 2001). The business improvement models and approaches have been primarily managerial initiatives originating from manufacturing and service industries and it has been argued they are not necessarily appropriate for construction. For example, Ahmed and Sein (1997) and Stockdale (1997) discussed the difficulties of implementing Total Quality Management in construction, Howell (1999) and Pasquire and Connolly (2002) discussed the difficulties of applying manufacturing/production principles in construction, and Love and Li (1998) tried and discussed Construction Process Re-Engineering. The appropriateness of business improvement models and approaches from manufacturing has also been evident in the adaptation of performance measurement frameworks when applied to construction, such as that of the Balanced Scorecard in Kagioglou, Cooper and Aouad (2001). Therefore to ensure that these models and approaches are fully embraced the developed evaluation model needs to demonstrate how it can be used within different industry sectors.

The second research need is to ensure that the developed model fully embraces the requirements of the construction industry moving it from a low and unreliable rate of profitability to one of improved margins and better returns.

1.2 AIMS AND OBJECTIVES

Against this background this research aims to develop a comprehensive evaluation model for business excellence to be used by the construction industry for improving performance.

The research aim can be broken down to the following research objectives:

1. Identify existing business improvement models and business improvement approaches;
2. Demonstrate the overlap between these business improvement models and business improvement approaches;
3. Demonstrate how these models and approaches are TQM in another guise with ISO 9001 as the starting point;
4. Develop an evaluation model for use in the construction industry;
5. Determine by the means of a checklist how the construction industry could implement this model; and
6. Determine the benefits, if any, on selected companies that have introduced business improvement models and approaches and analyse the effect that it has had on their employees and bottom line.

To achieve these objectives the following research tasks were undertaken:-

1. Conduct a literature review to investigate the current thinking on business improvement and analyse any gaps;
2. Develop an evaluation model and modify/confirm it through qualitative methods;
3. Apply qualitative methods to further confirm/adjust the model; and
4. Validate the model

1.2.1 RESEARCH METHODOLOGY

The research methodology is detailed in Chapter two. The research methods used to satisfy the objectives are illustrated in Figure 1.3. The following discussion details each stage and the research methods used in this research.

The research commenced by identifying, reviewing and choosing the literature giving the broadest outlook across business improvement, financial improvement and cultural management within industries both in the United Kingdom and abroad. Over 250 documents were reviewed. The models and approaches that were highlighted were the most popular both in terms of use and greatest improvement to a company demonstrated a clear overlap and consistency in outlook in driving and sustaining business excellence within organizations. Thus, the concept of developing an evaluation model that demonstrated the underlying logic of each model and approach emerged as a key requirement for the research. This model required qualitative feedback in order to provide insights to enable confirmation/modification of the model. Hence, expert interviews and case studies were conducted as an initial confirmation of the model. The model

at this point had been theoretically developed and qualitatively tested but required quantitative feedback to validate. This objective formed the analytic part of a questionnaire survey. With the aid of the Best Practice Club the questionnaire was distributed to companies that covered the majority of industry sectors. In order to ensure a representative mix of departments and personnel, each company was asked to send a number of questionnaires to all departments and support functions, i.e. quality, accounts, procurement, administration. Each company was to ensure that for each department/support function a range of personnel from Director/Senior Line Manager to the Junior Secretary were asked to complete a questionnaire. Thus this would ensure commonality across the different industry sectors.

The qualitative study was taken further and case studies conducted in three companies that had been surveyed initially by the questionnaire to illustrate how the framework could be used to create and drive business excellence. These were Morgan Est plc, a Civil Engineering company based in the Midlands which services many of the major clients within the industry. The other company chosen was Lear Corporation, an American owned company who are a 1st tier supplier in the automotive industry and Rolls Royce a supplier within the aerospace industry. These three companies were chosen so that a comparison could be drawn between two different industry sectors which already had well embedded ISO 9001 and TS 16949 systems respectively. Secondly, the findings would show how these systems provided the platform for taking the organization forward by achieving control over leadership, customer focus and continual improvement.

Finally to validate the model industry experts were asked to evaluate it in terms for usefulness, clarity and practicality.

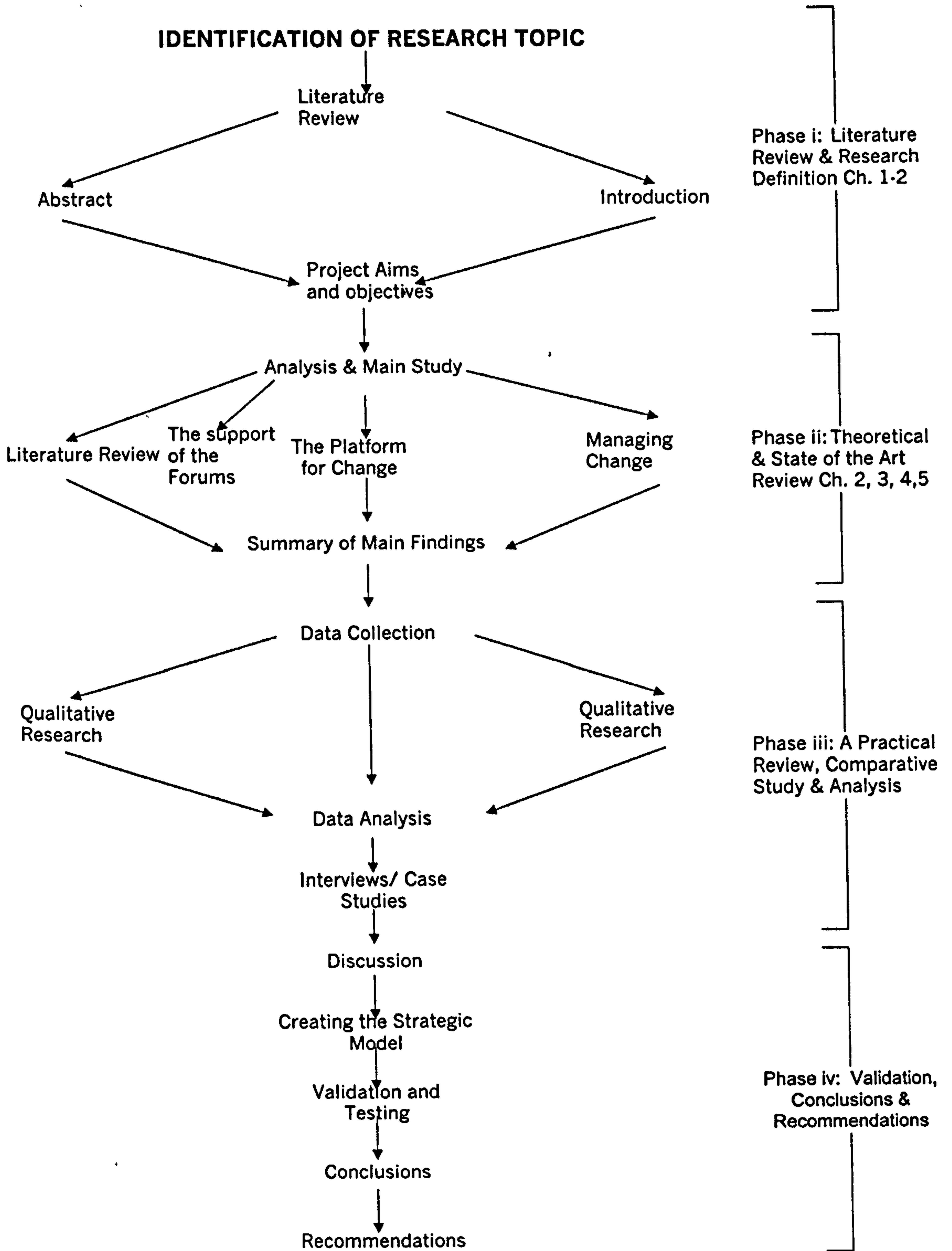


Figure: 1.3 Research Methodology

1.3 RESEARCH ACHIEVEMENTS

The major objective for this research was to provide the construction industry with an evaluation model and checklist which could be adopted in companies to drive business excellence. This was achieved. More specifically, the research achievement in terms of contribution to knowledge can be summarised as:

- A review of business excellence and business performance literature and analysis of gaps in knowledge of the subject, both in general and in construction has been undertaken;
- A description of the business improvement models and business improvement approaches and their functionality and use in industry has been developed;
- A model to facilitate business excellence and world class performance has been developed and validated;
- A checklist to assist the cultural management aspects; and
- A demonstration of how these models and approaches are TQM in another guise with ISO 9001 as the starting point.

1.4 A GUIDE TO THE THESIS

This thesis is divided into seven chapters, a guide of which is given below: -

PHASE 1: Review and Research Definition

Chapter 1 introduces the thesis, discussing the background, research needs and the aims and objectives of the research. The research methodology is

overviewed, and research achievements discussed. A guide to the thesis is also presented questionnaire and case study approach

PHASE II: Theoretical and State of the Art Review

Chapter 2 provides the detailed methodology for the research encompassing the questionnaire and case study approach

Chapters 3, 4 and 5 consists mainly of literary reviews, description and evaluation of the business improvement models and approaches and the development of an evaluation model for the construction industry

PHASE III: A practical review, comparative study and analysis

Chapter 6. This starts the review in practice by discussing the questionnaire in detail, analysing and summarising the responses from the questionnaire and reviewing the business improvement models and approaches in practice as well as a comparative study of Morgan Est plc, Lear Corporation and Rolls Royce in their quest for business excellence.

Further to this it identifies the benefits that can be derived from implementing such tools and a checklist to overcome cultural aspects which can be obstruction when striving for business excellence.

PHASE IV: Validation and Recommendations

Chapter 7 discusses the validation of the research by pursuing expert feedback of the developed evaluation model, its features and components. Also discusses

the benefits and limitations of the evaluation model, conclusions, recommendations and further work.

Chapter Two

Research Methodology

- 2.1 Introduction
- 2.2 Established research protocol
- 2.3 Approaches to empirical work
- 2.4 Data collection
- 2.5 Data Analysis
- 2.6 The research method employed
- 2.7 Data collection
- 2.8 Summary

Chapter Two

RESEARCH METHODOLOGY

2.1 INTRODUCTION

Research can be considered to be a “voyage of discovery”, whether anything is discovered or not. What is discovered depends on the pattern and techniques of searching, the location and subject material investigated and the analyses undertaken. Research is a learning process and does not occur in a vacuum. Research projects take place in contexts – of the researcher’s interests, expertise and experiences; of human contacts; of the physical environment etc. Thus, despite the best intentions and vigorous precautions, it seems inevitable that circumstances, purposes etc., will impact on the work and its results. The fact that research is being carried out will itself influence the results, as described in the Hawthorne Investigations of Elton Mayo (1949) and noted in the writings of Karl Popper (1989) on the philosophy of research. Research is never a completely closed system (Fellows and Liu, 1997).

The first part of this chapter examines the research process and the underlying principles. Qualitative and quantitative approaches and statistical inference and external validity are also examined. The meanings of generalisation, particularisation and rigour in a research context are also discussed as are the effects of knowledge, experience and bias.

The second part of this chapter builds on part one and presents the method adopted for this research demonstrating how it satisfies and reflects the established theory of research.

2.1 ESTABLISHED RESEARCH PROTOCOL

In the 1980's the Science and Engineering Research Council (SERC), the forerunner of the Engineering and Physical Sciences Research Council (EPSRC) in UK, ran a Specially Promoted Programme (SPP) in Construction Management of their view of the research process relating to the SPP. Initial studies provided the foundation for all the research work that followed. Depending on the nature of the study, the initial work provides either the means for determining or confirming the aim, objectives and hypothesis or for confirming the topic for study. In either case, initial studies are essential to ensure that the research intended has not been carried out already and, more especially, they determine what has been researched and what issues are remaining or emerging for investigation. This helps to avoid making the same mistakes that other researchers of the topic have made. Preliminary research involves searching sources of theory and previous studies to discover what the appropriate bases for the subsequent, detailed work are likely to be – often, alternatives will be found. It is at this stage that the design of the main research must be formulated or confirmed.

Research is a dynamic process. Early in the study, links between problems, which may be either topics or issues, theories, previous findings and methods will be postulated. The links should form a coherent chain, and so may need to be adapted as the work developed and findings emerge. The goal must be to

maintain coherence; only by such an approach will the results and conclusions be robust. The research path (Figure 2.1) is embodied in the research design, data collection and data analyses, encompassing both the nature of the data and the methods used. Whatever method is adopted, it is essential that the research be conducted rigorously – that it is an objective and valid study (Fellow and Liu, 1997).

Bechhofer (1974) considered the process of social research to be “....not a clear cut sequence of procedures following a neat pattern but a messy interaction between the conceptual and empirical world, deduction and induction occurring at the same time”.

He argues that the definition of the topic and terms will be established during the production of the research proposal; the programme of work will show the time available, although it is usual for the review to be “kept open” so that further literature can be incorporated if any work of significance is discovered during later stages of the project. However, care is required. Although keeping the review open in that way is useful to ensure it is comprehensive and to incorporate latest research findings, it may lead to the review never being finished – so it is important to establish a “final deadline” to close entries to the review.

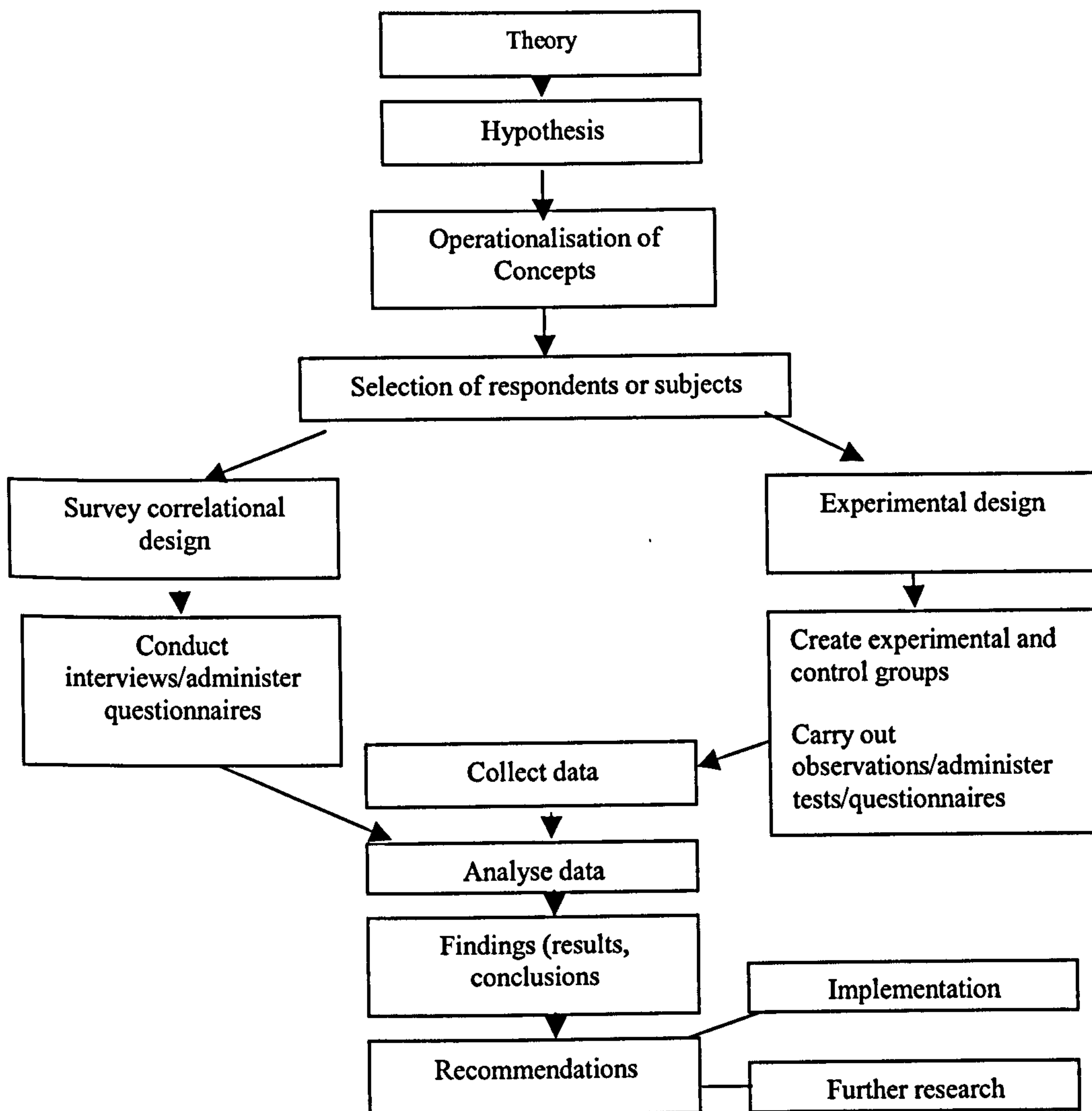


Figure 2.1: The Research Process

Source: Fellow and Lui, 1997

According to Haywood and Wragg (1982), the literature review must be critical and, therefore, demonstrate that “....the writer has studied existing work in the field with insight”. The insights should be derived from both the theoretical considerations and the completeness of the review of the literature. A mere listing of the articles which have been read with a summary of their main points is not sufficient; the critique – drawing out issues and arguments, setting alternative views against each other – is the essential element of the critical review. The topics reviewed in this research were: business performance measurement and excellence; business improvement models and approaches and culture. All of these topics were reviewed from both within and outside the construction industry sector. Internet searches and databases of journals, texts and conference papers were used. The search resulted in over 250 citations with a reference list of in-excess of 100 citations. This led to a summary of contemporary issues and an analysis of business improvement within industry. It also acted as the basis for the development of an evaluation model for business excellence.

2.3 APPROACHES TO EMPIRICAL WORK

Modelling is the process of constructing a model, a representation of a designed or actual object, process or system, a representation of a reality. A model must capture and represent the reality being modelled as closely as is practical. It must include the essential features of the reality whilst being reasonably cheap to construct and operate.

Rosenblueth and Weiner (1945) categorise models in science as material and formal models, Churchman et al. (1957) suggested that models fit into the

following categories: iconic, analogue and symbolic and Sayre and Crosson (1963) suggest the categories of: replications, formalisations and simulations.

All models contain parameters (variables) which must be identified and quantified for use in the model, together with their inter-relationships. The resultant models are either deterministic – what happened in the past will be replicated in the future – or stochastic (probabilistic) – the laws of probability which governed past realisations will continue to apply in the future. Deterministic models tend to be simpler in form and in the manipulations required than their stochastic counterparts. Whilst, by definition, stochastic models cannot take account of “shocks” which may occur in reality to the system under study, they are likely to be more realistic but more complex representations.

Models may be used to investigate and/or to predict; for managers, predictive models are more valuable, whilst auditing required investigative modelling. PERT is a stochastic predictive model; an investigative model could comprise a set of equations in several unknowns, sufficient that provided a certain number of values of some of the variables are known, the equations can be used to determine the remainder, as in linear programming (Fellows and Lui, 1997).

The objective of the model should be to reflect the purpose of the model. One should know for whom the model is to be constructed, in order to lend perspective to the modelling and to suggest sources of data, forms of output etc. The analysis stage comprises organised, analytic procedures to determine the operation of the reality, noting the location and permeability of the boundary of

the system to be modelled. Often, a diagram of the reality will be of benefit in identifying variables and their relationships prior to the quantification of both.

Verification of the model involves determining whether the structure of the model is correct; this is achieved by testing the model, by examining the outputs resulting from the model under a given set of inputs (Fellows and Liu, 1997). The aim of the evaluation model for business excellence was to help managers in choosing the correct improvement approach when faced with the many tools and techniques available.

2.3.1 Qualitative approaches

For a number of years, the scientific method, with its emphasis on quantitative studies, has been in the ascendant, with a result that research in disciplines which lie between the natural sciences and social sciences, notably management of technology and engineering, has been drawn or pushed towards adoption of the quantitative scientific method. However, quite recently, increasing recognition of the value and appropriateness of qualitative studies has emerged. This may perhaps be in acknowledgement of the potential for such methodologies to get beneath the manifestations of problems and issues which are the subject of quantitative studies, and thereby, to facilitate appreciation and understanding of basic causes and principles, notably, behaviours.

Tesch (1991) identified the following three categories of approach to the analysis of qualitative data:

- Language based – focus on how language is used and what it means – discourse analysis, ethno methodology and symbolic interactionism.
- Descriptive or Interpretive – attempts to develop a coherent and comprehensive view of the subject material from the perspective of those who are being researched; the participants, respondents or subjects
- Theory-building – seeks to develop theory out of the data collected during the study; grounded-theory is the best known example of this approach.

Oakley (1994) suggests that the word “qualitative” is used to describe research which emerges from observation of participants. Oakley asserts that such research has two sources:

- social anthropology; and
- sociology.

In carrying out studies which require the development of theory from data and the subsequent testing of the theory, where data collection, analysis and development of theory proceed together iteratively, Schatzman and Strauss (1973) advocate segregation of the researcher’s field notes into:

- observational Notes (ON);
- theoretical Notes (TN); and
- methodological Notes (MN).

Concerning the recording “....events experienced principally through watching and listening. They contain as little interpretation as possible and are as reliable

as the observer can construct them". TN are "self-conscious, controlled attempts to derive meaning from any one of several observation notes". MN are concerned with how the field work is carried out, and records any necessary changes, the reasons for such changes and when the changes occurred. Irrespective of the research methodology adopted for any project, taking detailed field (laboratory) notes is vital. The categorisation advocated by Schatzman and Strauss is appropriate for any research project, whether using qualitative or quantitative methods.

Much qualitative research concerns the generation of concepts through the researcher becoming immersed in the data collected in order to discover any patterns. In doing so, it is essential to be sensitive in order to detect inconsistencies and to be aware of the potential for different views to be expressed and for alternative categorisations and explanations to be valid. The researcher must be aware of his/her own preconditioning and views and hence potential bias (Fellows and Liu, 1997).

Hammersley and Atkinson (1983) are amongst a number of authors who consider the construction of typologies and taxonomies, which are categories and groups within the categories, to be important elements of analyses. The researcher should seek to establish categories, sub-groups and relationships between them from the data collected. Such categorisation of data will reduce the number of potential variables, thereby making the data more manageable and "visible" to assist the detection of patterns and possible dependencies, also called casualties. Clearly, in such qualitative research, much analysis is carried out by the researcher during the period of collecting data in the field.

Bogdan and Biklen (1982) differentiate between analysis carried out in the field during the period of collecting data and analysis carried out after the data collection has been completed. They assert that the researcher needs to be engaged in preliminary analyses constantly during data collection whilst post-collection analyses concern developing a system of coding the primary data.

Charmaz (1983) believes that, "qualitative coding is not the same as quantitative coding.....Quantitative coding requires preconceived, logically deduced codes into which the data are placed. Qualitative coding means creating categories from interpretation of the data." The belief implies that qualitative coding is more flexible, as categories are created to suit the data from the data collected, whereas quantitative coding may require data to be force-fitted into the pre-selected categories.

2.3.2 Quantitative Approaches

Essentially, quantitative approaches involve making measurements by collecting data. The approach is built upon previous work which has developed principles, laws and theories to help to decide the data requirements of the particular research project. Two major questions are: what is to be measured; and how should those measurements be made? The answers are derived from examination of the theory and previous research findings together with the aim and objectives of the research to be carried out; in particular, the hypothesised relationships in the research model.

Ideally, the researcher and the existence of the research will have no influence on the data collected. However, that is difficult and so the pragmatic objective is to minimise the impacts. Such minimisation is sought by using objective methods designed to remove as much bias as possible and to conduct the research in the most unobtrusive way, whilst retaining the goodwill of the collaborators and subjects of study – essential in studies of people and their behaviours.

Throughout quantitative studies, and scientific methods, a major objective is that the research is “value-free”; that the work is unaffected by the beliefs and values of the researcher(s) – i.e. it is objective. In conducting quantitative research, three main approaches are employed: asking questions of respondents by questionnaires and interviews; carrying out experiments; and “desk research” using data collected by others. Using data collected by others, who collected it possibly for a variety of other purposes, can be problematic, as the data, sampling etc. have not been tailored to the particular research project in question. However, it can be very helpful to use data collected already by others – it saves time and, for studies such as macro-economics, can be the only viable way of obtaining the data required (Fellows and Lui, 1997).

2.3.3 Collecting data from respondents

Much research in the social sciences and management spheres involves asking and obtaining answers to questions through surveys of people by using questionnaires, interviews and case studies. Often, responses are compared to “hard data”, such as the cost records of a project. However, many “hard data” are not totally “objective” or reliable in the sense of showing what they may be believed to show.

Survey techniques, such as questionnaires, interviews etc., are highly labour intensive on the part of respondents and particularly on the part of the researcher; one consequence is the low response rate, which is common, notably for postal questionnaires which can expect a 25% -35% useable response rate. Thus, many surveys do not produce data from which results capable of strong support for tests of hypotheses or conclusions can be drawn. Further, self-completed responses are very prone to bias and distortions – giving answers which respondents believe “should” be given rather than providing their “true” answers; giving answers to “please” the researcher etc. – as well as being self-perceptions by the respondents.

2.3.4 Questionnaires

Questions occur in two primary forms – open or closed. Open questions are designed to enable the respondent to answer in full; to reply in whatever form, with whatever content and to whatever extent the respondent wishes. Such questions are easy to ask but may be difficult to answer, the answer may never be full/complete and, often, the answers are very difficult to analyse. It is essential that answers to open questions are recorded in full. Closed questions have a set number of responses as determined by the researcher. However, such rigidity of available responses may constrain the responses artificially, hence a response opportunity of “other, please state” should be provided wherever possible. Care must be taken that responses to open questions are not biased by the response alternatives provided by related and preceding closed questions. Thus, it may be preferable to place open questions before related,

closed questions. It is possible to ask more closed than open questions, as responses to closed questions can be given more easily and quickly (Fellows and Liu, 1997).

Filter questions may be employed to progress certain respondents past a set of questions which are not relevant to them. Although the technique speeds respondents through the survey and maintains relevance of the questions answered, extensive use of filter questions can be annoying.

Questionnaires may be administered by post to respondents, to groups by the researcher or particular individuals, such as to a class of students, by a lecturer, or to individuals by the researcher – perhaps to form the basis of an interview. The questions should be unambiguous and easy for the respondent to answer, they should not require extensive data gathering by the respondent. They should not contain unnecessary requests for data, for instance, they should not request a name when the respondent is known, since the questionnaire was sent to the person by name, especially when anonymity is to be provided or when the identity of the respondent is not needed. Questions should be clear, each should concern one issue only and the request for answers should be given in an “unthreatening” form appropriate to the research.

All questionnaires should initially be piloted; completed by a small sample of respondents. The piloting will test whether the questions are intelligible, easy to answer, unambiguous etc., and through obtaining feedback from these respondents, there will be an opportunity for improving the questionnaire, filling in

gaps and determining the time required for, and ease of, completing the exercise (Fellows and Liu, 1997).

2.3.5 Interviews

Interviews vary in their nature, and can be:

- structured;
- semi-structured and
- unstructured

The major differences lie in the constraints placed on the respondent and the interviewer. In a structured interview, the interviewer administers a questionnaire perhaps by asking the questions and recording the responses, with little scope for probing those responses by asking supplementary questions to obtain more details and to pursue new and interesting aspects. In unstructured interviews, at the extreme, the interviewer introduces the topic briefly and then records the replies of the respondent. This may be almost a monologue with some prompts to ensure completion of the statements; clearly the respondent can say what and as much as she/he desires. Semi-structured interviews fill the spectrum between the two extremes. They vary in form quite widely, from a questionnaire type with some probing, to a list of topic areas on which the respondent's views are recorded.

The inputs of the interviewer are critical – especially probing – as the questions asked, the probes, will influence the responses obtained. The non-verbal

communications or “body language” of the participants will have an impact on the responses and recordings. Often, with permission of the respondents, tape recording the interview can be very helpful at the later stages of analysis and, through subsequent scrutiny, help to ensure accuracy and objectivity in recording responses.

2.3.6 Case Studies

Often, case studies employ a variety of data collection techniques. Unlike questionnaires and interviews when the case researched is the respondent and so a possibly large number of cases are researched for statistical significance, in a case study the case is the particular occurrence of the topic of research. It may be, for instance, a legal case hearing, a building in use over a time, or the procurement of a construction project. Interviews may be used accompanied by collection of “hard” documentary data. Questionnaires are less usual although they may be employed to gain an understanding of the general situation of which the case being studied is a particular instance. A case study yields deep but narrow results. Commonly, it will employ triangulation both in the case study itself and to facilitate generalisation of findings. However, it is essential to be aware of the limitations of generalising the findings of a case study research project (Fellows and Liu, 1997).

2.4 DATA COLLECTION

2.4.1 Data requirements

At an early stage of a research project, it is a good discipline to give preliminary consideration to data requirements. For any study which extends beyond a

review of literature and theory, a major issue is the collection of data. However, just because a researcher wishes to collect certain data does not ensure that those data will be available. Restrictions on collection of data apply for a variety of reasons – confidentiality, ease of collection or provision, cost, time etc.

Despite the potential problems, it is helpful to determine what data is ideally required for the research, and then to modify those requirements, if necessary, to overcome practical difficulties. The objective is to obtain an appropriate set of data which will permit the research to proceed, given the dynamism of research and the practical considerations, with outputs reasonably close to the original intentions.

2.4.2 Sampling

The objective of sampling is to provide a practical means of enabling the data collection and processing components of research to be carried out whilst ensuring that the sample provides a good representation of the population; i.e. the sample is representative. Unfortunately, without a survey of the population, the representatives of any sample are uncertain, but statistical theory can be used to indicate the representativeness. Measurements of characteristics, such as the mean, of a sample are called statistics whilst those of a population are called parameters. How to obtain representativeness begins with consideration of the population. Almost invariably, it is necessary to obtain data from only part of the total population with which the research project is concerned; that part of the population is the sample.

2.4.3 Sample Size

A particular issue in sampling is determination of the size of the sample. By sampling, a statistic called an estimator is obtained. Estimators should predict the behaviour of the population as well as possible – this is achieved by requiring estimators to have four main properties; they should be:

- consistent;
- unbiased;
- efficient; and
- sufficient

The variance of a consistent estimator decreases as the sample size increases. The mean of an unbiased estimator approximates to the mean of the population; there is an equal chance of the mean of the estimator being more than or less than the mean of the population (Fellows and Liu, 1997).

2.4.4 Obtaining data

Given the increasing number of research projects, collecting data is becoming progressively more difficult. The people who are targeted as respondents often receive many requests for data and so, as their time is precious, become unwilling or unable to provide data. A good principle is to present the request for data neatly and politely, ensuring that the data can be provided easily, that they are not too sensitive, that the study is of interest to the respondent and that the respondent will get a return commensurate with the effort expended to provide the data. At least, a summary of the research report should be offered and then provided.

Having identified the sample, often by organisations, the next step is to identify the most appropriate respondent in each organisation. For a study of quality, the job title to look for could be “quality manager”, “director of quality”, “quality controller”. The real issue is to determine which person is at the appropriate level in the organisation to be able to provide the data required for the research. An initial telephone call will be useful to determine who, if anyone, is the appropriate person – preferably by name as well as job title. If the person identified can be contacted by telephone, the study can be explained briefly and, it is hoped, their agreement to provide data obtained. The respondent should be advised of the nature and extent of data required, including the time required for completion of the questionnaire or interview. The time needed should be obtained from the piloting, so that the respondent can understand their commitment. Ensure that the time allowed is reasonably accurate.

Commonly, anonymity will not be necessary, although confidentiality may be advisable, in order to obtain fuller and more readily given responses. The assurances can be given verbally but should be confirmed in writing in the formal letter of request for response in which the purpose and legitimacy of the research should be explained (Fellows and Liu, 1997).

Irrespective of the approach to data collection, piloting of the collection is vital. Executed well, amongst helpful, informed and appropriate respondents, it will reveal flaws in the data collection method and parameters (such as time required for the collection) can be determined. Modification and re-piloting will enhance the rate of responses and quality of data obtained for analysis. Questions must be clear and precise.

After the data collection and analysis, their interpretations must begin to yield meaning in the context of theory and literature. For postal questionnaires, a date for commencement of analysis should be set to allow adequate time to obtain responses, including issuing polite reminders. A date for receipt of responses by the researcher should be specified clearly on the questionnaire and in a covering letter, usually 2-3 weeks from respondents' receipt of the questionnaire; at that time, non-respondents can be given reminders by post, telephone, fax or e-mail.

Moser and Kalton (1971) noted six primary conditions for postal questionnaires, apart from non-responses:

- "...the questions... (must be)...sufficiently simple and straight forward to be understood with the help of printed instructions and definitions....
- ...the answers....have to be accepted as final...There is no opportunity to probe....
- ...are inappropriate where spontaneous answers are wanted....
- ..the respondent...can see all questions before answering any of them, and the different answers cannot therefore be treated as independent
- ..(the researcher)...cannot be sure that the right person completes the questionnaire
- ..there is no opportunity to supplement the respondent's answers by observational data."

Non-responses present a problem, not just because they reduce the size of the sample which can be analysed, but more notably because they may represent a body of opinion which, although unknown, may be significantly different from that

which has been expressed by those who did respond. It may be the case also that the responses given by those for whom a follow-up reminder was necessary to obtain their responses form another group with a “cluster” of opinions; however, analysis can reveal such clusters.

For interview surveys, the issue of non-responses can be dealt with as the sample of respondents is being assembled. Interviews may be used to obtain greater “depth” following a postal questionnaire survey or/and to obtain information about non-responses to the questionnaire. However, interviews may be subject to various sources and types of error and bias. Some have been noted earlier; those of the interviewer wishing to obtain support, those of interviewees wishing to “please” the interviewer. If the participants like each other, the process will be different and the responses may be different from a situation in which the participants dislike each other, even if it is only a first impression. The subject matter can influence such personal interaction too (Fellows and Liu, 1997).

2.5 DATA ANALYSIS

The choice of data collected should be determined by the outputs required from the research, given constraints of practicality. The preferable approach is to consider, evaluate and plan the analysis in a similar way to planning the whole research project. Geddes (1968), the “father of town planning”, advocated the method of:

- survey;
- analyse; and

- plan

This represents a sensible way to ensure that the methods selected are appropriate. Not all research projects yield data which are suitable for statistical analyses, and even those which do may require only simple manipulations of small sets of data.

Qualitative data can be difficult and laborious to analyse – they must be handled systematically; a requirement which is easier with quantitative data. Categorisation of qualitative data may rely on the researcher's opinion; it may be useful to construct a set of guidelines initially, and to confirm or amend and supplement them on a "first pass" of the data. A "second pass", using the completed categorisation, will ensure that all of the data, especially the data considered early in the first pass, are categorised consistently. For large sets of data, a "piloting" exercise using a sample may serve as the first pass. Essentially, the approach arises as part of grounded theory. In such an exercise, it is necessary to consider each transcript so that the contexts of words are not lost.

Quantitative content analysis extends the approach of the qualitative form to yield numerical values of the categorised data – ratings, frequencies, rankings etc., which may be subjected to statistical analyses. Comparisons may be made and hierarchies of categories may be examined.

The purpose of analysing the data is to provide information about variables and usually, relationships between them. Hence, as research in a topic becomes

more extensive, quantitative studies may be undertaken to yield statistical evidence of relationships and their strengths; statistics are useful in determining directions of relationships (causalities) when combined with theory and literature (Fellows and Liu, 1997).

2.5.1 Plotting data

Once the data has been collected, it is helpful to produce a diagram or graph of the data. Such plots will help to indicate the natures of distributions of the data and relationships between them such that appropriate statistical techniques, if any, may be employed in analysis.

A table of desired and actual responses, such as to questionnaires sent and received back, noting proportion usable for the research, is useful to demonstrate the sampling attempted and realised (Fellows and Liu, 1997).

2.5.2 Results

Results record the outcomes from tests. The selection of appropriate tests to analyse data is very important. In some cases, a variety of analyses may be employed, both statistical and/or non-statistical. Given sufficient time and other resources, it is useful to employ “triangulation”, using a variety of analyses of the data so that the results which are produced can be considered both from the viewpoints of the individual analyses and from the perspective of the combination of the analyses. In particular, attention can focus on the analyses which agree with each other broadly, if not exactly, and any which produce conflicting results. Not only are the results dependent on the tests which have been carried out, but

are dependent upon the data which have been collected and the recording of those data and their coding, if applicable (Fellows and Liu, 1997).

2.5.3 Reporting

Once the research is complete, it is essential to produce a report of what has been done and what has been discovered, so attention must be given to its content and form. In many instances, other forms of presentation will be required as well.

The report of the research project is the primary source from which the research will inform “the world at large” of what has been done and what has been discovered. It is a primary communication document and, hence, is of paramount importance.

2.6 THE RESEARCH METHOD EMPLOYED

2.6.1 Objective

The objective of this section is to develop an appropriate research strategy that addresses the research problem whilst recognising and accommodating the constraints and protocols identified in this chapter.

2.6.2 Scope

In Chapter 3 it is proposed that there is a bewildering range of tools and techniques faced by organisations. However, the identification and examination of a representative sample of all industries would prove to be a prolific task and

therefore, was focused onto a practical level by the use of the “Business Process Classification Scheme” (Figure, 2.2) developed by the Best Practice Club.

Business Process Classification Scheme

- 1. Understand Markets and Customers**
 - 1.1 Determine customer needs and wants
 - 1.1.1 Conduct qualitative assessments
 - 1.1.1.1 Conduct customer interviews
 - 1.1.1.2 Conduct focus groups
 - 1.1.2 Conduct quantitative assessments
 - 1.1.2.1 Develop and implement surveys/questionnaires
 - 1.1.3 Predict customer purchasing behaviour
 - 1.2 Measure customer satisfaction
 - 1.2.1 Monitor satisfaction with products and services
 - 1.3 Monitor changes in market or customer expectations
 - 1.3.1 Determine weaknesses of product/service offerings
 - 1.3.2 Identify new innovations that are meeting customer needs
 - 1.3.3 Determine customer reactions to competitive offerings
- 2. Develop Vision and Strategy**
 - 2.1 Monitor the external environment
 - 2.1.1 Analyse and understand the competition
 - 2.1.2 Assess new technology innovations
 - 2.1.3 Identify social and cultural changes
 - 2.2 Define the business concept and organisational strategy
 - 2.2.1 Select relevant markets
 - 2.2.2 Develop long-term vision
 - 2.2.3 Develop overall mission statement
 - 2.3 Design the organisational structure and relationships between organisational units
 - 2.4 Develop and set organisational goals
- 3. Design Product and Services**
 - 3.5 Manage the product/service development process
 - 3.5.1 Develop project management skills
- 4. Market and Sell**
 - 4.1 Market products or services to relevant customer segments
 - 4.1.1 Develop pricing strategy
 - 4.1.2 Develop advertising strategy
 - 4.1.3 Develop market messages to communicate benefits
 - 4.1.4 Identify specific target customers and their needs
 - 4.1.5 Develop sale forecast
 - 4.1.6 Sell products or services
 - 4.2 Process customer orders
 - 4.2.1 Accept orders from customers
 - 4.2.2 Enter orders into production and delivery process
- 5. Produce and Deliver for Manufacturing Oriented Organisation**
 - 5.1 Plan for and acquire necessary resources or inputs
 - 5.1.1 Select and certify suppliers
 - 5.1.2 Purchase capital goods
 - 5.1.3 Obtain materials and supplies
 - 5.1.4 Obtain appropriate technology
 - 5.1.5 Disaster recovery
 - 5.2 Convert resources or inputs into products
 - 5.2.1 Develop and adjust production process (for existing process)
 - 5.2.2 Schedule production
 - 5.2.3 Move materials and resources
 - 5.2.4 Make product
 - 5.2.5 Package product
 - 5.2.6 Warehouse or store product
 - 5.2.7 Stage the product for delivery
 - 5.3 Deliver products
 - 5.3.1 Arrange product shipment
 - 5.3.2 Deliver products to customers

Figure 2.2: Business Process Classification Scheme

Source: The Best Practice Club, 2001

The Business Process Classification was used as it provides a networking facility for which listed companies, across many industry sectors, have already identified themselves as having practical experience, willing and able to share information under the particular classifications. Figure 2.3 gives an overview of the Business Process Classification Scheme. The processes are divided into two broad groups: Management and Support Processes and Operating Processes. Within these two groups there are 13 macro business process headings (for example, Understand Markets and Customers and Manage Financial and Physical Resources). These macro business process headings are refined into over 200 business processes.

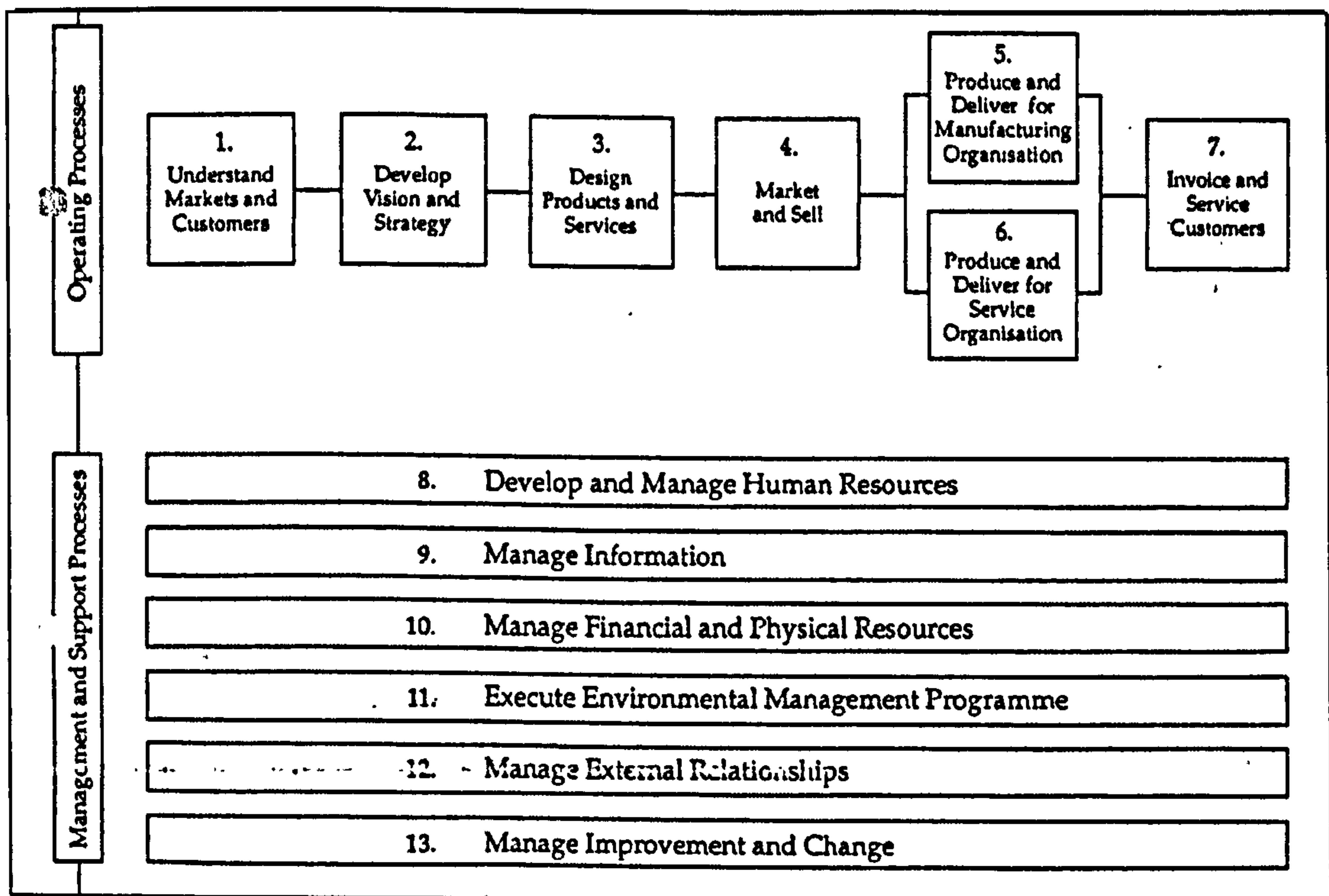


Figure 2.3: Business Process Classification (Overview)

Source: The Best Practice Club, 2001

2.6.3 Research design

The product of the research design should:

- make explicit the questions the research should answer;
- provide hypothesis/propositions about these questions;
- develop the data collection methodology;
- discuss the data in relation to the initial research and the hypothesis/propositions (Simister, 1994)

The nature of the problem demands an exploratory research design configured to identify the events and activities contained within the initial phase. It also demands an understanding of the activities presented in a practical model. That model should be capable of application to drive projects/companies forward and, subject to further research, application to a wider range of industries.

2.6.4 Research Strategy

The type of research employed is qualitative. The research problem requires the analysis and reconstruction of a management process. This is achieved by observation, interpretation and reasoning from situations, over which the researcher has no influence or control, corroborated and clarified by reference to the existing literature and expert validation.

2.6.5 Bias

The potential for elite bias to influence the research (through the use of participant observation) will be managed by using the project documents as the primary data source. By taking care to read only what they contained it is

considered that any innate bias will have been significantly reduced. Furthermore, the particular nature of the participant-observation needs to be considered. It did not begin until the initial phase was completed and therefore the true value of participant-observation, i.e. the witnessing of events as they happened, was not experienced. However, whilst this was lost, so also was the opportunity to create bias by the manipulation of events but the experience did provide insight and context.

All documentary evidence obtained was used, nothing was ignored and it has all been retained to serve as an audit trail. Whilst conducting the interviews, care was taken for facts and opinions, insights, corroboration of evidence and introductions to further sources were obtained.

It must be acknowledged that the conditions under which the field study work was conducted were not under the control of the researcher and could therefore be subject to holistic bias. Similarly, the researcher may have innocently permitted interviewees to create elite bias. All of these potential sources of bias must be considered when making generalisations from this research.

2.6.6 Validity

The validity of the research results was ensured by:

- using multiple sources of evidence;
- obtaining written statements of accuracy from key informants; and
- retaining copies of the documents reviewed and maintained records of sources of reference.

2.7 DATA COLLECTION

Data was collected via participant observation, questionnaires, case studies and interviews and by review of the appropriate literature. The sample was selected by the judgement and convenience methods with the aid of the Best Practice Club Business Process Classification. The questionnaire approach to the collection of field data was made because the research:

- seeks to discover the respondents'; awareness/knowledge/thoughts about the issue;
- seeks to discover the respondents' general views of the issue;
- seeks specific facets of the issue being researched;
- seeks reasons for the views held by the respondents; and
- seeks to discover how strongly the respondents hold their views.

In order to ensure that the questions were intelligible, easy to answer, unambiguous etc., the questionnaire was piloted on a small sample of respondents (10 in number). The feedback from the pilot respondents provided the opportunity for the questionnaire to be modified and the determination of the time required for completion.

The case study approach was used because:

- experiments require control over events and are best suited to single variable studies;
- histories deal with non-contemporaneous events;

- case studies investigate phenomenon within a real life context without the need for the researcher to control events; and
- case study based research is capable of analytic generalisation

Data collection and analysis is reported in the following order:

1. analysis of the existing project information and theory (Chapter 3);
2. the primary field data study and the development of an evaluation model for business excellence (Chapters 3, 4 and 5);
3. the existing theory and the primary field study data are analysed and compared (Chapter 6);
4. the evaluation model is validated and tested (Chapter 7)

The number of case studies to be included in the design was again determined on convenience and judgement. By deploying this approach it allowed data to be gathered in its rawest form whilst at the same time providing an evaluation model in which the research findings can be intrinsically linked to the data.

2.7.1 Data analysis

The model is a descriptive representation of the processes, activities, events and context contained in the existing theory and in the primary field study data.

Description depends upon recognising patterns of events. Events are identified by recognising their characteristics and the boundaries which separate them from their environment. The analysis employs the principle of pattern matching or quasi-replication to identify divergences between the existing theory and the field study data. The continued presence of any element in the progressive model or the introduction of any new element was the result of objective judgement and subjective interpretation of the arguments presented.

2.8 SUMMARY

This chapter has presented the research theory and drawn from that theory an appropriate qualitative method for addressing the identified research problem. Given the nature of the research it was more appropriate for an evaluation model to emerge from the data than attempting to impose any kind of theory from the outset. The evaluation model will allow companies/industries in all sectors with a vigorous tool for improvement for strategic positioning and increased efficiency and profitability. This is validated by the field study data and comparison against different industries which will ensure efficacy and robustness of the knowledge presented.

Application of the research methodology commences in Chapter 6.

Chapter Three

An Examination of the Business Improvement Models and Approaches

3.1 Introduction

3.2 The ISO 9000 Quality System

3.3 The EFQM Excellence Model

3.4 The American Baldrige Model

3.5 Total Quality Management (TQM)

3.6 Business Performance Improvement Reviews (BPIR)

3.7 Six Sigma

3.8 Balanced Scorecard

3.9 Process Classification Framework (PCF)

3.10 Creating an Evaluation Model for business excellence

3.11 Summary

Chapter Three

AN EVALUATION OF THE BUSINESS IMPROVEMENT MODELS AND APPROACHES

3.1 INTRODUCTION

Over several decades quality standards have been used to improve the quality of products and services as competition for market share, from home and overseas, increased. More recently, the drive to improve the levels of service offered by the public sector has seen the adoption of quality standards as a step towards the goal of excellence in those organisations. As a consequence the number of organisations seeking certification to quality standards continues to grow.

Business improvement models evaluate and recognise “world class” performance; the most popular are ISO 9001, the EFQM Excellence Model and the American Baldrige Model. Business Improvement approaches include ongoing programmes of improvement such as Total Quality Management, BPIR and Six Sigma, and tools that help managers understand the business, such as the Balanced Scorecards and the Process Classification Framework.

This chapter examines each of the aforementioned models and approaches with a view to developing an evaluation model that organisations can use on their quality journey.

3.2 THE ISO 9000 QUALITY SYSTEM

The 1980's witnessed an increased use of formal quality management systems amongst business communities around the world. BS 5750 was introduced in 1979 as the standard for quality assurance and was used by organisations as a means to increase accuracy, efficiency and, as a result, competitiveness. Following a revision in 1987, ISO 9001 was issued as an international standard in 1994. The standard has evolved towards a total quality approach and the 200 version shifts the emphasis to the enhancement of customer satisfaction through "continual improvement". During its evolution the standard has become a benchmark and, in many cases, the entry criterion for suppliers (Tanner, Bailey and Pertwee, 2004).

Many organisations have adopted ISO 9001 as a basis for their management system, and a recent study conducted by the European Centre for Business Excellence (2003) confirmed that adoption had brought many benefits. The study examined the reasons for adoption and found that the commonest was that customers required it. In one case this led to additional \$6m of sales, and in another case an additional £15m. The second most common reason for adoption was the trend in the marketplace; there was a feeling that organisations which achieved registration would have a competitive advantage.

Many organisations, however, have implemented ISO 9001 for the operational advantages that it delivers. One organisation researched for the European Centre for Business Excellence study attributed £2.9 m savings to the adoption of

ISO 9001. This trend is expected to grow as the full benefits of the new standard are realised (Tanner, Bailey and Pertwee 2004).

3.2.1 Principles

ISO 9001 identifies eight quality management principles that can be used by top management to lead the organisation towards improved performance:

1. customer focus;
2. leadership;
3. involvement of people;
4. process approach;
5. systems approach to management;
6. continual improvement;
7. factual approach to decision making;
8. mutually beneficial supplier relationships.

There is a close match between these principles and the principles that underpin the two business improvement models described in 3.3 and 3.4. The Baldrige model has its core values and concepts, and the EFQM Model its fundamental concepts of excellence.

3.2.2 Structure

ISO 9001 has a structure with five main requirements:

1. quality management system;
2. management responsibility;
3. resource management;
4. product realisation;
5. measurement, analysis and improvement

Figure 3.1 refers.

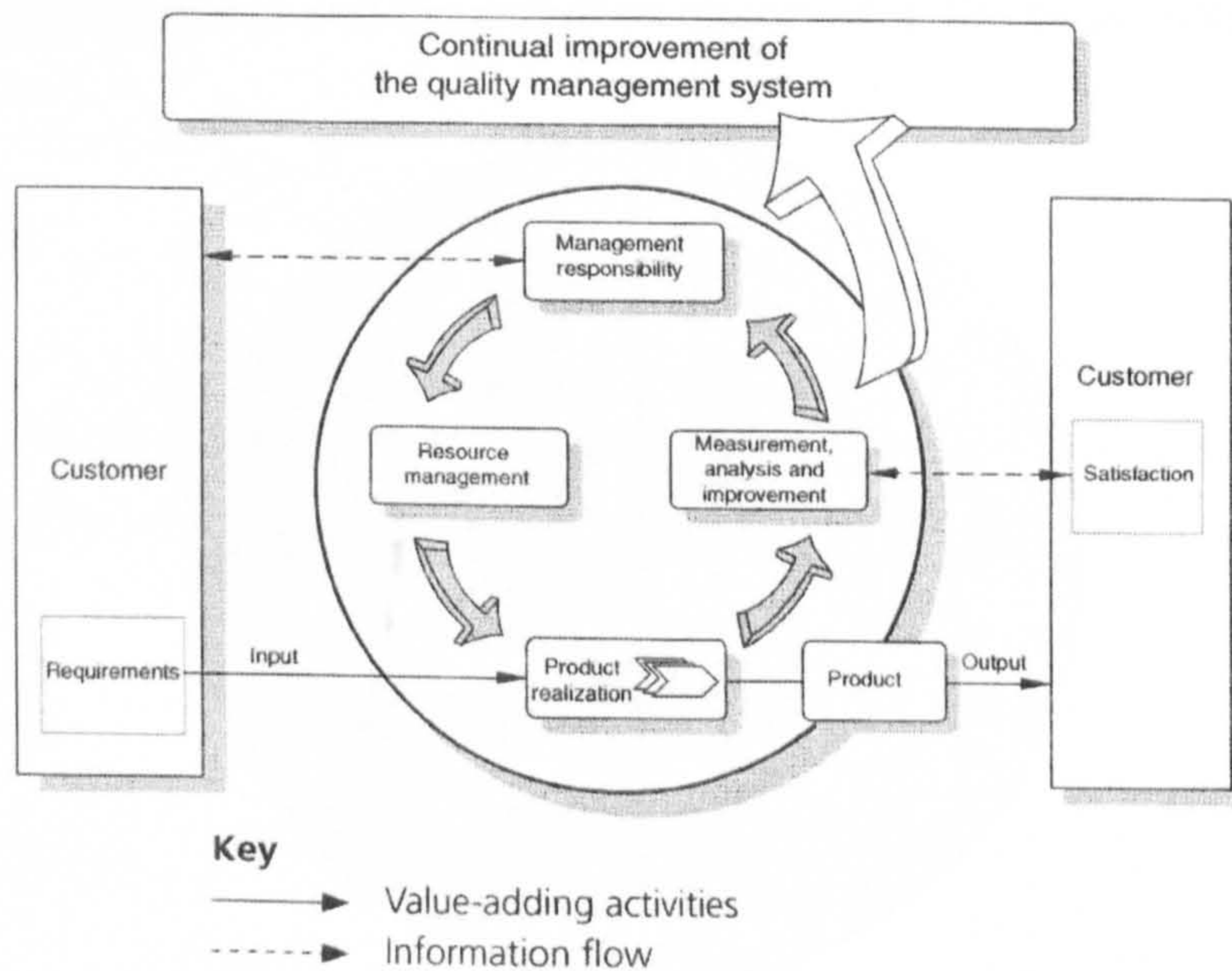


Figure 3.1: The Structure of ISO 9001

Source: BSI, 2003

3.2.3 Application

ISO 9000 focuses on the identification and control of processes. Once the processes of a management system have been determined Deming's plan-do-check-act cycle can be applied to the processes to seek continual improvement as shown in figure 3.2. One significant difference between the application of the

new standard and the previous version is in the way that third party assessments are conducted. Under the previous standard there was a risk that an assessment would only focus on a comparison between the detail presented within a series of documented procedures and the activities observed in the organisation.

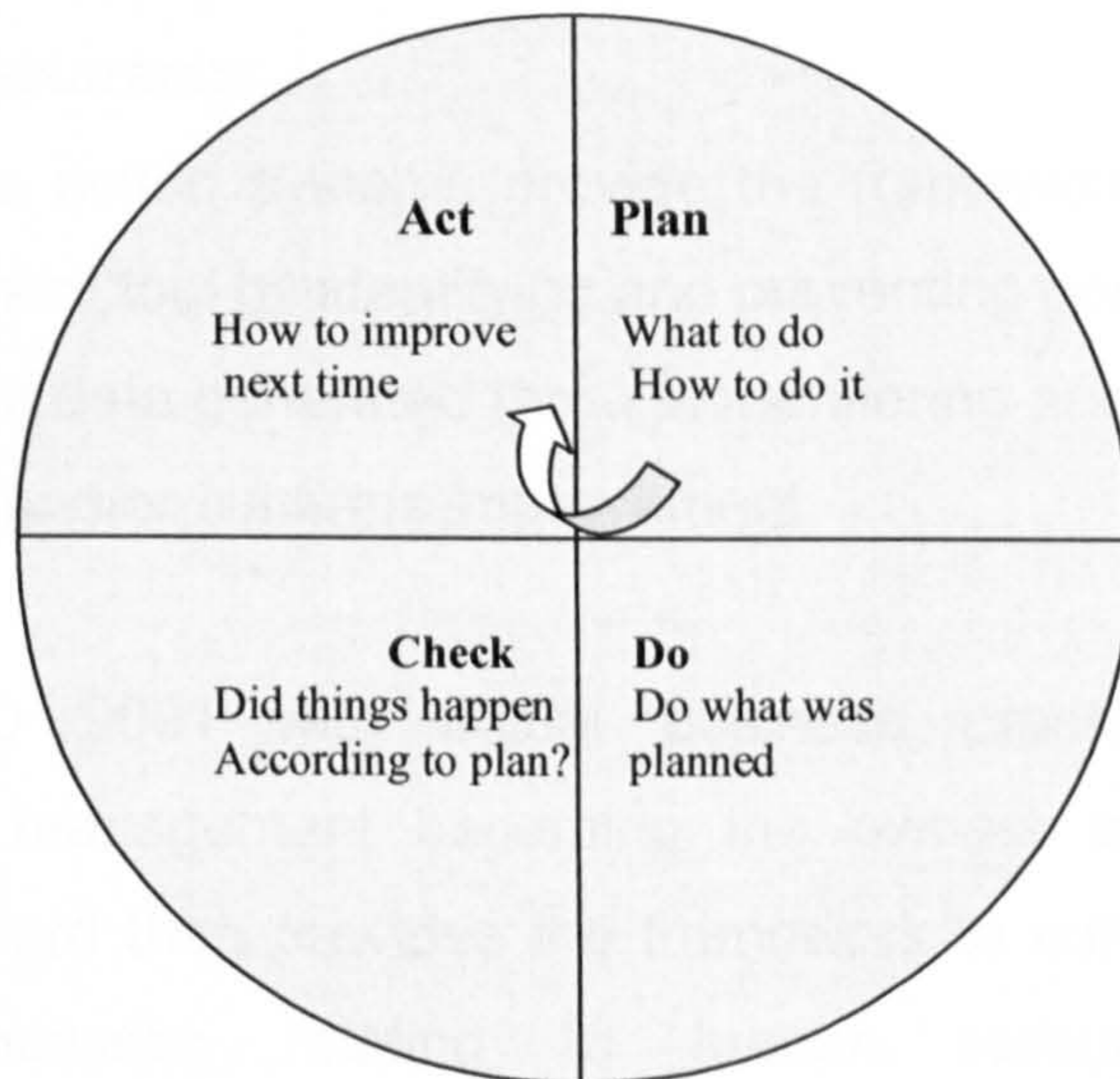


Figure 3.2: Demming's Plan-do-check-act cycle

Source: Oakland, 2003

The assessment approach required for ISO 9001:2000 is focused on the need to identify the processes within the organisation that contribute to the enhancement of the satisfaction of its customers. Once established, the assessors then need to test these processes to ensure that they are integrated and effective. This has changed the assessments from being “conformance” audits to being value-adding assessments.

Improvement is achieved through the analysis of factual data:

- **objectives establish a focus for the achievement of goals;**
- **corrective action systems analyse the root causes of problems and prevent recurrence;**
- **preventive action systems provide the framework with a risk or loss management tool by identifying and preventing potential problems;**
- **analysis of data generated through monitoring and measuring activities identifies and/or confirms improvement.**

Integration of ISO 9001 with actual business practice relies upon an organisation's top management becoming the owners of their improvement system. The standard then provides the framework to control and improve the organisation's processes relating to human resources, infrastructure, environment, product or service delivery and measurement.

When used in the spirit intended, ISO 9001 is an excellent control and improvement tool. The "spirit" has been captured within the eight quality management principles. It ensures that improvement "gains" are sustained. It will directly drive breakthrough improvement and has structured linkages to the "best practice" approaches to improvement. For optimal effect it needs to be implemented with a view to excellence rather than compliance; only then will it work for the business rather making extra work for it (Tanner, Bailey and Pertwee, 2004).

Key strengths of ISO 9001

- focuses on customer needs;
- avoids improvisation and lack of control;
- both process and performance focused;
- sustainable improvement;
- the accepted world quality management standard

3.3 THE EFQM EXCELLENCE MODEL

Leadership, vision and plan statement, customer focus are part of the 11 key elements of TQM as perceived by Zhang, 2000 . QMM's which support these are for example policy deployment, vision/mission statement, customer satisfaction surveys all key drivers of the European Foundation for Quality Management (EFQM) Model.

In September 1988, the presidents of 14 leading European companies pledged personal commitment and funds to set up the European Foundation for Quality Management (EFQM). There are now over 840 members – representing almost every sector, industry and country in Europe – all committed to the pursuit of total quality and business excellence. The EFQM Excellence Model was derived from the Baldrige Award, America's response to the successes of the Japanese automotive and electronics industries. These successes originated in the early work of Duran and Deming, the proponents of the post-war theories of performance measurement (Beatham et al, 2004).

Since its establishment, EFQM has constantly expanded its range of activities, strengthening and broadening its scope according to the needs of its members.

The European Quality Award, which was devised and developed by EFQM in conjunction with the European Organisation for Quality (EOQ) and with the support of the European Commission, has become the basis for 17 other national and regional quality award schemes. The associated EFQM excellence model, against which the award applications are assessed, is a valuable communication and improvement tool.

Both the model and the first cycle of the award were launched at EFQM's 1991 annual Forum. The model has nine criteria in two parts: five "enabler" criteria (leadership, policy and strategy, people management, resources and processes), broken down into 24 sub-criteria; and four "results" criteria (customer satisfaction, people satisfaction, impact on society and business results) with two sub-criteria each.

Although the model was developed initially for assessing applications for the award, EFQM found that many organisations had adopted the model for self-assessment and were using it either as a management tool or as the basis for their own quality and improvement programmes. In 1996 the executive committee recognised the model as EFQM's most important asset and made it the main focus of their activities and the basis for their strategic direction. Its continuous development and wider deployment became top priorities.

EFQM believed the model should reflect shifts in business emphasis and new management ideas as well as fulfil the requirements of large, small and medium-sized enterprises in the private and the public sectors. Their objective became: to provide a model that ideally represents the business excellence (TQM)

philosophy that can be applied in practice to all organisations irrespective of country, size, sector or stage along their journey to excellence.

The model development steering group was set up to focus specifically on the model – with 14 people from different backgrounds, sectors, experience and countries in Europe.

Giovanni Quaglia, model development manager, explains: “We benchmarked with other award models from around the world and gathered input from all our model’s stakeholders (members, assessors, applicants and trainers) at various events and activities we organised. Then, using the concept mapping methodology, we analysed the enormous amount of data and identified the key requirements and strategies to be incorporated into the improved model”. According to Quaglia, there were a number of specific reasons for improving the model:

- New areas of management and quality thinking – for example partnerships and innovation – had to be included
- Customer and market focus needed to be represented in the enablers
- The improvement process (plan, do, check, act), which was not properly addressed in the previous version, had to be included
- The link between the criteria and sub-criteria needed emphasis
- Emphasis on scoring was not conducive to improvement efforts and progress
- The logic of the areas to address needed to be improved.

In April 1998, a draft of the new version was sent to more than 1,000 users for testing. From the feedback received, the model was refined and retested, the

executive committee approving the final version in January 1999. The result – the EFQM excellence model – was announced in April 1999 (figure 3.3.).

The word “business” was dropped, so it is now the EFQM excellence model. Business results are now “key performance results”. Among the enabler criteria, the title people management has become “people” and criteria “resources” has now become “partnerships and resources”.

The model still has nine elements, classified as “enablers” and “results”. However, EFQM has recognised that the innovative and learning capacity of an enterprise is one of the key factors for organisational excellence, and that it is always connected through a feedback process to the results achieved.

The results criteria are now:

- Customer results – includes customers’ loyalty and their perceptions of the organisation’s image, products and services, sales and after-sales support
- People results – covers employees’ motivation, satisfaction, performance, and the services the organisation provides for its people
- Society results – relates to the organisation’s performance as a responsible body, its involvement in the community in which it operates, and any recognition it might have received.
- Key performance results – shows the financial and non-financial outcomes of the organisation’s planned performance, including things like cash flow, profit, meeting budgets, success rates and the value of intellectual property.

These criteria are assessed firstly on perception measurements (obtained for example, from surveys, focus groups, ratings, and complaints) and performance indicators (the internal measures an organisation uses to monitor, understand, predict and improve performance).

Results are taken to mean:

- Key results, including historical trends
- Previous, current and future targets
- The organisation's performance compared with others
- Cause and effect relationships that prompt improvement or change

The guidelines provide a list of specific items to be considered for both the measurements and the indicators sub-criteria for each result criterion. There are still five enabler criteria, but the terminology and areas which they address have been extended to reflect the new thinking.

While each "enabler" criterion still has four or five sub-criteria, the main difference is that the results must now be evaluated in terms of approach, deployment, assessment and review:

- Approach – a sound rationale, the needs of the stakeholders affected by it, the integration of an support for the organisation's policy and strategy and the desired results, and links with other criteria and sub-criteria where appropriate

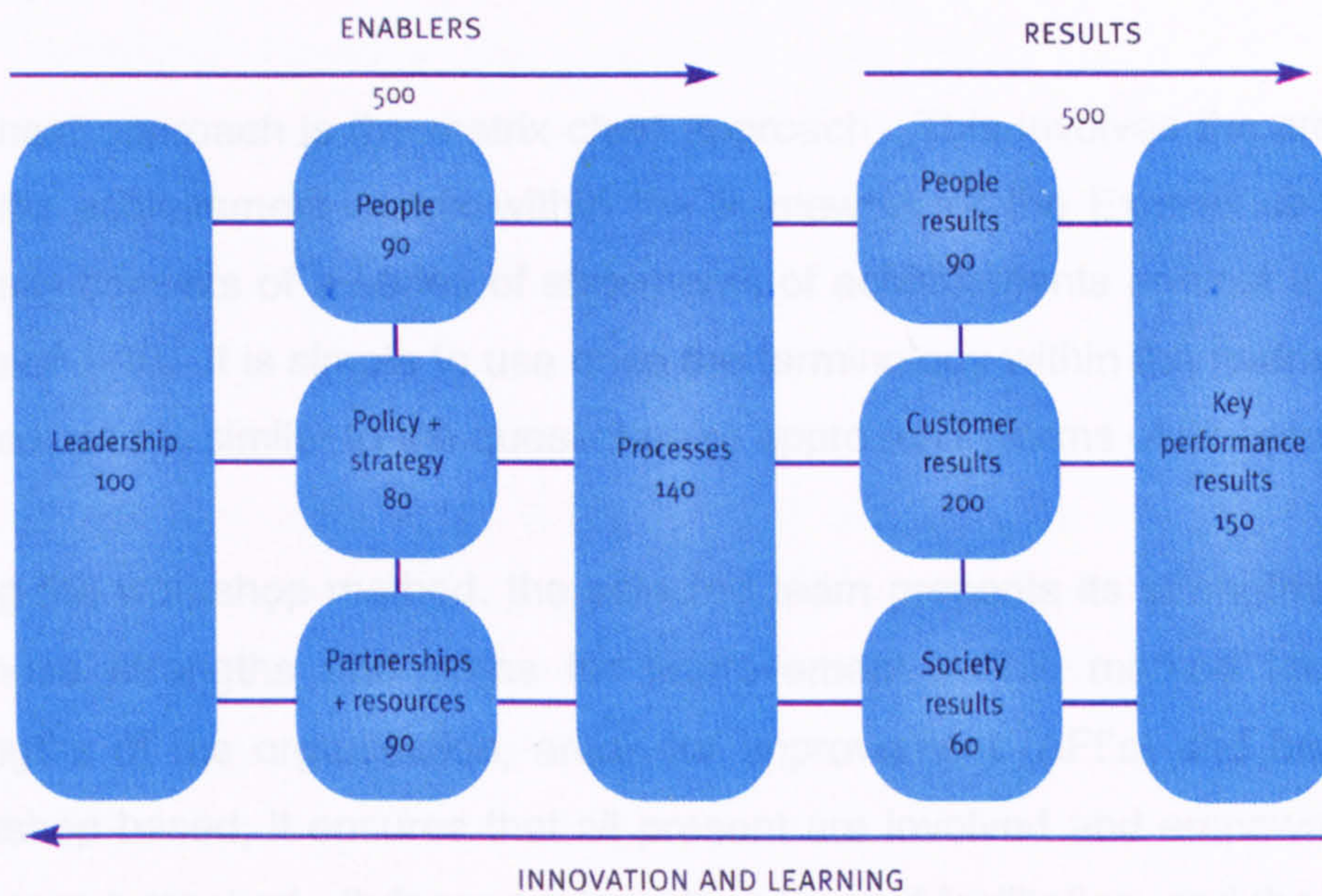
- **Deployment – translating into practice what is defined in the approach. It considers the extent of implementation of each approach and the systematic deployment of each approach**
- **Assessment and review – measuring and monitoring the approach. It considers the effectiveness and efficiency of the approach and its deployment, organisational learning, analysis and use of measures and information, and the improvements made.**

All this is encapsulated in the acronym RADAR (results, approach, deployment, assessment and review). Not only is the model the basis for the award applications, but it is also a powerful self-assessment tool in its own right and helps to identify improvement opportunities and formulate action plans. The RADAR logic incorporated into the model underlines that an organisation needs to:

- **Determine the results it wishes to achieve**
- **Plan and develop the approaches it is to use**
- **Systematically deploy those approaches**
- **Assess and review the approaches and then prioritise, plan and implement improvements.**

The changes needed an evolutionary rather than a revolutionary approach. There was a need to retain the strengths of the current model, while ensuring that the investment in training, knowledge and material would not be wasted. The model is now considered to be easier to use and easier to adapt to individual organisations with RADAR (see overleaf for further explanation of this approach)

providing a common language and philosophy for all stakeholders. Further



approaches are described below.

Figure 3.3: The EFQM Excellence Model

Source: Quality World, 2001

In total there are five approaches to self assessment (Figure 3.4). Depending on the level of maturity with the Excellence Model, the EFQM recommends the most appropriate method of assessment, ranging from the “questionnaire approach” to “award simulation”. The questionnaire approach which requires the least amount

of time and resources, produces data that can be used comparable with other scoring profiles.

The next approach is the matrix chart approach. This involves the creation of a specific achievement matrix within the framework of the Excellence Model. It typically consists of a series of statements of achievements against a numbered scale of 1-10. It is simple to use once the terminology within the matrix has been agreed, and is similar to the questionnaire approach in terms of its benefits.

Using the workshop method, the selected team presents its strengths, evidence of these strengths and areas for improvement. This method identifies the strengths of the organisation, areas for improvement (AFI's) and because it is workshop based, it ensures that all present are involved and empowered by the consensus reached. It does require a high level of facilitation, and the results are less robust than those from the pro-forma and award simulation approaches. A score is produced using the RADAR scoring matrix as discussed earlier in this chapter. It works on the premise that to deliver excellence in business, results must be pre-determined. Once results are pre-determined, then the approach of how to achieve these results must be planned and developed. The approach must then be effectively deployed and this deployment must be assessed and reviewed to determine not only the success of the deployment but also to identify changes that may be required. Once this has been reviewed then the cycle is repeated.

The pro-forma approach involves the completion of a pro-forma for each of the thirty-two sub-criteria contained within the Model. The approach identifies

strengths, evidence of these strengths and AFI's. The evidence must be clear and admissible, which means that the results are factual and not subjective. The data gathering provides the opportunity for more personnel within the organisation to become involved in the process and the approach also produces score profiles close to those of award simulation.

Award simulation is the most comprehensive self assessment approach, and effectively requires the same amount of effort and gains the same result as entering the European or the British Quality Award. It entails completing a full submission document in line with the award requirements and then having a team of assessors reviewing and scoring the report. For large companies the report is 75 pages long. The benefits of this approach are that it provides a powerful and concise way of reflecting the culture and performance and, due to the extent of the document, necessitates greater involvement of employees within the organisation. The document itself is excellent for disseminating and sharing good practice within the organisation, and gives an accurate score against the award schemes.

Finally there is also external assessment that can be applied for under the British Quality Foundation. Here the organisation again prepares a seventy five page document as carried out in the award simulation self-assessment. This document is submitted and reviewed by a team of qualified assessors. They review the document, and then visit the organisations before compiling a feedback report and awarding a score. The score provides a benchmark score against all the other organisations entering the award.

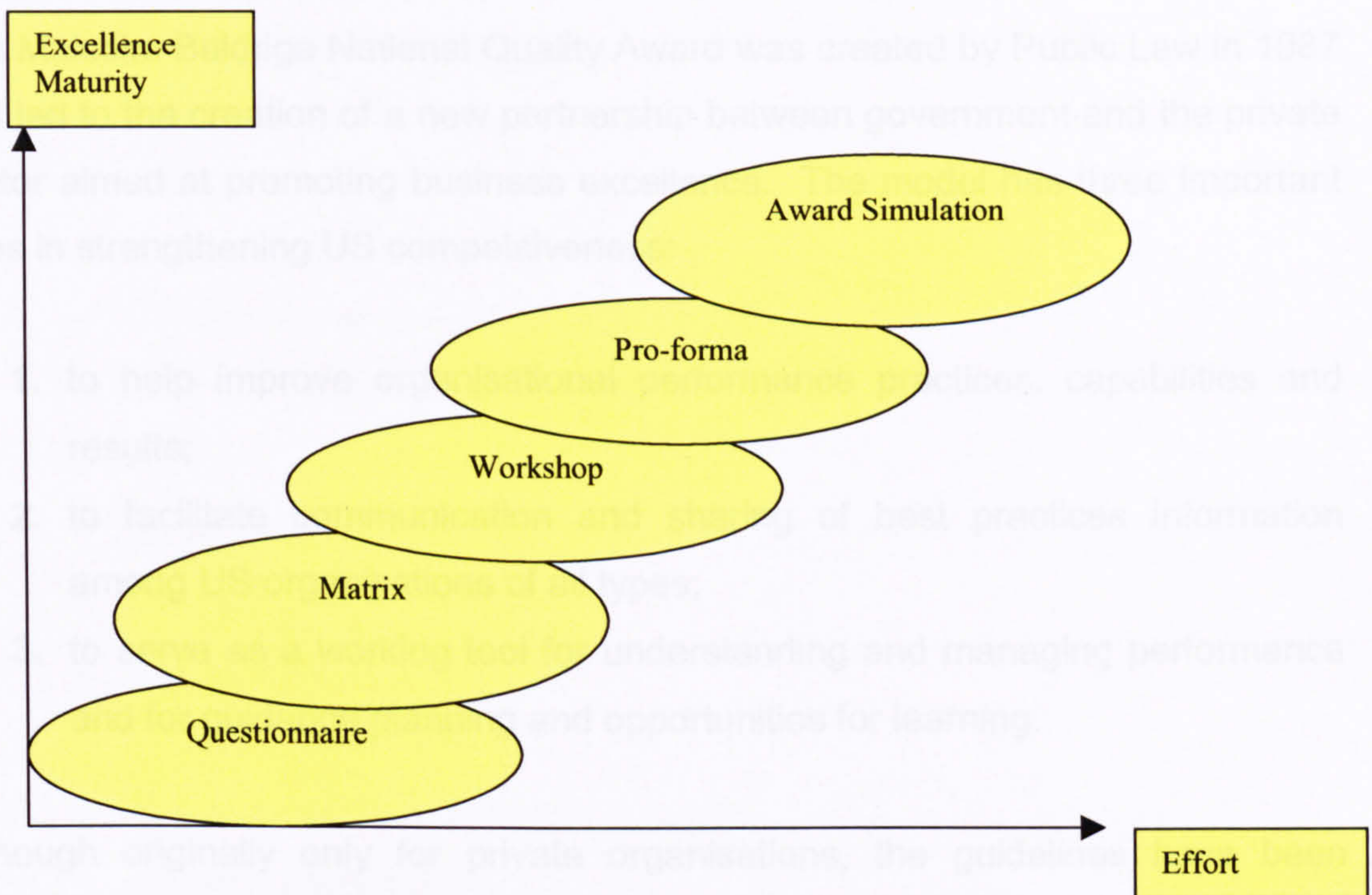


Figure 3.4 Maturity of Excellence and Effort Required

Source: Green Book 1999

In summary the key strengths of the EFQM Excellence Model are:

- strong business focus and emphasis on business results;
- balanced scorecard performance tracking and results;
- first framework to introduce “impact on society” concept;
- enabler – result structure encourages cause and effect;

- holistic business excellence model with strong linkages to ISO 9001 and the Baldrige model.

3.4 The AMERICAN BALDRIGE MODEL

The Malcolm Baldrige National Quality Award was created by Public Law in 1987 and led to the creation of a new partnership between government and the private sector aimed at promoting business excellence. The model has three important roles in strengthening US competitiveness:

1. to help improve organisational performance practices, capabilities and results;
2. to facilitate communication and sharing of best practices information among US organisations of all types;
3. to serve as a working tool for understanding and managing performance and for guidance planning and opportunities for learning.

Although originally only for private organisations, the guidelines have been extended to public and voluntary organisations, such as health and education. The popularity of the model within America is so great that although there are only around 30-50 applications for the award every year, over 250,000 organisations request copies of the guidelines (Tanner, Bailey and Pertwee, 2004).

As the Baldrige Award is now well established, researchers have been observing the benefits of the application of the model to organisations. In a recent study, Hendricks and Singhal (1999) concluded that business excellence “pays off

handsomely” and is a source of competitive advantage. It was noted, however, that it is not a replacement for corporate strategy or a guarantee for success.

3.4.1 Core Values and concepts

The model is built upon the following set of interrelated core values and concepts:

- visionary leadership;
- customer-driven excellence;
- organisational and personal learning;
- valuing employees and partners;
- agility;
- focus on the future;
- managing for innovation;
- management by fact;
- social responsibility;
- focus on results and creating value;
- systems perspective

These values and concepts are embedded beliefs and behaviours found in high-performing organisations. They are the foundations for integrating key business requirements into a results-oriented framework that creates a basis for action and feedback.

3.4.2 Structure

The 2003 Baldrige Award criteria framework consists of seven categories:

1. leadership;

2. strategic planning;
3. customer and market focus;
4. measurement, analysis and knowledge management;
5. human resource focus;
6. process management;
7. business results.

The structure can be seen in figure in 3.5.

3.4.3 Application

Each of the seven categories is broken down into 18 items. Organisations applying the framework first identify the activities they undertake and then review these against the requirements of each item. This review is termed a “self-assessment”.

- The strengths and areas for improvement for each item are noted. A number of areas to address aid this analysis
- A score out of a maximum of 100 per cent is based on two classifications. These are: approach-deployment and results
- Categories 1-6 are scored against approach-deployment and category 7, business results, is scored against results
- An overall score is calculated for each of the seven categories, which are then weighted to calculate a score out of 1000 points. Categories 1-6 carry 55 per cent of the weighting.

Organisations at the start of the quality journey will typically score less than 250 points whereas “world class “organisations would score over 800 points.

There are many ways to conduct the self-assessment, from a simple review undertaken by a team of people to the collation of a 75 page report assessed by an independent team. All approaches have their positive and negative points, but it is generally accepted that the production of the report and the use of an assessment team (the approach used in applications for the Baldrige Award) give the most accurate results and quality feedback.

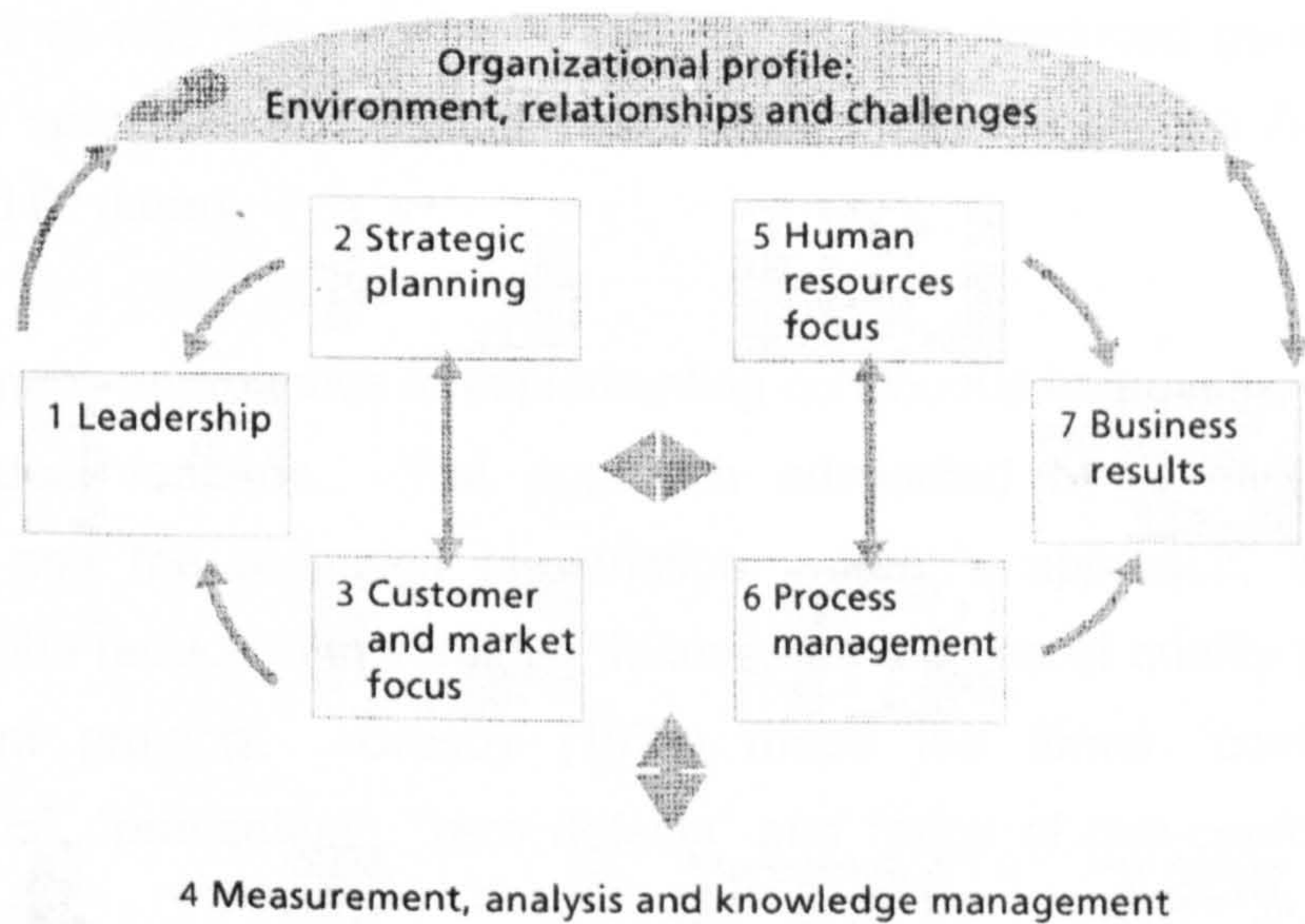


Figure 3.5: The Malcolm Baldrige Model

Source: Baldrige 2003 Guidelines

In summary the key strengths of the Baldrige Model are:

- strong customer/market focus and strategy focus;
- people and process focus;
- integrated systems approach;
- fact-based systems for improving performance;
- focus on results.

3.5 TOTAL QUALITY MANAGEMENT (TQM)

TQM is based on Kaizen, the Japanese philosophy of continuous improvement. Interest in Japanese methods increased in the late 1960s when Western organisations faced competition from a part of the world that had long been characterised as producing shoddy, cheap goods. Suddenly there was a new competitor that was not only lower priced, but also produced goods of higher quality and specification. The revolution had been led by two Americans Dr Deming and Dr Juran.

There are many approaches to implementing continuous improvement, each with their individual features. The approach advocated by Deming related to leadership and the reduction in variation. Juran's approach, although still advocating the reduction in variation, focuses on the use of quality planning and improvement projects. Crosby (1979) made the terms "conformance to requirements", "prevention", "zero defects" and "price of non-conformance" his catchphrases.

TQM is far wider in its application than just assuring product or service quality: it is a way of managing people and business processes to ensure complete customer satisfaction at every stage, internally and externally. TQM, combined with effective leadership, results in an organisation doing things right, first time (Oakland, 2003).

Processes are a key linkage between the enablers of planning (leadership driving policy and strategy, partnerships and resources), through people into the

performance (measured by people, society, customers and key outcomes). These “four Ps” form the basis of a model for TQM and provide the “hard management necessities” to take organisations successfully into the 21st century.

The importance of the three Cs – Culture, Communication and Commitment must not be underestimated. A simple model for TQM, see figure 2.6, is complete when these “soft outcomes” are integrated into the four Ps framework to move organisations forward successfully.

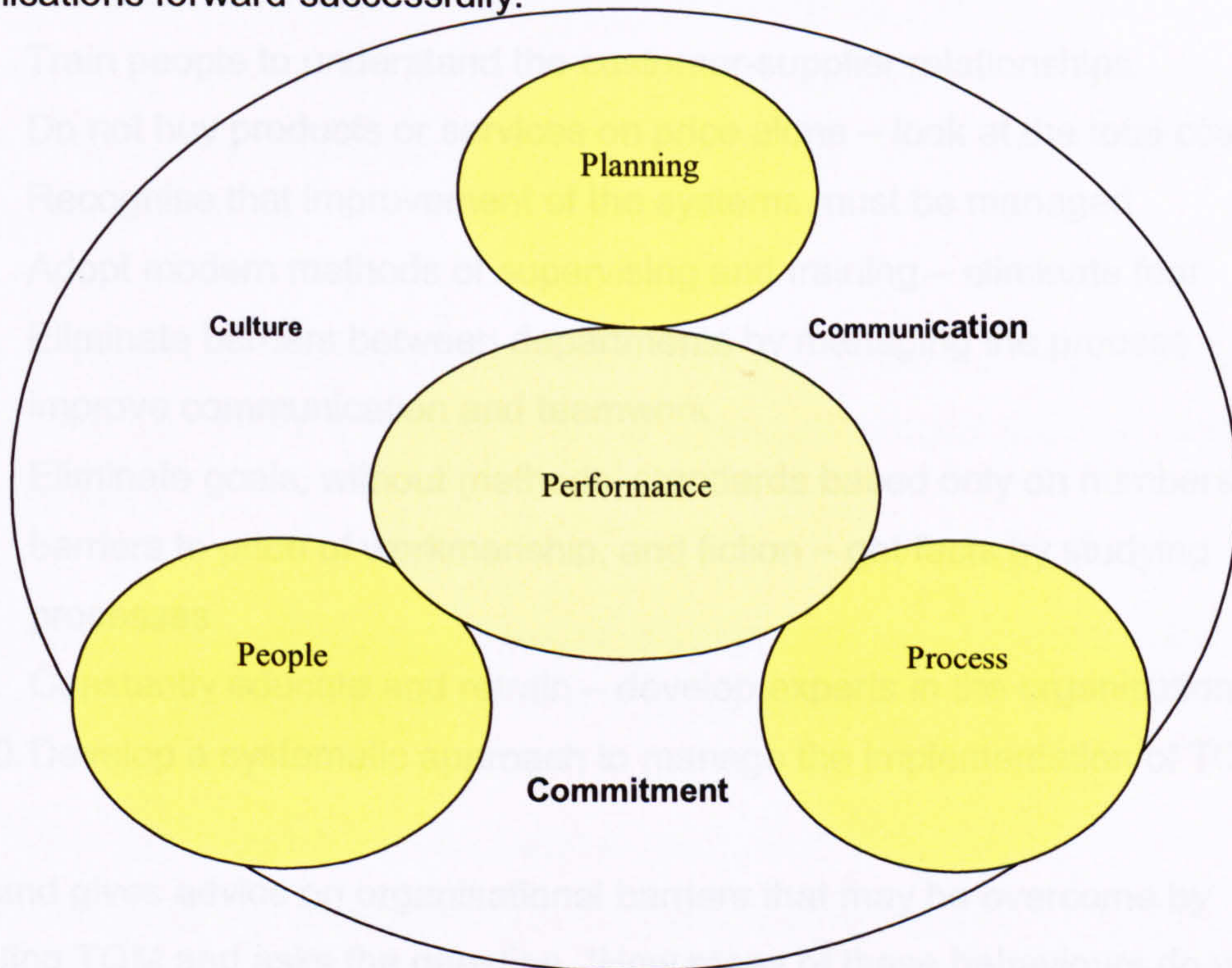


Figure 3.6: A model for TQM

Source: Oakland, 2003

The task of implementing TQM can be daunting. The following is a list of Oakland's points that leaders should consider. They are a distillation of the various beliefs of many of the quality guru's, applied in a pragmatic way.

1. The organisation needs a long-term commitment to continuous improvement
2. Adopt the philosophy of zero error/defects to change the culture to "right first time"
3. Train people to understand the customer-supplier relationships
4. Do not buy products or services on price alone – look at the total cost
5. Recognise that improvement of the systems must be managed
6. Adopt modern methods of supervising and training – eliminate fear
7. Eliminate barriers between departments by managing the process – improve communication and teamwork
8. Eliminate goals, without methods, standards based only on numbers, barriers to pride of workmanship, and fiction – get facts by studying processes
9. Constantly educate and retrain – develop experts in the organisation
10. Develop a systematic approach to manage the implementation of TQM

Oakland gives advice on organisational barriers that may be overcome by adopting TQM and asks the question, "How many of these behaviours do you recognise in your organisation?" These bad practices include:

- Leaders not giving clear direction
- Not understanding, or ignoring competitive positioning

- Each department working only for itself
- Trying to control people through systems
- Confusing quality with grade
- Accepting that a level of defects or errors is inevitable
- Fire-fighting, reactive behaviour
- The “It’s not my problem” attitude

3.6 BUSINESS PROCESS IMPROVEMENT REVIEWS (BPIR)

BPIR is based on the principles of ISO 9004:2000, Guidelines for Performance Improvement. The assessment element of BPIR is a unique offering of BSI Management Systems.

BPIR provides a framework that identifies how an organisation prioritises and responds to the needs of stakeholders through organisational policies, strategy and objectives.

The organisation is able to prioritise the varying demands by implementing improvement initiatives through a clear understanding of:

- who the organisation’s stakeholders are, and
- the needs and expectations of the various stakeholders.

The benefits of implementing BPIR include:

- focus on business performance improvement opportunities;
- a balanced approach to business improvement;

- monitor and prioritise the needs of its stakeholders;
- focus on the necessary resources required to improve;
- improve existing business management systems.

BPIR aims to assess the extent to which an organisation goes beyond the requirements of ISO 9001:2000 and incorporates principles based on ISO 9004:2000. It uses this information to focus on specific business needs – not just customer but also stakeholder needs.

ISO 9001:2000 is about customer focus, refer to figure 3.7. It is about turning customer requirements into customer satisfaction through the application of a management system.

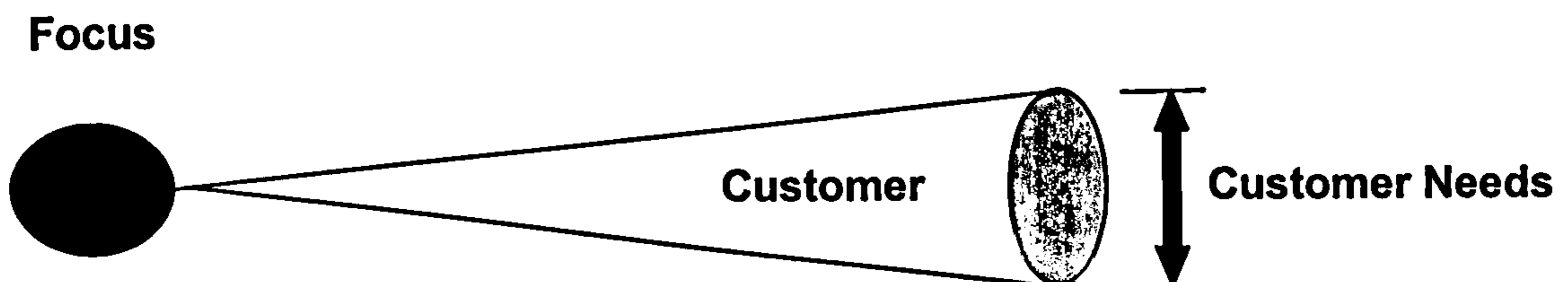


Figure 3.7: ISO 9001:2000 Focuses on the needs of the customer

Source: BSI, 2003

Nevertheless much wider aspects affect an organisation in addition to customers. These are the “stakeholders” and include:

- customers;
- people in the organisation;

- owners/stakeholders;
- society;
- suppliers;
- any other stakeholders.

ISO 9004: 2000 encourages the organisation to look at all stakeholders (Tanner, Bailey and Pertwee, 2004).

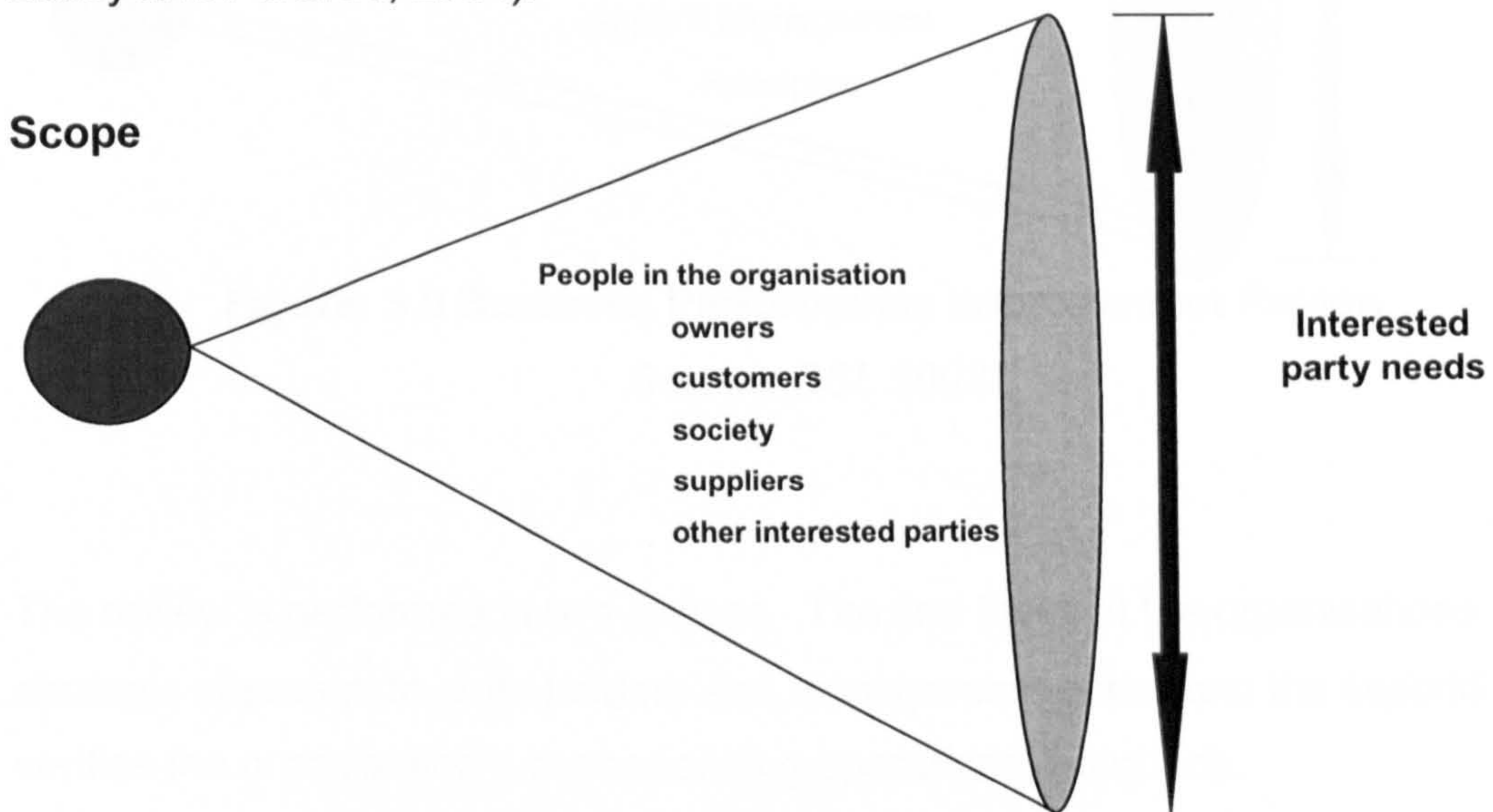


Figure 3.8: ISO 9004:2000 Guidelines for Performance Improvements

Source:BSI, 2003

However, to try and manage all stakeholder needs all of the time is not always possible or acceptable. Therefore, a review using BPIR encourages organisations to prioritise their stakeholder needs in order to maximise benefits.

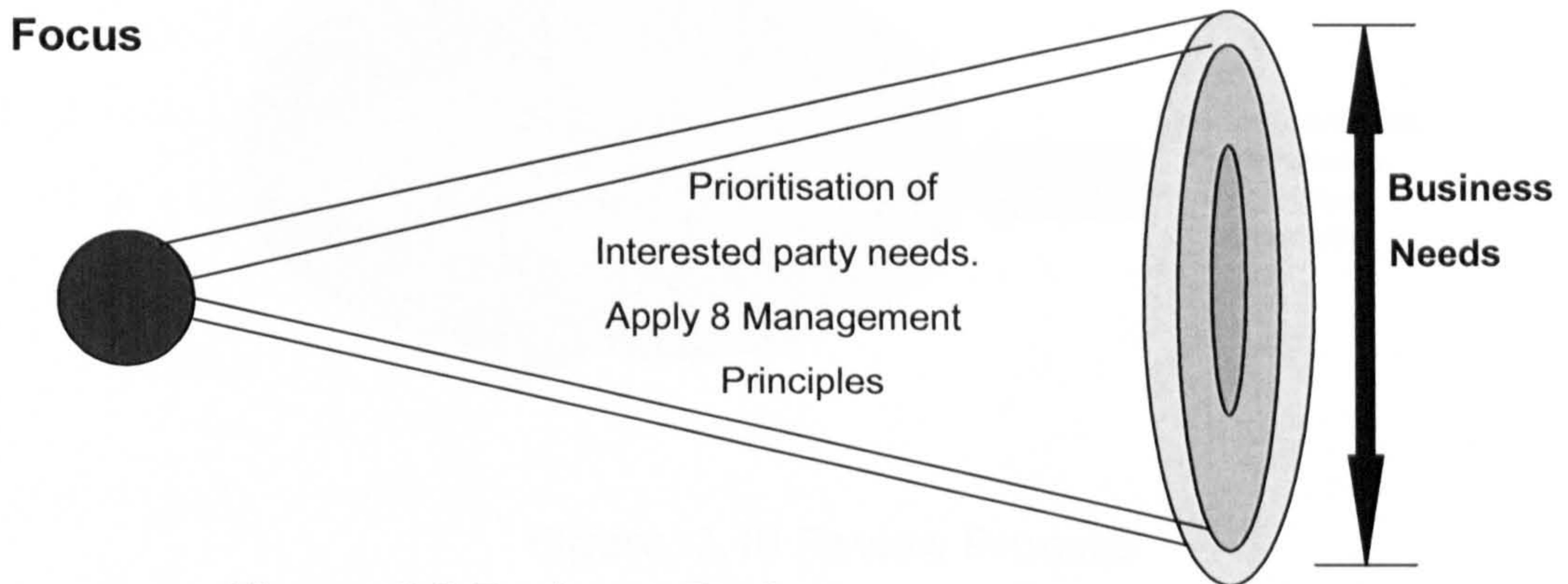


Figure: 3.9 Business Performance Improvement Review

Source: BSI, 2003

The review is performed in two phases. The first looks at the organisations strategic approach to stakeholders and management principles; the second verifies the organisation's corresponding operational approach.

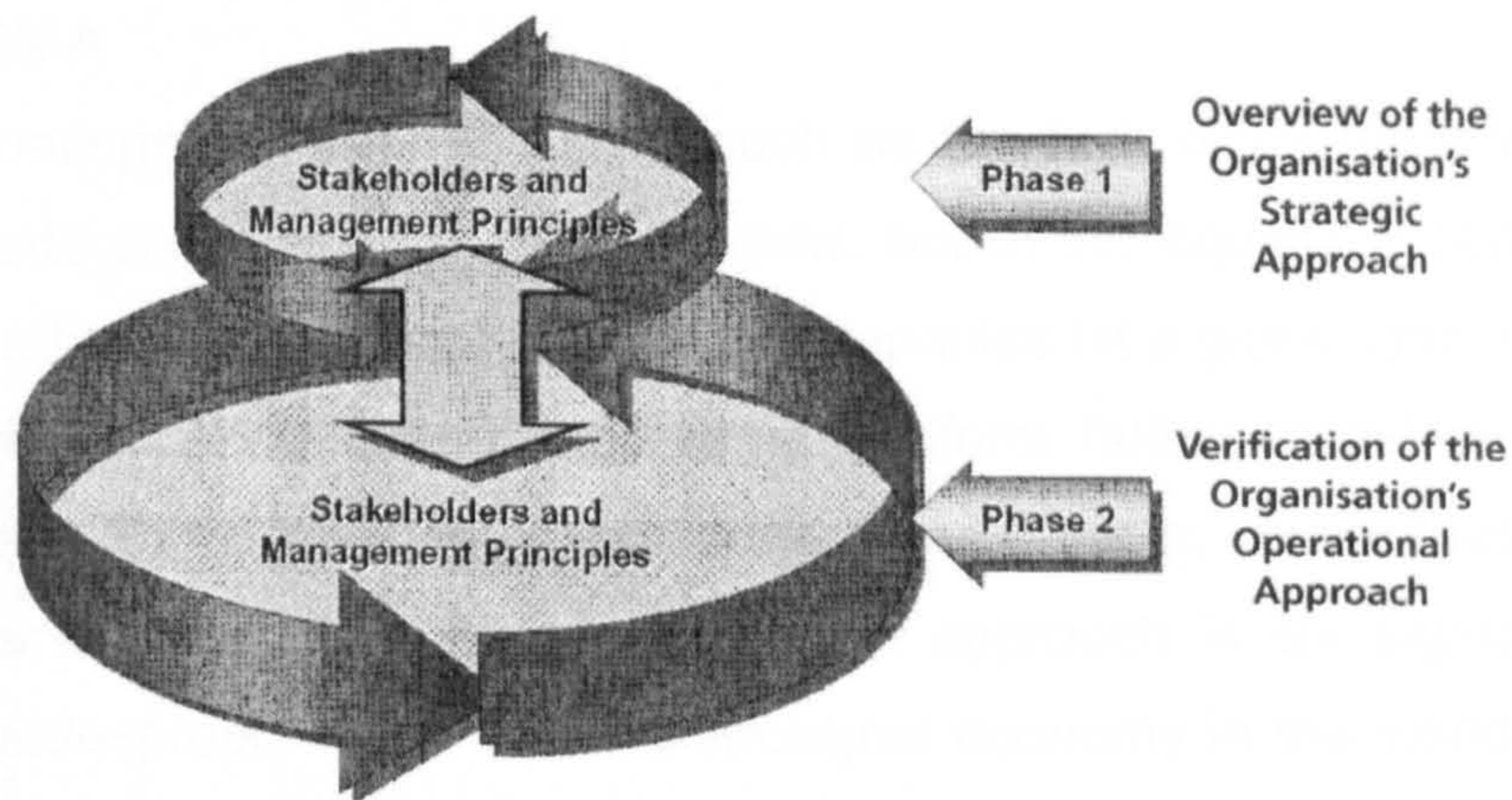


Figure: 3.10 Review Process

Source : BSI, 2003

The review will assess activities that contribute to performance improvement:

- the methods of identification and prioritisation of the needs and expectations of stakeholders; and
- the effectiveness of the approaches designed to deliver upon the needs and expectations of stakeholders

From the review, the organisation is presented with a picture of the degree of effectiveness relating to the deployment and achievement of the various ongoing improvement initiatives.

This then viewed against a balance between the various stakeholder needs and the management standard principles.

3.7 SIX SIGMA

The shortcomings of British industry, such as the lack of capital investment in modern plants and machinery, are not new, but other, equally important issues need to be addressed. In practice, many companies hit a glass ceiling in terms of performance, with continuous improvement efforts failing to deliver beyond a certain level. To reach world-class performance levels, businesses must find better ways to direct their efforts; one such approach is six sigma. Already becoming widespread in the US, the strongest economy in the world, six sigma was originally developed to improve key areas such as high scrap rates and costly waste, under-utilised capacity and slow cycle times due to high process variation.

Six sigma was pioneered by Motorola in the 1980s as an approach to improving productivity and quality, and reducing costs in the face of overwhelming competition from Japan. The company recognised that technology was now so complex that it was rendering old ideas about acceptable quality levels obsolete, so it developed a quality philosophy based on a goal for process quality of six sigma, consequently changing its internal perception of “acceptable” quality from parts per hundred to parts per million, or even billion. Other well known examples of six sigma organisations are General Electric, Honeywell, ABB, Lockheed Martin, Polaroid, Sony, Honda, American Express, Ford, Lear Corporation and Solectron.

To understand the dramatic nature of this change, it is crucial not to underestimate the gulf in performance between the world-class level and typical levels of performance, which range between two and four sigma. At three sigma,

the defect rate is up to 66,810 per million (6.68 per cent) and the total cost of poor quality is generally 40 per cent of sales revenue; at six sigma (3.4 ppm defective), the total cost of quality declines to roughly 10 per cent of sales revenue.

It was not long before many other major US businesses recognised the potential of six sigma; the rest is history. In 1999, GE had saved over \$2 billion using the six sigma methodology.

The success of six sigma within UK operations, such as GDA (which is co-owned by GE and Marconi), Black and Decker and Raytheon Marine, has proved the methodology to be a valid approach for UK industry. Smallpiece Enterprises has already seen a wide range of UK businesses join up to its training programme. According to Philip Catherwood, Business Development Manager, Source Wales part of the Welsh Development Agency) and previous black belt at Sony (UK), UK industry cannot afford to ignore or dismiss any best practice ideas; six sigma has the potential to be the biggest source of competitive advantage around.

“Within UK industry, there are still massive savings to be had in the cost of poor quality, and the potential return to be gained from six sigma is huge for any business. While I am not saying that UK companies will generate anywhere near the billions achieved by GE, proportionally, there is no reason why the same degree of savings cannot be achieved”, states Catherwood.

However, it is also important to realise that before there is any chance of widespread adoption in the UK, there are some significant hurdles to overcome,

not least the general complacency of many businesses, which are either unaware of six sigma or will dismiss it as another US fad.

Far too many senior executives and managers are consumed by everyday pressures, and as a result tend to minimise and marginalise their inputs into plans for the future. Chief Executives need to recognise the benefits of six sigma and provide the necessary leadership and support to establish it in their organisations.

Managers who are aware of Six sigma often assume that it is statistical process control (SPC) with a new name – statistical theory is only a small part of six sigma and it is much more than a technical quality tool to control the best-in-class philosophy that demands long-term, business strategy. The fundamental objective is to establish a measurement-based strategy to focus on systematic process improvement and variation reduction, through the application of powerful statistical tools. Waste and cost are driven out as quality improves, while customer satisfaction is increased through continuous improvement in quality and delivery performance.

To ensure its effective adoption, key features include the use of a team-based, project environment to introduce change, with the overall programme and individual project teams guided by designated “experts”: black and green belts – who are trained in six sigma tools, creative thinking, and project management. There are also “champions”. To whom black belts report, whose role is to ensure that projects are progressing. These people are the core of a successful implementation of six sigma.

There is an established framework (roadmap) for each item, which ensures that improvement activities are structured and that the link between customer quality requirements, parts and processes is maintained. While variations in the framework exist, all are based on a stepped process with certain key phases:

- Phase 1: define problem – involves defining the scope and goals of the improvement terms of customer requirements and the process that delivers these requirements
- Phase 2: measure -involves measuring the current process performance – input, output and process – and calculating the sigma capability for short and longer-term process capability
- Phase 3: analyse – involves identifying the gap between the current and desired performance, prioritising problems and identifying root causes of problems. Benchmarking the process outputs, products or services, against recognised benchmark standards of performance may also be carried out
- Phase 4: improve – involves generating the improvement solutions and fixing problems to prevent them from reoccurring so that the required financial and other performance may also be carried out.
- Phase 5: control – involves implementing the improved process in a way that “holds the gains”. Standards of operation will be documented in systems such as ISO 9000 and standards of performance will be established using techniques such as statistical process control (SPC). After a “running-in” period, the process capability is calculated again to establish whether the performance gains are being sustained. The cycle is repeated, if further performance shortfalls are identified.

- Transfer (or payback).

Figures 3.11 and 3.12 refer

Process Sigma	DPMA
6	3.4
4	233
4	6,210
3	66,807
2.3	308,437
Process	Defects per
Capability opportunities	million

Process Quality (in sigma) and the Corresponding defect rate (in ppm) for A normal distribution with a process Shift of 1-4 sigma

Figure 3.11: Process Quality

Source: Quality World, 2001

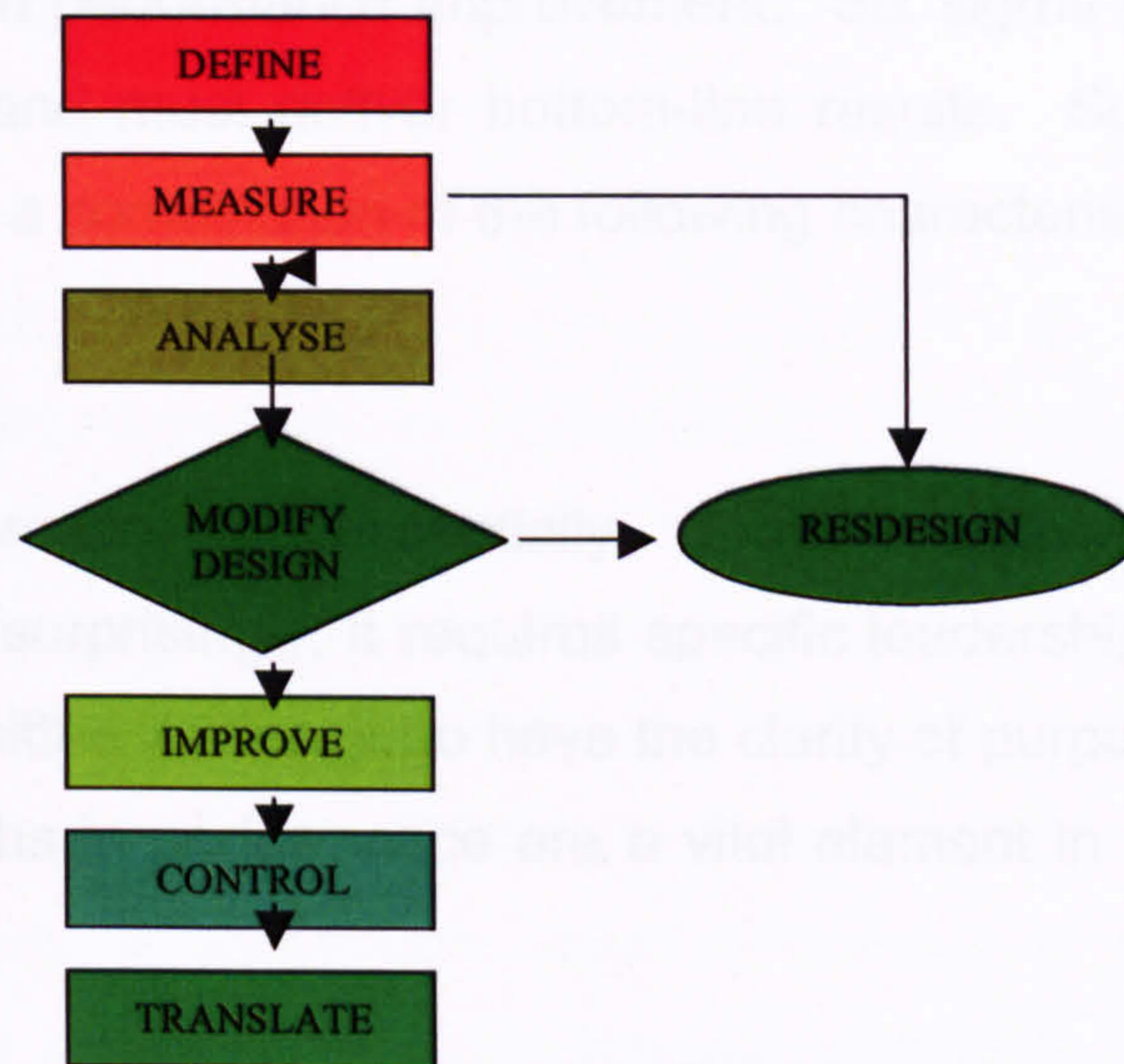


Figure 3.12: Six Sigma Model

Source: Jaguar Magazine, 2000

Critically, the approach is equally applicable to batch, process and transactional operations and is truly a cross-company mechanism. It can be applied to any aspect or transaction within the business – from design to sales order processing, distribution and service – which the customer may perceive as affecting quality. Using the common measurement index of “defects per unit” where a unit can be virtually anything (including a line of code or an administrative form), companies have started to utilise the approach to reduce defects in non-manufacturing operations.

A key feature of a successful six sigma culture is the creation of an infrastructure that supports and invests in performance improvement. Six sigma programmes involve major investment and must deliver bottom-line results. Successful six sigma programmes require a combination of the following characteristics:

- **Committed leadership**

The six sigma approach is essentially about achieving business transformation and not surprisingly, it requires specific leadership qualities to make it happen. Committed leaders who have the clarity of purpose and drive to achieve breakthroughs in performance are a vital element in all six sigma programmes.

The transformational leader in the six sigma approach is often described as having an edge. Frequently cited examples include Jack Welch (GE), Larry Bossidy (Allied Signal) and Bob Galvin (Motorola). The commitment to six sigma is evident through their behaviour, drive, energy and commitment to provide the necessary resources. It would be unwise to assume that this rather “hard” model of leadership represents some unified theory.

- **Strategic alignment**

Six sigma aims to achieve strategic breakthroughs in performance. Organisations that have successfully embraced it ensure that it supports their strategic objectives and key performance measures, and that it is well integrated throughout the organisation. In organisations such as GE and Allied Signal, six sigma is being used in all areas of the business to align resources to solve critical business problems and deliver strategic objectives.

It is used in product development, research and development, order fulfilment and back-office operations, among others, to deliver end-to-end process improvement.

- **A cadre of change leaders**

Six sigma is an intense approach to improvement and requires the full mobilisation of a trained and dedicated cadre of practitioners. In six sigma, improvement projects are led by a dedicated full-time resource – master belts and black belts. Black belt training provides the necessary knowledge and technical capability on delivering breakthroughs in performance. The typical curriculum for black belts includes four weeks of training in quality tools, delivered just in time for a team to begin its improvement project. Black belts help identify opportunities, transfer knowledge on improvement methodologies, act as mentors and coaches and champion the use of six sigma tools and strategies.

Project team members are called green belts and work on improvement projects on a part-time basis. Master black belts act as experts across all project teams. Master black belts are generally experienced black belts with improvement project, teaching and mentoring experience and a good knowledge of the more advanced improvement tools.

Massive investment in black belt training is a key feature in all six sigma programmes. Figures typically quoted are one black belt per 100 employees and one master black belt per 100 black belts. It is claimed that the average black belt project will save a company £100,000.

- **Bottom-line focus**

Six sigma focuses on delivering real savings and/or additional revenue. This focus ensures that projects are selected on the basis of maximising their monetary return and customer satisfaction. It is improvement based on removing cost whilst retaining or improving capability. The portfolio of improvement projects should include a mix projects capable of delivering quick wins as well as larger longer-term projects.

Companies such as ABB, Allied Signal and GE claimed massive savings from their six sigma programmes. ABB saved \$898 million each year for two years, Allied Signal has saved \$1.2 billion in direct costs since 1994 and GE published a net benefit of \$2 billion in its 1999 annual report. There is some debate about these claims and the assumptions behind them: why isn't this performance always realised in share performance etc. However, the focus on bottom-line results does indeed bring a hard strategic focus.

- **Process Approach**

Processes are the engines that deliver every organisation's value proposition. The focus of six sigma is on understanding processes and reducing variability. Process understanding requires processes to be mapped, their operation fully understood and their capability to deliver customer requirements fully quantified – i.e. the concept of process capability. Process sigma is based on the ability of the organisation's processes to deliver customer requirements. Therefore closing the capability gap between what the customer requires and what the organisation's processes produce is at the heart of six sigma.

- **Obsessed with measurement**

Management and measurement are inseparable in six sigma programmes – “you cannot manage what you cannot measure” is the accepted philosophy. Six sigma organisations collect data from all their processes and use the data to drive improvement throughout the organisation. They distinguish themselves from “normal” organisations in the range of data collected and the rigour in which it is analysed and used. There is great emphasis placed on understanding cause and effect. Fact-based decision-making is the norm.

- **Organisational learning**

Giving employees access to knowledge and information systems encourages organisational learning. Personal development and learning is also a key feature. In organisations such as GE, managers and aspiring managers are required to complete the equivalent of black belt training as part of the qualification process for promotion. GE has produced more than 70,000 part-time improvement team leaders. This sends out a powerful message about GE’s long-term commitment.

- **Continuous reinforcement**

Recognising and rewarding leaders and improvement teams contribution to improvement continually reinforces six sigma programmes. Incentive programmes must be designed to support six sigma and drive the desired behaviour. Organisations such as GE included competency and experience in six sigma as part of the appraisal process for all staff, including executives.

A large part of a project champion's bonus is typically tied to his or her success in achieving six sigma improvement goals.

3.8 BALANCED SCORECARDS

This approach has its origins in a one year research project conducted in 1990 that examined performance measurement in the future. The concern at the time was that performance measurement was essentially financial and that this was hindering organisations' ability to create future economic value.

As noted in Chapter one, David Norton, served as the study leader and Robert Kaplan as the academic consultant. The research study considered innovative performance measurement systems and this led to the publication of a Harvard Business Review article in January-February 1992 entitled "The Balanced Scorecard. Measures that Drive Performance". Their book, The Balanced Scorecard, followed this article in 1996. More recently, Kaplan and Norton's book The Strategy Focused Organisation (2001) reinforced the use of the Balanced Scorecard to deliver organisational strategy. The main principle behind the Balanced Scorecard is that traditional financial measures, which tell the story of past events, are now inadequate. In the industrial age, long-term capabilities and customer relationships were not critical for success. In the information age, there is a need for measures that guide and evaluate an organisations journey to create future value through investment in customers, suppliers, employees, processes, technology and innovation.

The Balanced Scorecard couples the financial measures of past performance with measures of the drivers future performance. This leads to four perspectives:

1. Financial perspective: how is the organisation doing financially?
2. Customer perspective: who are our customers and what do they think of us?
3. Internal/business-process perspective: how good are we at delivering customer satisfaction and achieving the financial objectives?
4. Learning and growth perspective: what capabilities must we develop longer-term?

The concept of “balance” comes from the need to have representative measures from each perspective, recognising that the perspectives are also linked as shown in figure 3.13.

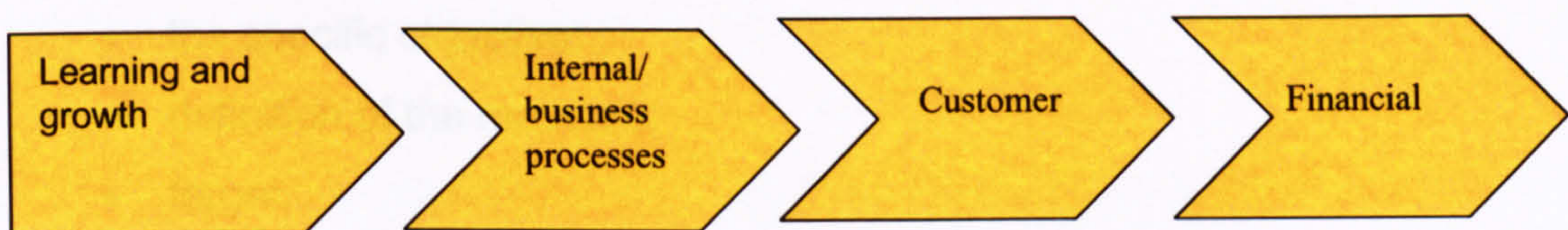


Figure 3.13: The Balanced Scorecard

Source: Kaplan and Norton, 1996

The starting point for the development of a Balanced Scorecard is referral to the organisation, vision and strategy. Once this has been established four questions should be posed, one for each perspective:

1. Financial: to succeed financially, how should we appear to our shareholders?

2. **Customer:** to achieve our vision, how should we appear to our customers?
3. **Internal/business processes:** to satisfy our shareholders and customers, which business processes must we excel at?
4. **Learning and growth:** to achieve our vision, how will we sustain our ability to change and improve? (Kaplan and Norton, 1996).

It is normal to identify a number of potential measures for the scorecard. The key to the effective use of the approach is to ensure that the measures finally chosen relate to the achievement of the vision and strategy, and that they maintain the “balance” by including all perspectives.

Several factors are recorded for each measure selected:

- the specific objective;
- definition of the measure;
- target;
- any related initiatives supporting the delivery of the target

It is also common for scorecards to be cascaded through an organisation, with a corporate scorecard supported by divisional scorecards, which in turn are supported by unit scorecards.

3.9 PROCESS CLASSIFICATION FRAMEWORK (PCF)

The American Productivity and Quality Centre (APQC) was founded in 1977 as a non-profit organisation working with business, labour, government and academia to improve productivity, quality and the quality of working life. Its main aim is to

improve American productivity through the transfer of knowledge and best practices. APQC's focus is primarily in the field of benchmarking.

When benchmarking, organisations often have problems identifying the processes to target in partner organisations, as processes are often named differently and have different scopes from organisation to organisation. The PCF was developed as a simple form of "translator" so that areas of interest could be identified during benchmarking activities.

By breaking down an organisation's activities into a number of common processes, it is easier to compare "like for like" areas and to see where processes vary significantly.

The main aims of the approach are to:

- encourage organisations to see their activities from a process rather than a functional viewpoint;
- encourage "out of the box " thinking, where processes from different industries are adopted to advance an organisation;
- help organisations to understand their processes better;
- help organisations to reach out across industry boundaries to communicate and share information;
- classify information in various forms (APQC, 2003)

The framework covers 13 top-level processes and is split into two sections:

- seven “operating” processes;
- six “management and support” processes.

Each top level process breaks down into a number of sub-processes, which themselves are sub-divided into a number of lower-level processes. The top-level processes are shown schematically in figure, 3.14.

Top-level management and support processes:

- develop and manage human resources
- manage information
- manage financial and physical resources
- execute environmental relationships
- manage improvement and change (APQC, 2003)

Top-level operating processes

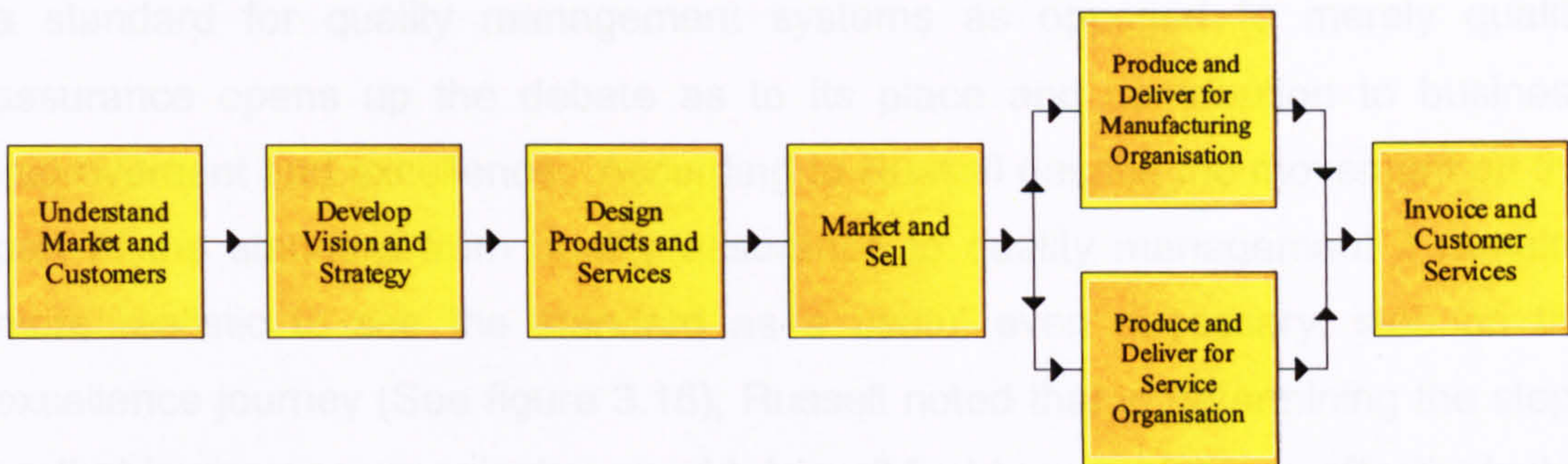


Figure 3.14: The Top-level processes

Source: APQC, 2003

Although designed for benchmarking activities, the PCF is an excellent aid to identifying an organisation's processes for other purposes. These include process analysis as part of continuous improvement or BPR activities, and identifying process interfaces within and across departments. It is an extremely valuable aid when preparing an ISO 9001 system.

3.10 CREATING AN EVALUATION MODEL FOR BUSINESS EXCELLENCE

With the plethora of tools it can be difficult for a company to choose the one(s) that will provide them with the greatest returns. The aforementioned models and approaches are based upon the belief that real quality improvement costs less, not more, because it pays for itself in reduced waste and increased customer satisfaction. It uses the same methods that are a part of, or should have been a part of, proper TQM.

The EFQM Model and the revised ISO 9001 and the attempts to reposition it as a standard for quality management systems as opposed to merely quality assurance opens up the debate as to its place and contribution to business improvement and excellence. According to Russell despite the movement on the part of the standard from quality assurance to quality management it remains more realistic to see the standard as a useful even necessary, step on the excellence journey (See figure 3.15), Russell noted that in determining the steps on that journey an organisation would do well first to consider how effectively it is using its current quality management system.

Where the system remains separate from the mainstream management of the organisation, dependent upon the effects of the quality manager and the threat of the external assessor to gain its attention, then neither the necessary culture nor the maturity is present within the organisation to take the next step towards excellence. Introducing the Excellence models at this stage and assessing the organisation against it would only serve to highlight these existing weaknesses. Used well, a quality management system can make a significant contribution to an organisations focus on excellence, whilst a poorly implemented and supported system will undermine any effort to achieve that status.

An approach to help organisations decide which “tool” was developed by Ericsson. The decision to use quality tools within Ericsson originated in 1987 when Ericsson managers attended a TQM seminar in Oxford. Examples of a number of different quality and management tools were presented as an aid to support TQM. One of the outcomes of the seminar was a strong

recommendation to use the 7 + 7 (quality management and quality control tools) together with the established plan, do, check, act (PDCA) cycle.

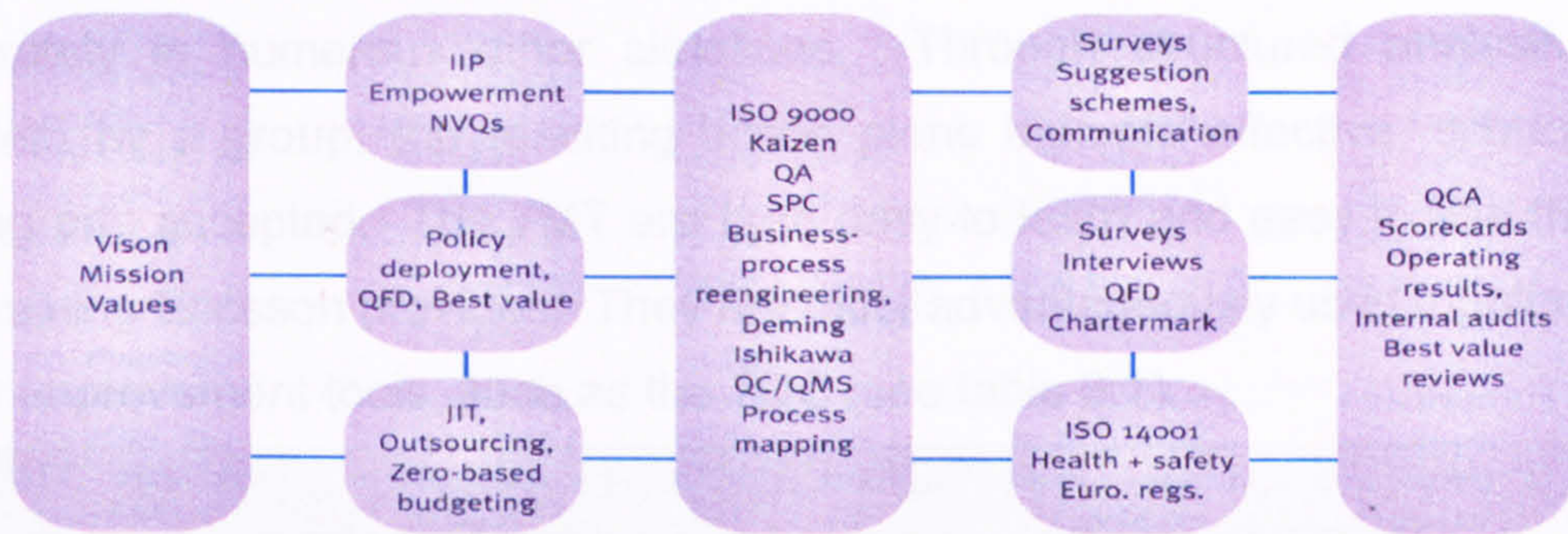


Figure 3.15 : The EFQM Excellence Model and Supporting Initiatives

Source: Russell, 2000

The 7 + 7 tools were widely accepted and although not invented by Ericsson, they have helped to provide the company with a complete set of tools to carry out effective improvement work. The quality management tools (7MT) support three basic steps: brainstorming, organising results and setting priorities. The tools support this through the analysis of “verbal data” by teams. The seven quality control (7QC) tools are used for analysing numerical data, leading to presentations of facts and firm conclusion.

The 7MT has been highly successful in Ericsson, achieving greatly improved results within a wide variety of business areas, having been employed at every level of the Ericsson hierarchy. The tools are also excellent for supporting the

formulation of objectives, policies and for general overall planning. The 7MT are most efficient when they are used in combination, for example when non-trivial problems are to be analysed by a group. They can also be effectively applied separately in numerous other situations. Through structured analysis of a problem by a group, the resulting action plans become effective, economical, lasting and accepted. The 7MT are both easy to learn and easy to use through the training Ericsson provides. They are most advantageously used together with other improvement tools, such as the 7QC (see table 3.1).

7 MT	7 QC
Affinity diagram	Frequency matrix
Fishbone diagram	Bar chart
Relation diagram	Pareto diagram
Tree diagram	Bar diagram and histogram
Matrix diagram	Scatter diagram
Arrow diagram	Run chart
Flow charts	Control chart

Table: 3.1 The 7 MT and QC tools

Source: Quality World, 2002

3.10.1 When tools are a problem

Until a few years ago, tools were widely used alongside the excellence model. However, a new generation of more simplified tools has now evolved causing the core function of the tools to be lost and the actual benefits to become less apparent. Unfortunately, good knowledge of tools is disappearing because many people who are now using simplified versions either forget or neglect to use the

tools in the way it was originally intended. However, at Ericsson this is not the case and it remains that the use of tools can lead to improved efficiency and operational effectiveness.

A frequent problem is that despite being aware that there is a need for a tool, many people do not know which tool to use nor when and how to apply it. On occasions there has been resistance to using tools because of previous bad experiences with them. This may in part be due to inexperience or lack of knowledge on behalf of the facilitator. For example, a brainstorming session may be unsuccessful because the lack of a formal structure renders the amount and pace of information received too difficult to handle.

Certain tools have been perceived as time-consuming, old-fashioned and not cost-effective. Some people are resistant to using tools as the benefits are not always immediately obvious and some tools have the reputation of being strict and inflexible. It is important to avoid several sessions using only one tool to tackle one problem. Attention should be on the problem rather than on how and which tool should be used. This should be decided before the session and not during. Time constraints may mean that not all attributes of a tool can be deployed. However, sometimes a quick solution can be achieved using parts of a tool.

Motivation, apathy and difficulty in assembling teams are all problems, which, at times, will need to be addressed. Therefore tools should be used in situations where people are already scheduled to discuss an issue. When arranging a meeting, emphasis should be on the required goal or outcome rather than on the

means to achieve it. However, if a tool is perceived as being the means to this end or of some benefit, it should be used as a matter of course. (Stimpson, Quality World, August 2002).

3.10.2 Developing the Evaluation Model

The exact use of the aforementioned models and approaches depends on an organisation's particular situation. Each of the models and approaches has one useful attribute in common – they each include valuable material for the development of a programme for senior management education on quality matters. For example, the BPIR offers specifics about management responsibility in bringing the plan-do-check-act cycle to life. The balanced scorecard helps us to link management's understandable emphasis on financial outcomes to the improvement and measurement of activities that will positively affect those outcomes. The excellence model can be drawn on as a resource not only to introduce questions relevant to planning continual improvement, but also to engender (through self-assessment) a spirit of measuring improvement by noting progress against acknowledged good practice criteria. All have valuable benefits, so all organisations have to do is to choose the right model or approach to reap the benefits.

As noted in chapter one and this chapter the difficulty is using the right model or approach for the right job without information overload, whilst at the same time giving a good return for the effort required. With this in mind and the apathy in some quarters to take on a quality approach, a simple yet effective model started to evolve that would answer some of the very basic questions that senior managers often asked.

For example:

1. What involvement is required?
2. What degree of change will be required to existing systems and people?
3. Timescale – what will be the length of time required to implement the models and approaches?
4. What will be the level of investment required?
5. Can any organisation implement the models and approaches?

The evaluation model, whilst simplistic, would provide an organisation with a means to choosing the right business model and or approach for their business and in particular their strategic needs in line with customer demand. If used correctly, organisations will see a return in their investment as waste is removed and capacity increases, costs will decrease leaving more scope for growth.

3.10.3 The Evaluation Model

The evaluation model (Figure 3.16) has been developed outlining the factors that organisations need to consider for the use of the business improvement models and approaches. The business improvement approaches described can be used to support ISO 9001 and other business improvement models. To help use the evaluation model:

- A thumbnail description of the business improvement approaches has been included;
- A summary outlining the factors to consider for the use of each approach;

Each business improvement approach is explained using a common format; brief background; basic principles; description; guidance on how the approach is best used.

Factor	Description	Options
Link to main ISO 9001 requirements	Where the approach supports ISO 9001	Management responsibility (MR), Resource management (RM), Process Management (PR), Measurement and analysis (M&A), Improvement (Imp)
Scope of use	Type of organisation	Private, public/voluntary, SME
	Where the approach was designed for use	UK, Europe, USA, global
	Industry	Manufacturing or service
	Where the approach may be used	Function, division and/or organisation
Degree of change in systems	How much change to the systems and approaches will be encountered day to day within the organisation	Large, medium, small
Degree of change for people	How much people will be affected by the change	Large, medium, small
Level of benefit	How much benefit will be derived from the change	Large, medium, small
Level of involvement	How people will be involved in the change	Fully inclusive, inclusive, coercive
Maturity level	Who should use the approach	Beginner, experienced, world-class
Timescale	How long it will take to implement the approach	Less than 3 months, 6-12 months, over 12 months
Level of investment	What it will cost in terms of resource and expenditure	High, medium, low
How to implement	How to get started	Evolution, project or programme

Figure 3.16: Key to using the Evaluation Model

Approach	Balanced Scorecard	BPIR	PCF	Six Sigma	TQM
Thumbnail description	A framework for defining performance measures	Provides a framework that identifies how an organisation prioritises and responds to the needs of the stakeholders	A list of common processes that aids process identification and benchmarking activities	Compares performance against process performance capability and empowers people to improve	A managed programme for improving all aspects of an organisation through the involvement of its people
Link to ISO 9001	<ul style="list-style-type: none"> ✓ MR RM ✓ PR ✓ M & A ✓ Imp 	<ul style="list-style-type: none"> ✓ MR ✓ RM ✓ PR ✓ M & A ✓ Imp 	<ul style="list-style-type: none"> MR RM ✓ PR M & A Imp 	<ul style="list-style-type: none"> ✓ MR ✓ RM ✓ PR ✓ M & A ✓ Imp 	<ul style="list-style-type: none"> ✓ MR ✓ RM ✓ PR ✓ M & A ✓ Imp
Scope of use	Function, division and/or organisation	Division or organisation	Function, division or organisation	Organisation	Division or organisation
Degree of change in systems	Large if no Measurement is In place already	Medium	Not applicable	Medium	Small
Degree of change in people	Large if no measurement is In place already. The change in approach to measurement is likely to change	Medium	Not Applicable	Medium	Large

Figure 3.16: The Evaluation Model for Organisations

Level of benefit	people's behaviour	Medium	Medium	Medium	Large	Large to medium depending on the success of implementation		
Level of involvement	Medium	Usually inclusive if scorecards are used	Fully inclusive	Inclusive	Fully inclusive	Fully inclusive		
Maturity Level	Any	Beginner, experienced and world-class	Beginner	Beginner	All levels	Beginner		
Timescale	Less than 3 months, but could be longer if there is no existing measurement	6-12 months	Less than 3 Months	Over 12 months	Over 12 months	Over 12 months		
Level of investment	Low	Medium	Low	High, due to training costs	High	High		
How to implement	Project	Project	Project	Programme	Programme	Programme		

Figure 3.16: The Evaluation Model for Organisations

3.11 SUMMARY

The pressure to keep ahead of the competition is vital. Competition and the need to maintain excellence in all aspects of any business is never-ending. Any company that stands still will find itself falling behind. The message is clear the construction industry needs to raise productivity and improve performance. Best practice is one of the key pillars for companies to act on in its search for excellence in the development and delivery of products and services as well as making their companies great places to work.

This chapter has explored a number of business improvement models and approaches that the quality world has instigated to help improve a company's standard of excellence and basis for establishing best practice

The EFQM Excellence Model with its focus on the five “enablers” and four “results”, providing an excellence framework designed to be used as a fundamental review of an organisation's operations and, in so doing, identifying areas to improve. It allows businesses to assess themselves relative to others using a generic framework, suitable for any type of business. It provides a structured process to identify, prioritise and drive forward business improvement and excellence (Beatham, Anumba and Thorpe, 2002). Total Quality Management (TQM) which focuses on continuous improvement the key principles being leadership, continuous self-evaluation and improvement and developing synergistic relationships. Six sigma – a statistical tool, used to describe quantitatively how a business process is operating, its purpose to eliminate defects and finally ISO 9000 a family of standards that can be used

across any industry regardless the product, service or size and with the improved EFQM Model and the 2000 versions of ISO 9001 and 9004 being compatible makes it easier to develop a system based on ISO 9000 with the help of ISO 9004 into the sphere of excellence.

Achieving excellence is never easy. There has been a move away from the gritty techniques of quality inspection such as statistical process control with the focus very much on more comprehensive concepts based on the broad principles of the ideal organisational culture. Although principles can be learned and adopted they all need focus, commitment with the concept very much on not just satisfying, but delighting the customer. Each of the models and approaches described have been built upon the undisputed founders of quality W Edwards Deming, Joseph M Juran, Armand V Feigenbaum, Crosby and the like.

Evaluating the business improvement models and approaches together there is an overlap. Comparing them with ISO 9001 demonstrates that ISO 9001 provides support and all are consistent with each other. ISO 9001 is the starting point for the journey towards world-class performance. It provides the platform for taking the organisation forward by achieving control over leadership, customer focus and continuous improvement. As demonstrated earlier in this chapter, the EFQM excellence model and Baldrige build on the foundations laid down by ISO 9001 and indicate potential areas for improvement once registration to ISO 9001 has been achieved. The business improvement approaches show how they can deliver improvement and could be considered TQM in another guise. In today's business environment, the focus on quality has gone well beyond the finished product to looking at the processes of production through the entire organisation. No longer is quality

merely a concept of meeting customers' expectations but of exceeding them. As more and more organisations are striving to achieve and maintain competitiveness the concepts of TQM have emerged within EFQM, Six Sigma and the like. The application, background, principles and methods of each approach has been covered and the relationship with ISO 9001 shown.

Chapter Four

Beyond ISO 9000

4.1 Introduction

4.2 Managing Quality

4.3 Critical success factors for the implementation of six sigma projects organisations

4.4 Malcolm Baldrige National Quality Award (MBNQA)

4.5 A continuous improvement process at Severn Trent Water

4.6 Lessons for the Construction Industry

4.7 Summary

Chapter Four

BEYOND ISO 9000

4.1 INTRODUCTION

As noted in chapter one, business excellence is an essential process if companies are to increase profits by streamlining operations, improving quality and eliminating defects or mistakes. Smart companies use support tools to automate routine tasks and free up time for the creative thinking needed for differentiation, tailoring responses to the particular needs of individual customers and creating more value for them. Whereas unsuccessful companies might initiate general cultural change programmes to highlight desired attitudes and behaviours, successful companies are more likely to look for specific ways of bringing out the best in people.

Nevertheless it took the publication of the Latham (1994) and Egan (1998) reports for the Construction Industry to recognise that it needed to modernise in order to tackle its problems. These include:

- low and unreliable rates of profitability;
- little investment in research and development and in capital;
- crisis in training; and
- clients who were still equating price with cost and, selecting designers and constructors almost exclusively on the basis of tendered price.

In this chapter the research focuses on how the business models and approaches, discussed in Chapter two, have provided sustainability, strategic direction and bottom line savings.

4.2 MANAGING QUALITY

The debate regarding ISO 9000's place in the quality improvement process and particularly its position with regard to TQM was instigated by Oakland and Mortiboys (1991), when they proposed that a quality assurance system was one of the three major components of TQM. Ho (1994), however, saw ISO 9000 more as a vehicle to implement TQM. Binney (1992) disagreed, stating that ISO 9000 was not the way to begin a TQM programme, advocating instead the use of the then relatively new EFQM excellence model. At the time, almost a decade ago, his views were not widely shared. The main reason was that the widely held belief was that in order to compete in world markets organisations had to go beyond ISO 9000 and implement TQM. ISO 9000 was not TQM. Therefore, that standard was considered by many to be a stepping-stone towards TQM. The problem was that for many companies achieving ISO 9000 was considered to be akin to "having quality" which is definitely not the case. Sun's (1999) international survey of 600 companies from 20 countries found that implementing ISO 9000 alone did not contribute much to quality improvement, while a combination of ISO 9000 and TQM contributed the most.

A survey of ISO 9000 certified organisations by Taylor (1995) found that 32% had also implemented TQM but 24% regarded ISO 9000 as the end of their quality journey. A further study by Lee et al. (2001) into nearly 400 ISO 9000 certified companies indicated that 70% would like to move beyond their ISO 9000 status but that 26% would maintain their ISO 9000 certificate with

minimum changes. Van der Wiele et al. (2001) suggest that, in order to better direct improvement activities, organisations should focus their efforts on the results categories of the EFQM or similar models. They argue that the EFQM model “defines and describes” TQM in a way that can be more easily understood by senior management. This would allow them to accept ownership of any changes required and be able to drive their organisations towards excellence. It would also give a tangible pathway to TQM with clearly defined requirements.

In a survey undertaken by Coleman and Douglas (2003), many organisations still viewed ISO 9000 as the end of their quality journey for two reasons: firstly, because they had been coerced into getting certification; and secondly because they had found TQM to be abstract with very many definitions and a lack of “hard” requirements. The EFQM excellence model with its nine criteria and well-defined requirements may well be the answer for organisations on their quality journey. Management will be able to understand and drive an EFQM programme within their organisations. This, together with appropriate training in quality tools and techniques, may be the best option for business success.

However, McAdam and Jackson (2002), Lau et al. (1999), McAdam and Mckeown (1999), Corrigan (1994) and Henkoff (1993) concluded that ISO 9000 and TQM should supplement each other in order to achieve the objectives of the organisation. In addition, Gotzamani and Tsiotras (2001) state that”Those companies limiting their efforts to the satisfaction of the minimum necessary requirements for certification will not be able to realise the full potential of the standards and are likely to fail. On the contrary, companies can really benefit from the process if they see the standards as an

opportunity to organise and improve their internal operations and quality by creating a dynamic and ever-improving quality system that may evolve in a TQM system....”

Arora (1996) described ISO 9000 as a pillar in a company’s approach to TQM since it includes important elements such as training, statistical process control (SPC) and management commitment. He added that ISO 9000 is an important part of TQM. To support those claims, Lai (1996) mentions that TQM is an approach to quality that goes beyond ISO 9000. He adds that ISO 9000 and TQM are not different alternatives to each other, and are not mutually incompatible. ISO 9000 builds a strong foundation for a TQM environment, emphasising customer needs, employee involvement, and making continuous improvements (Lai, 1996). Moreover, McAdam and Jackson (2002), Williams (1997) and Askey and Dale (1994) revealed that ISO 9000 certification provides the building blocks for successful and effective implementation of TQM. Further, McAdam and Mckeown (1999) found the majority of the organisations in their study progressed from ISO to TQM and considered ISO to be an important step towards the TQM journey.

To investigate the benefits of implementing both ISO 9000 and TQM instead of only one of them, Rao et al. (1997) undertook a study of firms implementing TQM in the USA, India and China. The study suggested that ISO 9000 firms had better quality management practices and results than the firms that were not registered to ISO 9000. Sun (1999) analysed data obtained by the London Business School and Chalmers University of Technology, covering 20 countries. The study concluded that implementing ISO 9000 alone did not contribute much to quality improvement in organisations. However, in implementing both ISO 9000 and TQM contributed the most. Moreover,

Pabhu et al. (2000) investigated the impact of ISO 9000 certification and TQM on organisational performance. The study concluded that organisations, which systematically adopt best practice starting with ISO 9000 and continuing with TQM, are achieving a higher level of organisational performance than other companies.

The benefits of TQM inevitably depend on effective implementation but a number of potential benefits have been outlined. Chong (1998) argues that TQM may provide a fundamental way of conducting business, making the organisation more competitive and viable, with TQM driving change and improvement. Jeffries et al. (1996) claim benefits such as enhanced profitability, reduced costs, creating an innovative approach, accountability and a more enjoyable working environment. A study by Radovilski et al. (1996) of 235 companies that had implemented TQM revealed increases in profit (21%), market share (9%), and productivity (20%) with reductions in defects (24%) and costs of achieving quality (20%). On the other hand, TQM may not contribute significantly to improvement if poorly implemented. Shearer (1996) refers to the potential for empowerment causing some loss of control, whilst Blackiston (1996) warns about over delegation by top management, placing the burden for change on the employees and then blaming them for failure. Senior Management should tackle the important issues of TQM, demonstrating leadership and commitment. Blackiston (1996) states that some companies choose the wrong strategy, the wrong tool or select merely one tool, whilst Hradesky (1995) refers to the absence of strategic planning and Ackoff (1992) to the lack of systematic orientation. When each department is trying to improve performance independently of others, this can also lead to failure. Radovilski et al. (1996) found major TQM implementation problems with lack of management commitment, poor

communication between departments and the perception of TQM as a trend or campaign rather than real, working system.

4.3 CRITICAL SUCCESS FACTORS IN THE IMPLEMENTATION OF SIX SIGMA

Those who have implemented and practiced six sigma agree that the most important factor is continued top management support and enthusiasm (Henderson and Evans, 2000). People in the highest level of the organisation must drive six sigma. In six sigma success stories like Motorola, GE, and Allied Signal, the CEO's are the ones who have made it possible. All of them support, participate and are actively involved and dedicated in company-wide six sigma initiatives. Jack Welch, GE's CEO, has strongly influenced and enabled the restructuring of the business organisation and changed the attitude of the employees towards six sigma (Henderson and Evans, 2000). Welch supports and participates in a very hands-on approach such as dropping in on weekly and monthly six sigma reviews, monitoring project progress weekly through summary reports, and making site visits at manufacturing operations to observe the degree to which six sigma is ingrained in the culture (Henderson and Evans, 2000). In addition, Welch reviews and presents to the shareholders the progress of six sigma in GE in every meeting, term or annual report. Managers must be involved in the creation and management of the process management system, and also participate in projects themselves (Eckes, 2000).

Six sigma cannot be treated as yet another stand-alone activity. It requires adherence to a whole philosophy rather than just the usage of a few tools and techniques of quality improvement (Dale, 2000). Six sigma projects must be targeted for process and product improvements that have a direct impact on

both financial and operations goals. Even if the first efforts focus on fairly narrow problems, their impact on the whole business should be clear. It needs to be clear how projects and other activities link to customers, core processes and competitiveness (Pande et al, 2000).

Many authors generally accept six sigma is a philosophy that provides a better product or service, in a faster manner and with a lower cost than competitors (Harry and Schroeder, 2000; Eckes, 2000). It should be extended to other operations within a company. Since the goal of every company is to make profits now and in the future, six sigma makes processes profitable while attacking variability in business processes. In every single project, the link between the project and the business strategy should be identified. It should also demonstrate the benefit of the project in financial terms and in which way it will help the business strategy.

Ford Motor Company has embraced the six sigma methodology since 1999. The expected process performance improvement (i.e. reduction of rework, scrap rate, reduction of warranty costs, reduction of process variability etc) is about 70% per project and thereby cost savings are in the range of \$200,000 – 250,000. GE reported in their 1999 annual report that using six sigma had produced more than \$2 billion in benefits in 1999 whilst at Motorola they reported similar figures of \$2.2 billion saved in reducing cost of poor quality in 2002.

4.4 MALCOLM BALDRIGE NATIONAL QUALITY AWARD (MBNQA)

The MBNQA that US organisations use in achieving organisational and quality excellence, contain in their framework several TQM concepts, including: leadership and social responsibilities, strategies and plans, customer

focus/relations, human resource development, information management, processes, quality, suppliers and overall results.

Apart from creating an organisation's mission and vision, the MBNQA "Organisational leadership" sub-criterion examines how leaders determine the performance expectations of an organisation. In this area, a culture of innovativeness and empowerment among employees is stressed, Bennis (1999) claimed that the challenge for leaders is in releasing the brainpower and creativity of their people. A survey involving 10,000 American workers revealed that a large majority desired an increase in autonomy in order to be more productive, creative and innovative (Mamman and Saffu, 1998). Autonomy and empowerment foster the exploration of new ideas and innovativeness (Verespej, 1998). Empowerment gives people more confidence to act and fosters a sense of job ownership.

Three successful leaders, for example, stress a corporate culture that highly values creativity and freedom to try out new ideas. They are: Richard Branson of Virgin, Jack Welch of General Electric (GE) and Percy Barnevik of ABB. All three have a common characteristic in running their companies – they are adamant about releasing the creative energies of their employees and encouraging entrepreneurial challenges (De Vries, 1996). Both Branson and Barnevik believed that, "If employees are inspired, empowered and free to act, they will stretch themselves to make exceptional efforts, demonstrate a high degree of commitment, and be willing to take risks" (De Vries, 1998).

In the MBNQA the "Public responsibility and citizenship" sub-criterion, for example, community contribution is highlighted as part of leadership duties. The assessment ensures that an organisation's operations do not cause any

negative impact on the society. The role of leaders in guiding organisations to look beyond wealth creation and to prevent unwanted negative publicity has become important for establishing and maintaining good reputation. The American society's potential for creative software developments is encouraged by the MBNQA "Information management" sub-criterion. It examines the quality of information systems (hardware and software) that are being applied to track business processes, and to analyse and review business performances. The ease of information and data access throughout the organisation is also examined.

The MBNQA includes in its framework the importance of fostering a culture of entrepreneurial challenged and of harnessing new technologies, as well as in employing diversity to create competitiveness and business success. However, it does lack an emphasis in solving problems from their roots. In order to sustain TQM practices, the view of business processes as a succession of parts which forms an integrated whole must be kept in perspective. Hence, a systems approach to quality management must remain.

4.5 A CONTINUOUS IMPROVEMENT PROCESS IN SEVERN TRENT WATER

The models and approaches reviewed in this chapter have cited success in organisations outside of the UK and or construction sector. Following the publication of the Latham and Egan reports there has been recent improvements within the construction industry. An industry wide group developed a set of simple headline Key Performance Indicators (KPI's) based upon the seven Rethinking Construction targets but with the addition of a Client Satisfaction measures. In all there are 12 measures. All demonstration

projects are required to measure their performance against these KPI's and to report annually. DTI collects data from industry at large, also annually, enabling a comparison to be made between all industry performance and that of Rethinking Construction demonstration projects. Recent independent research reviewing the impact of the Demonstration Projects, managed by Construction Excellence, among participants has concluded that:

- more than two-thirds reported improved partnering, procurement, or supply change management skills in their organisation;
- more than half report that their organisations have made changes in eight specific areas of their business as a result; and
- more than two-thirds of participating individuals felt that they had been at the cutting edge of construction innovation and learned new skills.

However, it is difficult to ascertain what the Construction Industry, has used as its “enablers” to help improve its “results” in other words the “models and approaches” described in chapter three and the implementation of them in this chapter.

A major client within the Construction Sector, Severn Trent Water plc is an international utility services and environmental solutions company which is a leading provider of water, waste and utility services. The company generated revenues of £1.7 billion in 2000-2001 and employs more than 14,000 people in the UK, Europe and USA. The customer profile is 60% domestic households with the remainder being business organisations, which involves serving over eight million customers two billion litres of drinking water every

day. At the same time, around 2.7 billion litres of waste water and sewage are treated each day, from communities and businesses across the region. The company has achieved 99.9% compliance with water quality standards every year from 1997 – 2001; in 1999 it was awarded a UK National Training Award and The Edinburgh Quiddich Trophy in recognition for excellence in staff training and development, particularly for team leaders in the customer relations department.

Severn Trent Water has developed a continuous improvement process for the customer relations department in the UK. They initiated a business change programme to review and improve all existing policies, systems, processes and organisational structures. The existing processes are documented as a series of operational management processes, which are managed, monitored and reviewed to compare process output with the target. Targets have been established against four perspectives.

It is intended that targets will provide the basis for a comprehensive performance management model, which integrates the strategic goals with operational processes and measures. Staff training is being carried out to improve awareness levels and encourage personal contributions to achieve consensus with the targets. However, a process for continuous improvement is also required to provide solutions to existing problems and shortfalls in customer service.

In-company research was carried out, through a staff attitude survey to identify strengths and weaknesses, to identify the main barriers to continuous improvement in the areas of leadership, training, communication, motivation, teamwork, and change management. The study concluded that the company

should develop an organisational culture and management style to support continuous improvement of daily working processes, and that change should be managed against the achievement of appropriate quality targets. A continuous improvement process was developed based on a structured problem-solving model incorporating the application of established tools, to be applied by problem solving teams from the customer relations department. It was recommended that the team members should be trained in the problem solving process, and the related quality tools and techniques. Also, management should lead and support this approach by concentrating on team (rather than individual) performance achievement.

4.6 LESSONS FOR THE CONSTRUCTION INDUSTRY

There has been a tremendous amount of research on the implementation or otherwise of the business models and approaches discussed in this chapter outside of the construction sector. Lessons which are invaluable to the construction industry, if they are, to implement the various business models and approaches on offer effectively. The crucial point is that the construction industry has yet to achieve as a matter of routine, world class standards of cost, quality and timeliness (Latham 1999 and Egan 1998). There is evidence that the industry can deliver quickly and efficiently and large cost savings are possible. Olympia and York estimated that they built Canary Wharf for 30% less than most other offices in London and at a higher level of quality, whilst some industry leaders estimate that productivity can be improved by as much as 50-60%. A leading contractor has set itself the task of reducing construction costs by 30% and of increasing staff productivity by 100% by end-2006 (Priestly, 2003) by improving attitudes, greater flexibility, maximising productive hours and improving productivity through technical improvements and standardisation of materials and systems, better planning and the like.

The importance of these references is that they come from within the industry and take account of a conviction founded on successful experience from outside the industry sector both within the UK and overseas lessons which construction must take on board and learn from. In summary:

- The industry's future depends on successful competition overseas. It needs a sustained fight to increase market share and profitability in the world market. The fight has to be by the rules of world-class competition. These are more about the quality and consistency of performance of people, systems and components;
- The quality of the industry and of its investment in people and systems is of central significance to the nation's economy as well as the quality of the built environment. The need to improve its competitiveness and its productivity is of paramount importance;
- Seek co-operation in all its working relationship not confrontation;
- Improve productivity through changes in procedures and methods;
- Train the managers and staff in TQM to hold their own with the world's best, giving them the responsibility and authority needed to do their job well;
- Undertake operational research and associated development to widen its knowledge and sharpen its competitive edge; and,

- Take the lead on quality matters rather than being obliged to follow the ordinances of others. (Priestly, 2003).

4.7 SUMMARY

It seems today that ISO 9000 is a powerful instrument, which cannot be disregarded. It is, far and away, the most influential initiative that has grown from the quality movement of the late 1980's. The new process-based structure of ISO 9000:2000 is consistent with the plan, do check, act improvement cycle. A greater emphasis is placed on the use of measurement and analysis of results feeding into the review and improvement process than before. The revised standard is a step towards TQM, customer satisfaction and does not just achieve product quality assurance. ISO 9000 is a pillar in a company's approach to TQM since it includes important elements such as training, statistical process control and management commitment and builds a strong foundation for a TQM environment.

However, the exact use of the aforementioned tools depends on an organisation's particular situation. It's not a good idea to necessarily adopt any of them fully – in the sense of “we have done ISO 9001, now let's do the excellence model”.

All of the tools have one useful attribute in common – they each include valuable material for the development of a programme of senior management education on quality matters. In cases where managers are not committed to quality principles as perhaps they should be, these tools may help.

However, to implement these tools, radical changes to the processes through which projects are delivered has been discussed in chapter three and is further examined in chapter five.

Chapter Five

Managing Change in Organisations

5.1 Introduction

5.2 Resistance to Change

5.3 Cultural Change

5.4 Organisational Change

5.5 Mechanisms of Cultural Change

5.6 Summary

Chapter Five

MANAGING CHANGE IN ORGANISATIONS

5.1 INTRODUCTION

In a changing world progress is rarely achieved solely by rational means nor entirely by “reasonable” people. Leadership, vision, inspiration and much more are essential components for success in handling change. As noted in chapter three and four effective management of change is enhanced through careful planning, sensitive handling of the people involved and a thorough approach to implementation. It is one thing to know what to do; leadership, vision, imagination and involvement of people can all contribute to identifying the course of action to take, or product market to exploit or organisational structure to implement. This chapter sets out to identify the key “components” for successful change and to set out a range of concepts and techniques to help people handle change more effectively when implementing the aforementioned business models and approaches.

5.2 WHY RESISTANCE TO CHANGE?

The first myth is that people universally dislike change, and will attempt to avoid it. While it is certainly true that change programmes (including TQM) often provoke resistance, this is by no means a universal reaction. Indeed, on many occasions people accept change in relation to product and service improvement that has happened in many European organisations would not have taken place (Dale, Cooper and Wilkinson, 1997). The reality is that the majority of the population of the developed world has adapted to enormous changes, both in technology and way of life, over the last few decades. Rogers and Shoemaker (1971) have suggested that people fall into five

different types: innovators, early adopters, majority (early), majority (late) and laggards:

- Innovators are quick to adapt to new ideas and to change accordingly. They are also risk takers, as some of the new ideas may prove to be mistaken and/or difficult to adopt and put into place.
- Early adopters follow closely behind the innovators, but are rather more respectable and tend to conform with societal norms. They are not seen by the rest of society to be as non-conformist as the innovators.
- The early majority take on change once it has started to become accepted.
- The more conservative late majority wait to see all of the effects before adopting change
- Finally, the laggards are very suspicious of change and are slow to adapt

Rogers and Shoemaker (1971) suggest that the largest number of people fall into two “majority” classifications, with far fewer occupying the extreme “innovator” and “laggard” positions. It might also be the case that individuals vary according to the nature of the change.

The other myth is that resistance to change is necessarily a “bad” thing. Sometimes such resistance may be healthy. Both people and organisations need periods of stability to re-freeze and absorb the changes that have already taken place. Also, the existence of resistance may be an indicator that, for some reason, a particular change is not considered desirable. In

such cases a closer look is needed at the root causes of the resistance, and this in itself may produce an improvement.

5.2.1 Reasons for resistance

Where change is resisted it may be for a number of reasons. Sometimes people believe that the change is likely to be to their disadvantage and even that of the organisation itself. On occasions this may indeed be true. It can hardly be a surprise if people's jobs are at risk or if they have worries about whether or not they can cope with the new concepts, procedures, systems, skills, practices etc that they will resist the related change. A good example of this is the worry among some shop-floor operatives that Statistical Process Control (SPC) would expose their lack of numeracy and literacy, and that they do not have the time in their day-to-day production routines to measure process parameters and/or product characteristics, carry out calculations and plot the data on control charts. Another example is that engineers often believe that they do not have the time in their jobs to contribute to the preparation of Failure Mode Effect Analysis (FMEA) and the subsequent use of the results. Sometimes, it is felt by employees that changes are being made by a manager to establish his or her own personal mark as a form of "impression management", and that it is unlikely to last for very long as new managers in turn do the same. The fear of change is often enhanced by the secretive manner in which change programmes are planned and implemented; fortunately this is not usually the case with the introduction of TQM into an organisation. In some cases, the outcomes of improvement projects may not be actioned or publicised if there is any doubt about the successful outcome of the activity. This failure to communicate is often done, of course, because management fear that people will find ways of blocking the changes if they are aware at the early planning stage of the likely

outcomes of the change. Paradoxically, the secrecy itself makes people suspicious and often leads to the very behaviour that management had hoped to avoid. Secrecy, therefore, becomes a self-fulfilling prophecy (Dale, Cooper and Wilkinson, 1997).

Change will involve some effort, as new ways of doing things have to be learnt. For some people the fear of the unknown will be a major factor, especially if there are high levels of insecurity and dependency. Again, using the example of SPC, when it is being introduced on a particular process as part of a pilot programme there is a tendency for operators and first-line supervision to react with the comment "why us and not them?" and sometimes "why them and not us?"

Other sources of resistance, may lie in the social system. The existing norms of the group of organisation will usually be very powerful. These are necessary, of course, as they provide the rules within which people relate to each other and work together. Change may require that these norms are changed in some way. Problems may also arise if change programmes are instituted in only one part of an organisation. This may cause imbalance elsewhere, which will be resisted as a means of restoring the balance. Other resistances, of a social nature, may be due to the change agent threatening vested interest or "sacred cows". If change programmes are carried out by outside consultants, there may also be an element of suspicion of outsiders and the view of "what can they teach us?", "all talk and no action", "what do they know about the industry?" and "we are teaching them whereas it should be the other way around". The use of a standard approach from a management consultancy is employed by many organisations to start a

process of quality improvement and this suggestion of suspicion needs to be recognised.

5.2.2 Overcoming resistance to change

There is evidence that the best way to reduce resistance to change is to involve those whom it is going to affect in the decision making process. Individuals who have been involved in the diagnosis, planning, devising and implementation of change are far more likely to feel positively about it. In general, they will feel more committed, which will lead to speedier and improved implementation. When managing a process of change the human trait of people wanting to support their own ideas should never be forgotten. Natural leaders within a business can also assist with breaking through the barriers of resistance to change.

The ideal situation is where all the necessary information is freely available, and decisions are then taken by consensus. There will, however, be occasions when it is not possible to be totally open (for example some of the information is commercially sensitive). As Makin et al. (1989) continually emphasise, the general rule should be that good communication and feedback channels should be established between the source of change and those who will be affected. Even where these are short-term costs, such as a need for retraining, it is necessary to show that there will be long-term benefits, such as improved pay, improved job security, better working conditions, avoidance of a takeover, achievement of a prestigious quality award, the award of customer contracts etc. Obviously, it will be easier to effect change if there is a general climate of trust in the organisation where people feel that their fears will be listened to, and their problems recognised

and dealt with in a sympathetic manner. Ideally, the programme itself should be open to change in the light of such feedback.

5.3 CULTURAL CHANGE

Changing culture has become one of the most hyped and written about areas of management and it is relatively new. Management has historically been seen as concerned with planning, organising and controlling, largely an administrative function. A number of books written in the USA in the 1980s suggested that culture was a primary weapon for management in the battle for competitive advantage. Ouchi (1981), Pascale and Athos (1981), Deal and Kennedy (1982) and Peters and Waterman (1982) argued that strong cultures could lead to better performance and that one of the main responsibilities of senior management was to manage corporate culture. There is little doubt that the notion of culture has flooded rather than seeped into management thinking and there has been a burgeoning interest in initiatives such as customer care, teambuilding and organisational change initiatives, as well as TQM, which have sought to change culture or “mindsets”.

The assumption is that managers with a vision can use various tools and techniques to manipulate culture. This takes a particular stance on culture. For “purists” culture is something an organisation is: “culture is a socially constructed system of shared beliefs, meanings and values. It emerges from the social values of organisational members and is the product of shared symbols and meaning” (Bright and Cooper, 1993). In contrast, cultural “pragmatists” define culture as something an organisation has: “a set of variables to be managed in the pursuit of organisational objectives”. The term culture is used very loosely in management today. It originates from studies

of “primitive” societies in the nineteenth century. The term has now been used to look at smaller social groups such as organisations.

Corporate culture is a somewhat ambiguous concept and is difficult to define. Schein’s (1985) definition encompasses the key aspects:

“a pattern of basic assumptions – invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration – that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.”

Corporate culture, then, is not easily observable, and it is not the same as the behaviour one can observe when studying organisations. It can be seen as existing on several levels, with different features attached to each level (Huse and Cummings, 1985; Kotter and Heskett, 1992; Schein, 1985). The basic idea is that corporate culture’s deeper levels, the basic assumptions and the values – what Schein (1985) refers to as the “essence of culture” – exist on an invisible level. These assumptions and values are seen as extremely difficult to change, hence any attempt to change them will require a long-term effort by senior management. In contrast, we have what Kotter and Heskett (1992) term the “group behaviour norms”, and Schein (1985) and Huse and Cummings (1985) call the “cultural artifacts” which one can observe when visiting an organisation. These are typically easier to change and are the manifestations of culture (e.g. office layout, dress code, architecture).

In recent years managing culture change has become one of the most debated issues in management literature. Organisations are faced with an

environment where change is almost a part of the daily routine, organisations must adapt and change accordingly. However, Huse and Cummings (1985) suggest that organisations should always try other solutions before attempting cultural changes. Similarly, Kotter and Heskett (1992) argue that the difficulties involved in managing these processes are often underestimated. Not only are such changes disruptive to the organisational processes and procedures, they are also disruptive to the members of the organisation. It should also be said that some changes in culture (e.g. elimination of reserved car parking spaces) are relatively easy to make but the benefits are short-term, whereas others are more difficult (e.g. managers become coaches rather than supervisors) but the effects are longer term.

The role played by leaders is an integral part of most texts on culture and change. Leaders have been found to play an instrumental role in guiding the organisation through cultural change, as well as other organisational change processes (Huse and Cummings, 1985). As Kotter and Heskett (1992) note, “leadership from one or two people at the very top of an organisation seems to be an absolute essential ingredient when major cultural change occurs”. Moreover, this process has to come from the top, because to change cultures one needs power at the level only found at the top of organisations, and usually the scope of change is of such magnitude that only top management are in a position to carry it through (Brubakk and Wilkinson, 1996).

Learning that is embodied within culture arises through the process of dealing with threats or by the positive reinforcement of successful behaviour, with the resulting assumptions eventually leading to habitual behaviour. Moreover, as Morgan (1986) observes:

“culture is not something that is imposed on a social setting. Rather, it develops during the course of social interaction. In organisations there are often many different and competing value systems that create a mosaic of organisational realities rather than a uniform corporate culture”.

Furthermore, the role and influence of middle managers and supervisors receive little attention in the corporate culture literature. However, according to Kotter and Heskett (1992), middle managers play an important part in major culture change – “Ultimately, it is their actions that produce the changes” – although they are not seen as being able to initiate such changes.

5.4 ORGANISATIONAL CHANGE

If TQM, as Oakland (1989) maintains, is “a way of managing the whole business organisation to ensure complete customer satisfaction at every stage, internally and externally”, then it could be a way of changing corporate culture to manage change in a more customer responsive manner. Achieving cultural change is central to what TQM is about. Deming (1992) does not mention the term TQM but his fourteen points encourage managers to change the way in which the organisation is managed (i.e. cultural change).

However, cultural change is problematic. While TQM may be seen as an answer to the problem of large companies suffering from “rigid hierarchies which isolate top management, confine middle management to administrative roles and frustrate operational and supervisory management in their decision making” (Thurley and Wirdenius, 1989), TQM alone may not be able to overcome all these problems. The corporate culture of the organisation and existing ways of doing things might be too strong for TQM. Indeed, existing ways of doing things constitute the main barriers to TQM’s successful

adoption in the first place; that is, quality management is often introduced so as to operate within existing structures and cultures rather than being used as a vehicle to transform them (Wilkinson and Witcher, 1993). Thus, the emphasis is on how to make existing processes work better rather than on altering those processes in the first place. This is particularly true when it is considered as an evolutionary process from a base of quality assurance. As Burack (1991) notes, “established organisation cultures are not easily modified because their very reason for existence often rests in preserving stable relationships and behaviour patterns”. Thus, it may be that rather than viewing TQM as a process for changing organisations, conversely organisations must change to accommodate TQM (Wilkinson and Witcher, 1993). In reality it is mix of both.

5.5 MECHANISMS OF CULTURE CHANGE

According to Schein (1985), there are five primary mechanisms for culture change:

- What leaders pay most attention to
- How leaders react to crises and critical incidents
- Role modelling and teaching by leaders
- Criteria for allocating rewards and determining status
- Criteria for selection, promotion and termination

Schein's secondary mechanisms for the articulation and reinforcement of culture are:

- **The organisation structure**
- **Systems and procedures**
- **Space, buildings and facades**
- **Stories and legends about important events and people**
- **Formal statements of philosophy and policy**

The central message arising from the work of Schein is that organisations devote too much time and attention to changing mission statements and changing organisational structure. What is far more important are the roles of leadership and the use of the full range of the organisation's "rewards and punishment" levers such as pay, appraisal and promotion. Mission statements and company values need to be underpinned by changes in senior management attitudes, which are likely to be reflected by new appraisal or pay criteria. In terms of TQM this means promoting those managers and employees who practice the principles of continual improvement.

Programmatic change which starts with a "big splash" educational approach intended to change the behaviour of individuals by changing their attitudes has been criticised as ignoring the fact that the change process in fact works in the exact reverse way, i.e. changed behaviour leads to changed attitudes

and the most effective way to change behaviour is by changing the context in which people work by creating new responsibilities and relationships (Beer et al., 1990).

5.6 SUMMARY

In this chapter various theories of motivation and their implication for managers and organisations have been examined. By examining these theories in the context of TQM, managers might better understand some of the obstructions typically encountered in the introduction and development of the concept. While the links between culture change and total quality ideas have attracted much attention in the popular management literature, there is little detailed guidance available which addresses the practical issues of managing culture in organisations. In the long term, there is a need for the introduction of both quality systems and a quality culture to facilitate a company-wide improvement process.

Chapter Six

Putting theory into practice

6.1 Introduction

6.2 Data collection

6.3 Methodology

6.4 The questionnaire design

6.5 Validity of the Methodology

6.6 Analysis of the questionnaire

6.7 Discussion

6.8 The three targeted companies strategic approach to TQM – the interview

6.9 A comparative discussion of the three targeted companies

6.10 Summary

Chapter Six

PUTTING THEORY INTO PRACTICE

6.1 INTRODUCTION

One of the key emerging themes in Chapter three and four was that the construction industry needs to raise productivity and improve performance. Customers are now turning their attention to the quality of the product or service using various models and tools as an assurance of that product or service meeting their or their customer requirements. However, in order for these models and approaches to be successful in companies, total commitment of everyone including the client, staff, supervisors, operatives and the like is required with a clear understanding of who the customers and suppliers are.

There was also evidence that in order to successfully implement these models and approaches the literature review highlighted that it requires clear leadership and a complete culture change coupled with a system that is flexible enough to meet unknown risks and avoids bureaucracy. It entails providing the correct education and ensuring personnel have the right tools to do their job and encouraging them to take responsibility for their own job i.e. self-assessment. However, as shown in the literature review there has been criticism that there is a plethora of models and approaches that for example the public perceiving the BSI kitemark on a product as guarantee for high quality. It was therefore concluded that the key aspects highlighted in Chapters 1,3,4 and 5 and summarised in this Chapter would form the basis of the questionnaire with which to gather tangible data on the implementation of the EFQM and Six Sigma in three exemplar companies.

As noted in Chapter two in order to validate this research it was necessary to connect the empirical data produced by research to the study's initial research questions and ultimately to its conclusions (Yin 1989). Three criteria were considered crucial in identifying the companies. The first was that concepts of total quality had to be studied within a range of different industries in order that best practice could be established. The second was that the companies had implemented ISO standards and embarked on TQM concepts and principles. Lastly, the companies had to be operating in different conditions. The companies were selected on the basis of their accessibility and for meeting the criteria. A letter was sent directly to a named individual for quality/business improvement outlining the scope of the research, a meeting could be arranged, with other representatives from the company if necessary, to discuss the subject further. All were willing to contribute to the research. This formed the initial interview. The identification of the organisations had been carried out by means of self-selection and validation by the Best Practice Club.

The remaining sections of this Chapter define the data collection, the methodology that was undertaken for this research, the design of the questionnaire and the analysis of results from the returned questionnaires and subsequent interviews.

The first exemplar company is Morgan Est plc. They are part of the construction brands group Morgan Sindall plc, with its head office in Rugby and regional offices throughout the UK with turnover in excess of £250 million. They specialise in partnering, design and construct and PFI/PPP projects, where value engineering brings benefits to both Client and Contractor. The

company has a very wide client base within both the public and private sectors and operates four operational divisions. They operate in all sectors of Civil Engineering including utilities, water, tunnelling, bridge and road building. They currently have contracts between £10,000 to over £150 million. Each project is different, with different teams in different locations but employing the same processes.

The second company is Lear Corporation, a FORTUNE 500 company headquartered in Southfield USA. The Lear company was founded in 1917 in Detroit as American Metal Product manufacturer of tubular, welded and stamped assemblies for the automotive aircraft industries. Lear has grown to meet the changing needs of the industry with 17 acquisitions since 1994. Today, the company exclusively serves the automotive industry and creates all six interior systems: seat, instrument panel/cockpit, door and trim, overhead, flooring and acoustic, and electronic/electric distribution. With an annual turnover of \$14.4 billion in 2003, Lear's strategy was to put "our customers first and to continuously improve our quality and overall financial reserves....", The research was based on Lear Birmingham who work in the same location, with the same team, employing the same processes.

The third company is Rolls Royce. A global company providing power for land, sea and air. The company has a balanced business portfolio with leading positions in civil aerospace, defence, marine and energy markets. Rolls Royce is a technology leader, employing some 37,000 people and operating from 48 countries. The turnover for Rolls Royce in 2002 was £5,788 million and it has a strategy of addressing four global markets; investing in technology, capability and infrastructure; developing a competitive product portfolio; growing market share and capturing substantial after-market and

service opportunities. The research was based on their airlines division, again operating in the same location, with the same team employing the same processes.

6.2 DATA COLLECTION

The research design is the logical sequence that connects the empirical data produced by research to the study's initial research questions and ultimately to its conclusions (Yin 1989). One of the principal purposes of the design is to help avoid the situation in which the collected data does not address the initial research questions.

The research design should therefore:

- Make explicit the questions the research should answer;
- Provide hypothesis/propositions about these questions;
- Develop the data collection methodology;
- Discuss the data in relation to the initial research questions and the hypothesis/propositions (Simister 1994)

The principle aim of the data collection was to ascertain the practices, procedures and policies, relating to Business Excellence, for three dissimilar, but successful companies - Morgan Est plc, Lear Corporation and Rolls Royce. There are a number of research methodologies for data collections available. The first, surveys, collects data in a standardised form from samples of population and allows the researcher to carry out statistical inferences on the data (Simister 1994). This statistical inference, moving from the particular observations of the sample to the wider generalisations of entire populations, is a major reason why surveys are popular with researchers

(Oppenham 1992). The second form of data collection, experiments, are undertaken to measure the effects of manipulating one variable on another variable and for finding casual relationships between variables (Robson 1993). The final form is case studies, which allow data to be collected in its rawest form. However, Robson (1993) suggests that the research design of case studies has traditionally been very loose, the design often only emerging after a prolonged involvement in the field collecting data. Robson favours Yin's (1989) approach in suggesting that a case study research design should be drawn up explicitly at the commencement of the research. The research design can be tailored during the research to take account of any changing circumstances that the field work throws up. The use of case studies allows a "naturalistic enquiry" (Lincoln and Guba, 1985) to be undertaken, allowing the research findings to be intrinsically linked to the data. A case study provides a framework within which the units of analysis are fitted (Simister 1994). The data collection for this research was based on the third methodology, case studies, as it enabled the research findings to be linked to the data. However, Yin's (1989) methodology of data collection was used whereby the research design, the questionnaire and interview were drawn up at the start of the research as it provided a structured approach.

6.3 METHODOLOGY

As stated in Section 6.2 the case study methodology was chosen as the method of data collection, of which there are two main sources of data: documentation and people (Simister 1993). For the purpose of this research a questionnaire was developed and a structured interview and study was undertaken at each organisation. Each method shall now be discussed in turn. A questionnaire, the design of which is discussed under questionnaire, Section 6.4, was sent to each of the companies the number dependent upon

size and turnover of each company. The questionnaire was based on experiences gained in surveys of a similar nature, and was piloted and revamped with the final version of the questionnaire distributed to 250 recipients. Morgan Est was sent 100 and a 100 was returned, Lear Corporation 75 with 62 returned and Rolls Royce 75 with 48 returned. A total of 210 completed questionnaires were received, giving a completion rate of 84%. In order to ensure a representative mix of departments and personnel, each company was asked to send a number of questionnaires to all departments and support functions, i.e. quality/business improvement, finance, procurement, administration as well as the engineering functions. Each company was to ensure that for each department/support function, a Director/Senior Line manager to the Junior Secretary was asked to complete a questionnaire. These departments were chosen because they would be common in all three companies. If the questionnaires had been sent by job title they may have only been common to one type of industry and one company and there may not have been an equivalent in the industries/companies. For example, Site Agent is common terminology in construction but not manufacturing.

The questionnaire contained closed questions as objective answers were required in the initial research which was necessary to see whether a trend was occurring in the different organisations. The same questionnaire was used in a further study in the same organisations with the personnel that had been actively involved in the implementation of tools and techniques for improvement.

The Simister (1994) method of interview technique described in Chapter two was used which combined several categories together. In this research the

interview was “focused” (Bouchard 1976) moving from general to specific topics: questions about the respondent’s role on tools and techniques for improvement; the timing of their first involvement; and outline of the tasks undertaken; and totally unstructured questioning. The next stage was very specific questioning based on the questionnaire to pickup points that the researcher had noted in the initial analysis of the questionnaires which had been returned from the three organisations, but had not been discussed. The aim of this research was to substantiate the responses to the questions further; to provide subjective data and provide bias free data from the respondent.

6.4 THE QUESTIONNAIRE DESIGN

The questionnaire design, see tables 6.1 and 6.2, consisted of a number of questions grouped under six main headings, getting started, management responsibility, resource management, the improvement programme, process management, measurement and analysis and improvement these being the key areas from the literary reviews as indicated in Chapters 1,3 and 4, which are considered to be the key linkage between ISO 9001 and the business approaches and models; ISO 9001 being the bedrock and the approaches and models being “TQM” in another guise. The questionnaire had been revamped after an initial pilot and experience gained in response to the initial pilot.

The respondents were simply asked, from their experience, to either circle a number on a scale of 1-6 for all factors or simply tick a box appropriate to the given answer. For example question one under the main heading of background respondents were asked:

Which of the following describes what Total Quality Management means to your organisation? Please circle a number on the 1-6 scale for All factors.

	<i>Not important</i>	<i>Very important</i>
	<i>At all</i>	
<i>Satisfying external customers</i>	1 2 3 4 5 6	

The literature review highlighted that TQM means satisfying both internal and external customers from which tangible evidence was required as to whether this was being advocated in each of the three companies.

Upon return of the questionnaires either a mean score for those questions that required a number on a scale of 1-6 or the number of ticks under each heading was added and the percentage based on the total number of returned questionnaires from each company was calculated.

Example

For aims and objectives 41 respondents from Morgan Est answered yes that their TQM programme was initiated at Board Level.

$41/75 \times 100 = 54\%$ of the total number of respondents agreed with this statement

6.5 VALIDITY OF THE METHODOLOGY

Ford et al (2000), cite Guba and Lincoln (1982) when offering criteria for evaluating and strategies for assuring the rigor of qualitative research projects. They argue that the data collected must satisfy four characteristics: Internal Validity (truth value); External Validity (applicability or transferability); Consistency, Reliability or Dependability; and Objectivity. Internal validity was

gained through the anonymity of the respondents the opportunity for further comment and the methods of data collection. External validity was fostered through the researcher's long term involvement with Morgan Est plc and with the interviewees involved business excellence in the aforementioned companies. The large sample group that was engaged and the same facilitator being used assisted in achieving consistency. However, further validity of the evaluation model has been recommended in future work and recommendations in chapter seven,

6.6 ANALYSIS OF THE QUESTIONNAIRE

The elements of each of the business models and approaches that were highlighted in Chapters 1,3 and 4 were adopted as the basis for the questionnaire. Under these main headings a series of questions were established, based on Chapters 1,3 and 4, for example under management responsibility is the question as to *why is it difficult to get commitment to TQM?* Chapter 1 and 3 and 4 highlighted that TQM was everyone's responsibility, which was further advocated, by gurus such as Juran, it was decided to collect tangible evidence as to whether this was being practiced in each of the three target companies.

A copy of the questionnaire and the mean and percentage scores in response to the number of replies for each of the three companies is shown in Table 6.1. The main findings of the survey under the broad headings of getting started, management responsibility, resource management, the improvement programme, process management, measurement and analysis and improvement is shown in 6.6.1 to 6.6.5.

GETTING STARTED 1. Question Which of the following describes what Total Quality Management means to your organisation? Please circle a number on the 1-6 scale for ALL factors Not Important at all Very Important 1 2 3 4 5 6	Mean Score Morgan Est	Mean Score Lear	Mean Score Rolls Royce
Satisfying external customers	5.6	5.8	5.7
Each person satisfying their internal customers	3.1	4.2	4.4
Each person in the organisation has a designated Responsibility for product and service improvement	4.3	4.7	4.5
Each person is dedicated to continuous process improvement	4.2	4.7	4.6
Partnership between organisation and suppliers	4.3	5.1	5.2
Partnership between organisation and customers	5.1	5.3	5.4
Employee involvement and development	5.0	4.9	5.1
Teamwork	5.3	5.5	5.7
Reducing costs	2.7	5.0	4.6
Improving process capability	3.5	4.7	4.8
Process Management	3.8	4.5	5.1
Participative management	3.9	4.4	4.6
EFQM	2.1	1.5	5.1
Six Sigma	3.2	5.9	1.5
TS16949	0	6.0	0
ISO 9000	5.8	5.7	5.6
Just in Time	2.1	5.8	4.3
Benchmarking internally/externally	3.5	3.2	3.7

MANAGEMENT RESPONSIBILITY	Mean Score	Mean Score	Mean Score
2.1 Question Please indicate on the following six point scale your perception of the commitment of your organisation to Total Quality Management Programmes No Commitment Fully Committed 1 2 3 4 5 6	Morgan Est	Lear	Rolls Royce
	4.1	5.7	5.2
2.2 Question Why is it difficult to get commitment to TQM Programmes? Please circle a number on the 1-6 scale for <u>ALL</u> factors No Problem at All Very Difficult 1 2 3 4 5 6	Mean Score Morgan Est	Mean Score Lear	Mean Score Rolls Royce
A Lack of top management leadership	5.5	2.7	3.1
Managers are not sure what is required	3.9	3.3	3.4
Employees, other than managers, are not sure what is required of them	4.3	4.7	3.2
Quality improvement is seen to be the sole responsibility of the quality/business improvement department	3.1	1.7	2.1
Quality improvement is seen to be solely the concern of operations personnel	4.6	2.1	2.3
Emphasis on short term objectives	4.2	3.4	3.7
A lack of resources	5.1	3.7	3.1
A tendency to cure symptoms rather than getting to the root cause of the problem	5.7	2.4	3.2
Tools and techniques are seen as an end in themselves	3.4	2.7	2.8
Lack of objectives and strategies	2.6	1.8	2.1
Barriers between departments	3.9	3.2	3.6
Fear	3.3	3.1	3.4
Uncertainty about what to do next	3.4	2.2	2.8

RESOURCE MANAGEMENT			
3.1 Question Please indicate when your organisation started on Total Quality Management Programmes	Morgan Est	Lear	Rolls Royce
Not yet started	0%	0%	0%
Less than 12 months ago	0%	0%	0%
1 to 2 years ago	0%	0%	0%
2 to 4 years ago	0%	0%	0%
4 to 6 years ago	7%	0%	0%
6 to 8 years ago	35%	89%	71%
3.2 Question Has your company formulated a plan for the introduction and development of Total Quality Management?	Morgan Est	Lear	Rolls Royce
	68%	71%	75%
3.3 Question Was your TQM Programme Initiated at Board Level?	Morgan Est	Lear	Rolls Royce
Yes	48%	87%	77%
No	45%	10%	13%
Don't Know	7%	3%	10%
3.4 Question What are the main objectives of your TQM Programme? Please circle a number on the 1-6 scale for <u>ALL</u> factors	Mean Score Morgan Est	Mean Score Lear	Mean Score Rolls Royce
Reduction of costs	3.7	5.0	4.8
Increased customer satisfaction	5.8	5.7	5.5
Improved delivery performance	3.9	4.8	4.9
Involvement and participation of employees	4.1	5.1	5.2
Improved teamwork	4.3	5.2	5.3
Improved processes	3.4	4.7	4.4
Improved design	4.2	4.6	4.8
Reduction in rework	4.5	5.9	5.1

3.5 Question Which of the following factors provided the motivation to start TQM?	Morgan Est	Lear	Rolls Royce
Pressure from competitors	18%	32%	75%
Demand from customers	81%	72%	41%
Your company's Chief Executive	17%	54%	65%
Need to reduce costs/improve profitability/improve performance	64%	71%	47%
3.5 Question Please indicate how you started on the TQM Programme	Morgan Est	Lear	Rolls Royce
Used the services of a major management consultancy	2%	0%	0%
The use of a particular tool and technique	25%	41%	35%
Developed your own quality objectives and strategy from the published literature on the subject, discussions with other practitioners, visits to other companies	61%	72%	68%
THE IMPROVEMENT PROGRAMME 4.1 Question Does someone in your company have formal responsibility for improvement? Yes No Don't Know If yes, what is their position and reporting relationship in the company?	Morgan Est 100%	Lear 100%	Rolls Royce 100%
PROCESS MANAGEMENT AND MEASUREMENT AND ANALYSIS 5.1 Question Did/do you have any milestones for the introduction of a TQM programme? Yes No Don't Know	Morgan Est 69% 20% 11%	Lear 72% 15% 13%	Rolls Royce 55% 10% 35%

5.2 Question	Morgan Est		Lear		Rolls Royce	
Have you taken any measurements to assess the progress of the TQM Programme in relation to these milestones?						
Yes	57%		62%		68%	
No	20%		25%		21%	
Don't Know	23%		13%		11%	
If yes what measurements did you take?						
5.3 Question	Morgan Est		Lear		Rolls Royce	
Does your company have a programme for TQM training?						
Yes	79%		81%		74%	
No	10%		5%		8%	
Don't Know	11%		14%		16%	
5.4 Question	Morgan Est		Lear		Rolls Royce	
Please indicate the aspects of Total Quality Management in which training has been or will be carried out	Under taken	Planned	Undertaken	Planned	Undertaken	Planned
Integration of business processes	18%	43%	25%	51%	19%	55%
Quality and business strategy/competitive advantage	29%	29%	37%	25%	31%	37%
TQM and business process management	18%	29%	31%	10%	38%	22%
Top management leadership in TQM	32%	43%	47%	13%	48%	17%
TQM as organisational learning/change	25%	14%	41%	17%	36%	19%
Organisational structures for TQM	29%	21%	62%	5%	55%	7%
Customer satisfaction	32%	36%	67%	22%	54%	18%
Competitive benchmarking	21%	11%	5%	2%	17%	12%
Employee involvement in TQM	50%	29%	64%	31%	49%	27%
Evaluation, incentive and recognition systems	25%	29%	37%	8%	42%	11%
Quality costs & cost effectiveness of TQM	21%	32%	58%	17%	41%	12%
Reliability management	7%	21%	61%	20%	59%	18%
Failure mode and effects analysis	11%	18%	77%	10%	64%	5%
Statistical Process Control	14%	18%	81%	2%	63%	17%
Performance measurement	32%	32%	54%	21%	44%	44%
Problem solving	29%	29%	51%	24%	47%	25%
Just in time	7%	11%	68%	20%	54%	13%
Flowcharting	29%	18%	44%	10%	51%	5%

IMPROVEMENT			
6.1 Question Please describe how you recognise and reward the contribution of your staff	Morgan Est	Lear	Rolls Royce
6.2 Question Has your TQM programme achieved, or is it achieving, its objectives? Yes No Don't Know Partially	Morgan Est 29% 14% 21% 36%	Lear 54% 5% 17% 23%	Rolls Royce 55% 17% 22% 6%
6.3 Question Have there been any unanticipated effects of the programme? Yes No Don't Know If yes, what are these	Morgan Est 27% 31% 42%	Lear 17% 51% 32%	Rolls Royce 15% 58% 27%
6.4 Question Please rank the programme overall on the scale for its effect on the company at this time Success Failure 1 2 3 4 5 6	Mean Score Morgan Est 3.2	Mean Score Lear 3.7	Mean Score Rolls Royce 3.4
6.5 Question What criteria are in your view appropriate to measure the success or failure of a TQM programme?	Morgan Est	Lear	Rolls Royce

6.6 Question Using the scale below, please indicate the extent to which you think that the TQM programme has improved things in the company Not at all Very Much 1 2 3 4 5 6	Mean Score Morgan Est	Mean Score Lear	Mean Score Rolls Royce
Communication	2.2	3.1	3.6
Waste prevention	3.1	4.8	4.3
Time saving	2.9	3.9	2.7
Shared objectives	3.8	4.6	4.1
Job satisfaction	3.0	4.0	2.8
Safety	3.1	4.1	3.8
Corporate identity	4.0	4.4	4.1
6.7 Question Please list the three main benefits of the programme	Morgan Est	Lear	Rolls Royce
6.8 Question Has the company attempted to measure the cost of quality? Yes No Don't Know If yes, please give brief details	Morgan Est	Lear	Rolls Royce
Yes	57%	69%	63%
No	22%	15%	18%
Don't Know	21%	16%	19%

Table 6.1: The Questionnaire

NB 250 Questionnaires were sent out – 210 returned giving a completion rate of 84%

100 were sent to Morgan Est - 100 returned

75 were sent to Lear Corporation - 62 returned

75 were sent to Rolls Royce - 48 returned

6.6.1 Getting started

Respondents were asked to rank on a six point scale from 1 (not important at all) to 6 (very important) a list of given factors in relation to what TQM means to their organisation. Total Quality Management is all about satisfying customers in a total sense and this should be the start and end point for every single action taken by an organisation. This fact appears to be well recognised by respondent companies since “satisfying external customers” was the top ranked factor.

Everyone in an organisation is both a customer and supplier and if each person satisfies their internal customers then there is a very good chance of the external customers being satisfied. “Satisfying internal customers” was not however as well recognised by the respondents. This indicates perhaps that the internal customer/supplier concept has not yet been fully embraced by industry. The factor which was ranked second in each of the organisations was “teamwork”. Teamwork, in a variety of forms, is an essential element of TQM and this ranking is encouraging.

Whilst partnership is clearly recognised with customers, it is of some concern to note the slightly lower ranking given to developing partnerships with suppliers. This finding may be interpreted as the organisations firstly getting their philosophy and concept of TQM right, putting a process of continuous quality improvement firmly in place before extending the concept to the suppliers. On the other hand, supplier partnerships and long-term business relationships may not be seen as key issues. If this is the case some education is required as a matter of urgency.

At the other end of the continuum, the lowest rankings were in the areas of “EFQM, Six Sigma, TS16949 and Just in Time”. All these factors are of equal importance in facilitating TQM. However, the results indicate that in Morgan Est and Rolls Royce for example Six Sigma is of little importance compared to Lear where it is seen as being very important. This may reflect a failure to understand the terms or a lack of exposure to some of the well-developed concepts in the development of TQM.

6.6.2 Management Responsibility

Respondents were asked to indicate on a scale of 1 (no commitment) to 6 (fully committed) the commitment of their organisation to TQM. There was minimum variation between Lear and Rolls Royce but a greater variation between these two organisations and Morgan Est. Following this, the organisations were asked to rank on a six point scale from 1 (no problem at all) to 6 (very difficult) a list of given factors on why it is difficult in their company to get commitment to TQM. All the available advice and evidence is that the total commitment and personal leadership of the Chief Executive Officer (CEO) and the senior management team is vital to the success of TQM. Without this nothing will happen, TQM will fail to take root in the organisation and the necessary change in organisational culture will not take place. It is encouraging that a lack of senior management commitment to TQM was not seen as a major difficulty by the respondents in Lear and Rolls Royce but was seen as difficult factor in Morgan Est.

For both Lear and Rolls Royce most of the factors were ranked middle of the road or presenting not problem at all indicating that there was a great commitment to TQM. The main difficulties within Morgan Est apart from “lack of top management leadership” was seen to be “emphasis on short term

objectives”, “a lack of resources” and “a tendency to cure symptoms rather than getting to the root cause of a problem”. This may indicate that Morgan Est are looking for a “quick fix” rather than looking for long term improvements in their company objectives and strategy.

At the other end of the continuum the factors ranked as presenting less than average difficulty for all three organisations are: “quality improvement is seen to be the sole responsibility of the quality/business improvement department”, “lack of objectives and strategies”, and “a lack of resources”. It is interesting to note that “fear” was given a mid-table ranking, perhaps indicating that the necessary changes in organisational culture have started to take place in industry.

6.6.3 Resource Management

All three organisations have a majority percentage of having operated TQM for more six years. This is encouraging that they have taken up the challenge but what would be of particular interest is the main motivators and approaches the companies took when introducing TQM.

With regard to whether the companies had formulated a plan for the introduction and development of TQM 68% of the respondents agreed to this in Morgan Est, 71% in Lear and 75% in Rolls Royce and in the most part this had been initiated at Board Level. All the available evidence from the companies exhibiting superior performance is that building TQM principles into an organisation’s culture is a long-term activity. Respondents were asked to rate on a scale of 1 (not important) to 6 (very important) the main objectives of their TQM “programme”. In Lear and Rolls Royce five and four objectives respectively received a score of 5 and above; reduction of costs; increased

customer satisfaction; involvement and participation of employees; improved teamwork and reduction in rework. Indeed the remaining four objectives received a score of 4. At the other end of the continuum, reduction of costs, improved delivery performance and improved processes received a score of less than four within Morgan Est. Again this would question the main motivation for Morgan Est in implementing a TQM programme

Respondents were asked to indicate which factors, in their case, provided the motivation for their companies to “start” TQM. Demand from customers in all cases was a motivator as well as the need to reduce costs/improve profitability/improve performance. In addition to this for Lear and Rolls Royce the Chief Executive was also a motivator. Although Morgan Est is motivated by the same factors it is contradictory with the previous question where reduction of costs received a score of less than 4.

The most popular approach that the organisations took when they started on introducing the concept and principles of TQM into their organisations was developing their own route map using a variety of information sources. A variety of people, consultancies, institutions and associations have, in recent times, been strongly advocating their view on the best means of approaching TQM. This finding indicates however that the companies in question have not been influenced by the misinformation.

6.6.4 Process Management , measurement and analysis

Project management is something in which the construction industry excels, and it was therefore not surprising that the respondents from Morgan Est (69%) indicated that they had some form of milestones for measuring the progress of TQM against set objectives as did Lear and Rolls Royce.

Western organisations often do not invest sufficient monies in TQM education and training. The ability of the Japanese to manage the process of quality improvement more successfully and at a faster rate than appears possible in Western European companies, is a key issue in their success story. One of the major factors appears to be the depth of knowledge and training in quality skills, techniques and problem-solving which is possessed by the Japanese management and supervisory structure. It was therefore surprising but encouraging that the majority of respondents from the three companies in this survey stated that they had a formal training programme for TQM training.

Respondents were presented with a list of aspects of TQM and asked to indicate what, if any, training had been carried out and those in which training is planned. Those aspects, (50% or more of respondents) in which training is currently carried out are as follows:

- Employee involvement in TQM
- Organisational structures for TQM
- Customer satisfaction
- Quality costs and cost effectiveness of TQM
- Reliability management
- Failure mode and effects analysis
- Statistical process control
- Performance measurement
- Problem solving
- Just in time
- Flow charting

The aspects (30% or more of respondents) of TQM in which organisations are planning to carry out training are as follows:

- Integration of business processes
- Top management leadership in TQM
- Customer satisfaction
- Quality costs and cost effectiveness of TQM
- Performance Measurement

6.6.5 Improvement

In terms of rewards and recognition for employee involvement the main features mentioned were publicity, token awards, and incorporation of recognition into a formal appraisal system.

It is interesting to note that there had been some unanticipated effects of TQM, the main ones were due to implementation difficulties. It was encouraging in the most part all three companies were using the cost of quality and other sophisticated tools such as six sigma to measure the success or otherwise of their TQM programme.

The main reported benefits of TQM are:

- Marketing/customer factors
- Improved systems/practices
- Better communications
- Teamwork

The main failings mentioned were:

- Long time frame, slow to get results
- Management factors

6.7 DISCUSSION

Data was obtained from three established organisations within their respective industry sectors. It was both interesting and reassuring that the findings from the survey demonstrated a greater awareness and implementation of TQM within industry. This was reflected by the emphasis on a training programme for TQM indicating a TQM maturity within the respective organisations. However, there were some notable differences between the respective companies in their definition of TQM and their measure of success. It was therefore necessary to visit the respective organisations to discuss the areas of shortfall in order to establish definitive areas of strength and weaknesses and hence best practice.

Although the research has centred on three exemplar companies, Morgan Est plc was considered to be a typical example of a company within the Construction sector. It would therefore be reasonable to expect the lessons learned from this research be applied to other companies within the aforementioned industry.

6.8 THE THREE TARGETED COMPANIES STRATEGIC APPROACH TO TQM – THE INTERVIEWS

From the results of the analysis of the questionnaire each Quality/Business Improvement Manager within each company, Morgan Est, Lear and Rolls Royce were interviewed. The purpose of the interview was to:

- Substantiate or otherwise the results of the questionnaire;
- To determine the philosophy and values within each organisation;

- To establish the principles that underpin the business excellence models that are an integral part of improvement and further improvement of performance in the future for each of the companies; and
- To validate the evaluation model for organisations for business excellence

In order to collect the data and to ensure that there was continuity between the interview, the first data collection exercise and the key themes in the implementation of business models and approaches as highlighted in Chapter 1,3 and 4 the questionnaire was again used as the basis of the interview along with the analysis of the results. In addition to this the evaluation model for business excellence in Chapter three, was also used to gather specific information in order to benchmark each of the companies which would highlight areas of strengths and weaknesses.

6.8.1 Morgan Est plc

Morgan Est plc is part of the Morgan Sindall Construction Brands Group. The company is made up of four divisions, Civil Engineering, Tunnelling, Water and Utilities and each division develops a strategy that contributes to group strategy. Morgan Est employs skilled engineers of all disciplines and this resource is available to build teams to meet individual project requirements.

The company currently employs approximately 750 staff, 1,000 skilled operatives and in excess of 1,000 subcontract personnel. Training and development are prime concerns within the company, their people being the most valuable asset that they possess. Training in leadership, negotiation, presentation and communication underpin the key requirements to deliver safely, on time and within budget. A programme of continual improvement is in hand addressing problem areas using structured problem solving

techniques. Measurable outputs are a necessity to benchmark improvements and action plans which are implemented to reflect this requirement.

The company has a management system to ISO 9001 independently assessed by BSI-QA. However, customers such as the Highways Agency whose procurement vision *"...is to be recognised as a client at the forefront of best procurement practice by working in partnership with the supply chain to deliver best value solutions and services..."* have developed a selection toolkit which includes a supplier self-score using a Capability Assessment Toolkit (CAT) and a validation of the CAT scores by trained assessors. The validated scores are held on the Highways Agency procurement database to be used to determine tender lists. With this in mind and the revision of the ISO 9000 standard with its emphasis on competence, process management and performance measurement Morgan Est had to revise their approach and philosophy towards continual improvement.

As a consequence Morgan Est adopted the EFQM, in part, as a methodology for improvement in an area that provided a pattern of activities and attitudes in the construction industry that had been referred to as "the claims culture". As demonstrated in Chapter 3 and 4, it has long been recognised that the construction industry must deliver consistently high levels of quality products and services if they are to flourish in an increasingly competitive environment. It is also recognised that to do so, fundamental changes in philosophy and culture was necessary as referred to Chapter 3 and 5. Morgan Est participated in a research programme which aimed to identify best practice in five UK construction companies, Tarmac, Mowlem, Amec, Morrison Construction and Miller Civil Engineering Services Limited and to facilitate benchmarking between them and an award winning company. The

framework to be used was provided by the European Foundation for Quality Management (EFQM) Business Excellence since it provided a comprehensive assessment of organisational issues relating to best practice. The method that was employed to collect the data on the criteria was a series of four focus group meetings which was conducted in each of the five companies. Each focus group was composed of staff from a different organisational level, ranging from senior management to administrative staff. The focus group method was intended to give participants the opportunity to state their views and discuss the issues with their colleagues.

The results of the study can be found in appendix A. Below each bar chart an overall summary and areas for improvement was provided by the Business Improvement Manager within Morgan Est. Although an overall score was not given it did highlight areas of strategic improvement if Morgan Est was to grow profitably in the future. Some of the issues raised such as lack of measuring, sharing of information, and harmonisation of teams have been dealt with by the introduction of an integrated process system. This falls in line with the revised ISO 9000 standard in having a process approach whilst also providing the company with the opportunity to integrate three disparate departments, Business Improvement, Environmental and Safety. The framework has enabled key people to become involved in the development of their “working system” in teams, which will have a valuable input into the future growth of the company. Morgan Est, in their cost benefit exercise, claim that this approach will save them money in registration fees with their accreditation body; provide greater accessibility of the system with their project teams; would reduce failure and appraisal costs and provide an opportunity to implement increased preventative measures by providing results based on what they do and how they do it. An example of the integrated system is shown in appendix B.

In their continual quest for improvement Morgan Est have also used other tools and techniques for improvement such as "Six Sigma". This tool and technique was chosen when reviewing their approach to Supply Chain Management. However, when discussing the approach with their Business Improvement Manager it was difficult to ascertain within the company as to what was different with this tool as to any other TQM tool and technique. Statistical monitoring and analysis was used to gather information as was fishbone, flowcharting and process mapping, traditional tools for improvement. In addition to this a cost exercise was undertaken to demonstrate the improved bottom line savings to the main board for the introduction of improvement procurement methodologies.- savings in both process time and cost from 52 minutes to 8 ½ minutes and £25.00 to £5.59 respectively.

However, when the Business Improvement Manager was questioned further as to why these tools were adopted the reply was that they were introduced by the Business Improvement Team rather than the main board. This is line with the respondents to the survey.

It was interesting to note that again during the interview that meeting customer demands was more important than whether costs was reduced. This is further enhanced by the change in approach by many of Morgan Est's customers such as the Highways Agency, Severn Trent, Anglia and the like. Morgan Est have seen over recent years that tender price is no longer a significant factor but performance and delivery are seen as key criteria measured by benchmarking all their contractors, finally arriving at a consensus score. This has been evident recently with the company having to undertake a self-assessment using a self-score proforma provided by and

validated by the Highways Agency over a one week visit to Morgan Est's Head Office and selected project locations. An extract of this is shown in appendix C. Worthy of note is the fact that Morgan Est scored themselves 65 out of a possible 75 and the Highways Agency validated that score with 56 out of 75. This was seen as a good indicator that the company approached the self-assessment with an open and honest mind and were prepared to learn by any identified shortcomings. It also gave the opportunity to involve the main board in an activity, which ultimately will determine whether the company is successful in obtaining future work with the Highways Agency which contributes a significant part of their revenue and potential future growth.

A training programme is available which is endorsed by the Main Board – a budget in excess of £250,000 is allocated. Specific training on tools and techniques such as Introduction to Quality, Six Sigma, EFQM, What are the benefits of ISO 9000, Cost of Poor Quality and the like are available on the company intranet. Although take up is good it could be improved significantly.

Although it was encouraging from both an industry and company perspective in the change of approach and philosophy, the move towards change in Morgan Est still appears to be led by the Business Improvement Team who are committed because of the future need for work. They endorse, but are not fully convinced by, the benefits of some of the approaches adopted.

6.8.2 Lear Corporation

Lear Corporation, with headquarters in Southfield, USA, focuses on integrating complete automotive interiors, including seat interior trim and electrical systems. With annual net sales of \$14.4 billion Lear is the world's largest automotive interior systems supplier. The company's world-class

products are designed, engineered and manufactured by more than 115,000 employees at 280 facilities located in 33 countries. One of the significant results of the return of the questionnaire was the respective company's definition of TQM. Both Morgan Est and Rolls Royce had a response of 0 for TS 16949 whilst Lear had a score of 6. When this was followed up at the interview this automotive standard is of great significance and is entirely automotive lead by their external customer.

Six Sigma, as indicated by the respondents, is of great importance at Lear Corporation. This disciplined process is being implemented in all operations- manufacturing, sales and administration- at every location around the world. They perceive Six Sigma as helping them to eliminate defects in their processes in order that their products are excellent. This they hope will translate to improve customer satisfaction and help generate future business growth. By implementing a common programme throughout their company, Lear hopes that Six Sigma will also help unify Lear into one global team.

Six Sigma is an integral part of the philosophy of Lear and is a process that builds upon many of the tools currently used in COMPASS, VAVE and other quality initiatives at Lear. The company are so committed to this tool that they are dedicating full-time resources such as Deployment Champions, Project Champions and Black Belts to help ensure that project objectives are met and shared and provide specific training and support. By instigating Six Sigma on identified projects such as "Throughput of cluster calibration and test" (refer to appendix D) cost savings have been in the region of \$193,027.39. Although finance is the main driver for project selection the cross functional team support required is also of great significance. When undertaking such a project a "project review" needs completing which details the project

description and goal; financial information including labour, material, “soft” saves; champions concerns; direction for next review and champion assignments. When asked why Six Sigma has such commitment within the company the response was one that as being an American owned company finance is the key driver therefore any tools that saves money on the bottom-line receives commitment and resource. Lear perceives Six Sigma as being different from TQM, despite the fact that similar tools and techniques are used such as qualitative, statistical and instructional methods. Their perception is that with many TQM project cost savings is not a key driver; their experience has shown that many TQM projects are never completed and are primarily led by the Quality Team rather than cross-functional teams.

Within Lear evidence has shown that by using Six Sigma they have been able to deliver higher levels of value to their customer’s; reduced cycle times and lead times; driven out constraints, allowing for more efficient process throughput and inspection has been reduced and rework eliminated in the most part. They see their Six Sigma programme as a long-term goal if they are to ensure integration and standardisation at every level. In five years, they see Lear operating as a Five Sigma company. Once this sigma value is reached, the company may encounter a barrier created by the fact that some defects are inherent to design. When processes are redesigned, these inherent defects will be addressed and Six Sigma level quality attained. Their processes must always be measured and improved with Six Sigma becoming a permanent part of the culture.

On a final note their Six Sigma philosophy is discussed with their external supplier/customer chain. They communicate with their suppliers about their Six Sigma implementation and inform them of their increased quality

expectations. Their future plan is to offer support to key suppliers in identifying defects in their products and implementing Six Sigma at their locations. In addition to this they share their Six Sigma project successes with their customers to demonstrate how they are striving to make the best products in the automotive industry.

6.8.3 Rolls Royce

Rolls Royce is one of the most famous names in the world – a global aerospace, defence, marine and energy group with facilities in 15 countries. Their products lead the world in quality, innovation and engineering excellence. Turnover exceeds £4 billion and serves customers in 135 countries. They are world leaders in gas turbine technology, designing and manufacturing the engines powering many of today's most successful civil and military aircraft, 2400 corporate and utility operators and more than 100 armed forces.

Maintaining a strong position within the highly competitive aero-engine market place is key. Their strategy is to have engines on all major modern aircraft types and they have invested heavily in their product range over the past 20 years. At the same time have striven to ensure they have the best product, with guaranteed reliability and lowest cost of operation.

Rolls Royce now has the biggest portfolio of aero engines in the world. Through deployment of their strategy they have increased their number of aircraft applications by 8 fold: from four in 1980 to 32 in 2001. Over the same period their market share more than trebled from 8% to 28%.

Rolls-Royce has moved from being a small player in the world of aero engines manufacture to one of the top three in competition with General Electric (GE) and Pratt and Whitney (P & W). Market share has increased largely at the expense of P & W, establishing Rolls-Royce in the number two position.

Such is the current strength of Rolls-Royce in the large engine market that GE/P&W have been forced to form an alliance to compete with Rolls Royce on the latest super-jumbo airliner.

Rolls Royce has technologically advanced products of high reliability and low cost of operation. Product availability, measured in terms of flight delays, and reliability both out perform their major competitors, e.g. a world record set by a Rolls-Royce engine of 40,000 hours on wing equates to 20 million miles between services for a car engine.

This has been a major factor in growing their market share as demonstrated by the success of the new family of Trent Engines.

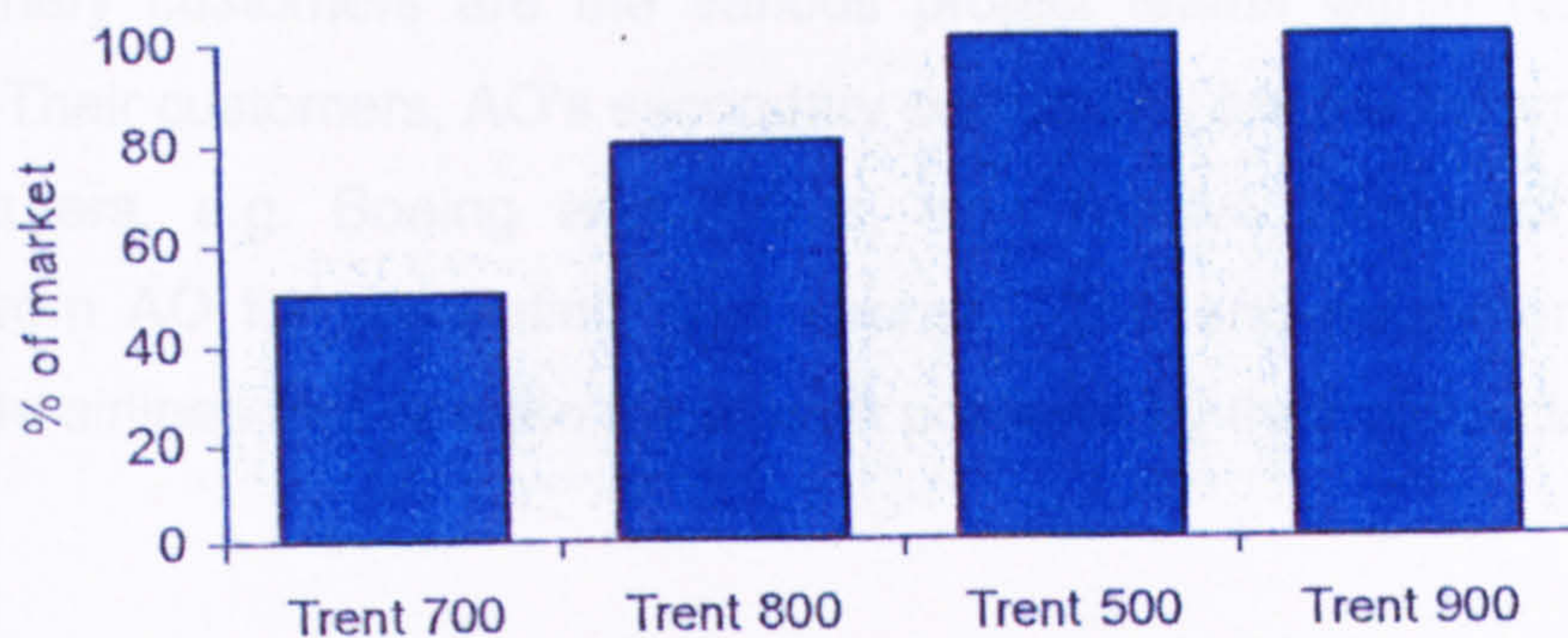


Figure 6.1 : Trent Customer

Source: Rolls Royce, 2004

Customer loyalty is further enhanced by reaction time in closing out problems.

Figure 6.2 shows their success in converting operators into Trent customers, and is a powerful endorsement of their commitment to their product. The British Airways decision in 1998 to stop using the GE90 to power its Boeing 777 and turn to the Trent 800 was a major signal to the world's airlines.

AO is the civil aircraft engine assembly and test operation of Rolls-Royce, which is accountable for 30% of company business. They employ 2300 personnel with an annual operating budget of £80 million, managed assets of £187 million and annual turnover of £1 billion.

In 2000 they delivered 450 aircraft engines to customers worldwide. At the same time they built and tested 110 development engines to validate and certificate new products.

AO's primary customers are the various project teams within Rolls-Royce Airlines. Their customers, AO's secondary customers, are the external aircraft manufacturers, e.g. Boeing and Airbus, who receive production engines directly from AO for installation onto aircraft. The end customers are the world-wide airlines that operate the aircraft powered by their products.



Figure 6.2: Growing Customer Loyalty

Source: Rolls Royce. 2004

The quality of their production engine build and timeliness of their delivery have a major influence on individual airline customers' (e.g. British Airways, Singapore Airlines etc) satisfaction levels, as accurate scheduling, product reliability and running costs are fundamental to their business success. The ability of AO to support new engine development programmes with an organisation that is responsive, capable and cost effective is also the most influential aspect of ensuring that Rolls-Royce is able to deliver the right product, at the right time and at the right price to the market place.

AO has firmly established itself as a world-class operation. They can directly benchmark their performance against P & W, a partner company on the V2500 engine project. They currently build, test and despatch production engines to the customer in 15 days compared with P & W's 24 days.

AO is fully committed to a total quality approach driven through policy deployment with a team dedicated to do everything possible to continue the drive for excellent business performance. By implementing the principles of the Excellence Model, the team has achieved a 131% increase in sales per employee over the last five years.

The Excellence Model is being used as the key driver for the business, forming the foundation for continuous improvement and enabling AO to meet the expectations of their stakeholders, customers, suppliers, employees and the community in which they operate. Throughout the last five years, during the implementation of major initiatives, the Executive team has remained convinced that *“the excellence model is the best catalyst to establishing a world-beating business”*. As pioneers of business excellence within Rolls-Royce AO are sharing the lessons learned with many other areas of the company and this has resulted in the number of Rolls-Royce business units using the excellence model increasing by 12 fold over the last four years.

The background to AO implementing the excellence model has not been an easy one with challenges of 9/11 and the resultant reduction in orders and the need to significantly reduce manpower. The appointment of a new Director and the need to understand the business were real issues that this business unit had to manage.

AO's leadership team were responsible for creating the vision and values and providing the environment in which a flexible and empowered workforce could achieve its goals. The vision, values and goals were communicated to everyone through the “Business Plan Deployment (BDP) process” Figure 6.3.

These were reinforced by continuous communication and training. AO have a long tradition of commitment to excellence in product quality, operational capability and safety spanning over 100 years. As part of their ongoing drive for excellence their business has been underpinned by the Success Through Our Team (STOT) initiative. This has provided a common focus for improvement across AO directed at creating a “benchmark” business.

Their strategy was delivered on a page and the “visual factory” in action was instigated Figure 6.4 refers. A Supply Chain Restructuring Team was created to re-design the partnerships and processes, restructuring the process from individual parts to build kits. A kitting area was introduced to receive the kits direct from the suppliers and they are now pulled from the suppliers by the assembly areas. The result of this is that thousands of parts have been condensed into 29 build kits; the pull system has significantly reduced inventory holding; buffer stocks are held by the supplier; suppliers now feel the pain for poor performance; fitters’ jobs are much easier; quality issues are easier to resolve and the number of parts supplied late continues to reduce.

For their people there has been the introduction of Team-based working on the shop floor; standardisation of employee development process; alignment of individual objectives with business objectives and improved development cell process for succession planning. Finally there has been the discipline of 5S which has been used to improve the visual appearance and the efficiency of any area, Figure 6.5 refers.

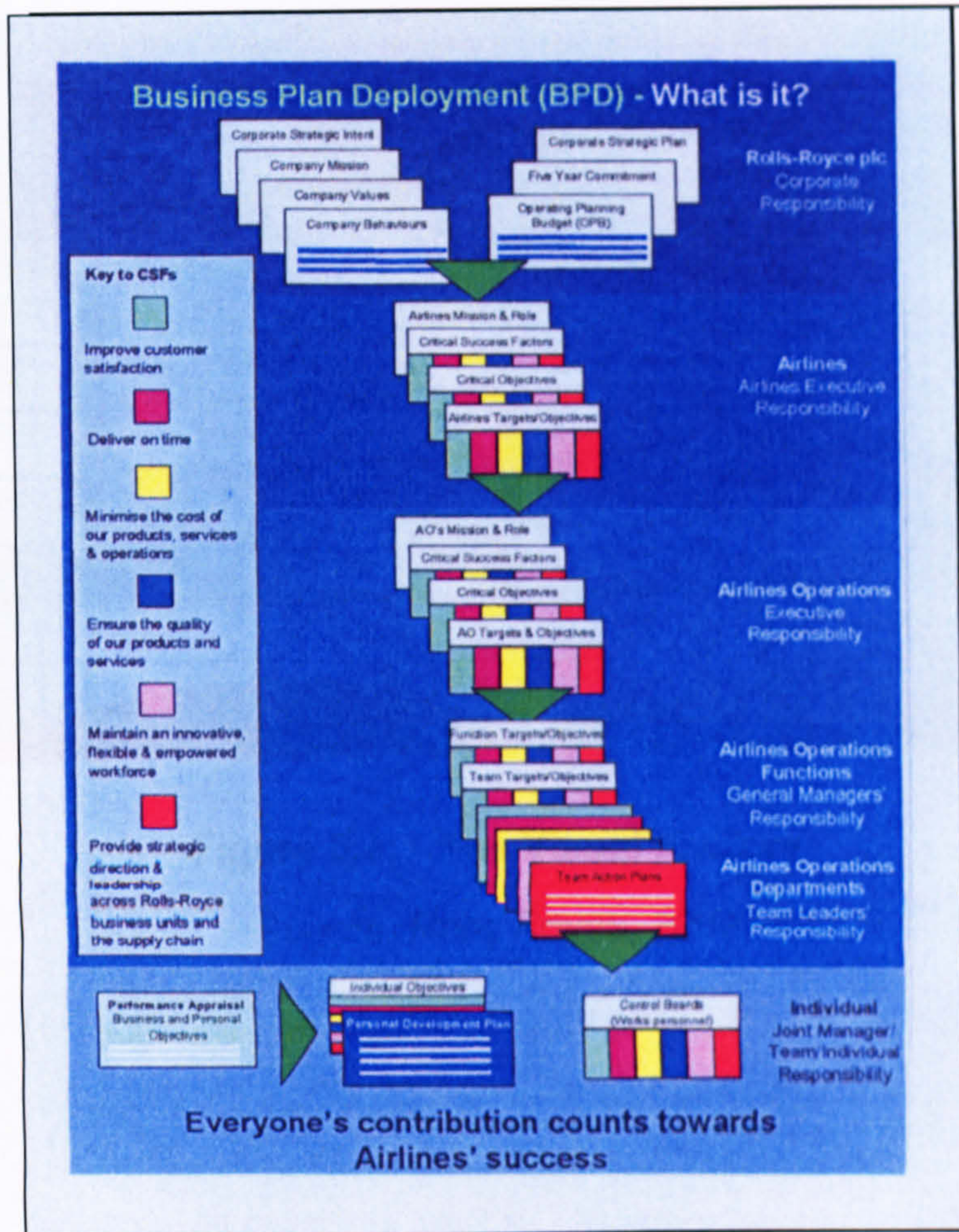


Figure 6.3: The BDP Process

Source: Rolls Royce, 2004



Figure 6.4: The Visual Factory

Source: Rolls Royce, 2004

As the lead presenter of their 2000 DEF submission concluded following a site visit: "Our total dedication to continuous improvement (in partnership with customers, suppliers and employees) has established A0 as a proven model of successful change management. The cultural change has taken off and is gathering momentum by the day. The tangible benefits are more for all to see and, arguably more important, to feel. You really have to experience it at first hand to fully appreciate the very positive feedback from everyone in Airbus Operations".

Having won the first ever Rolls-Royce EPOM Quality Award in 1999 and having received a commendation for business excellence in the UK award in 2000 they then went on to deliver a credible performance in the UK award in 2001. Their experience, success and leadership is now being used to great effect across other Rolls-Royce business units and other companies.

The discipline of 5S improves the visual appearance and the efficiency of *any* area.



From this...



...to this.

Figure 6.5: Visualisation – the discipline of 5S

Source: Rolls Royce, 2004

As the lead assessor of their 2000 BQF submission concluded following a site visit...."Their total dedication to continuous improvement (in partnership with customers, suppliers and employees) has established AO as pioneers of successful change management. The cultural change has taken off and is gathering momentum by the day. The tangible benefits are there for all to see and, arguably more important, to feel. You really have to experience it at first hand to fully appreciate the very positive feedback from everyone in Airlines Operations".....

Having won the first ever Rolls-Royce EFQM Quality Award in 1999, and having received a commendation for business excellence in the UK award in 2000 they then went on to deliver a creditable performance in the UK award in 2001. Their experience, success and leadership is now being used to good effect across other Rolls Royce business units and other companies.

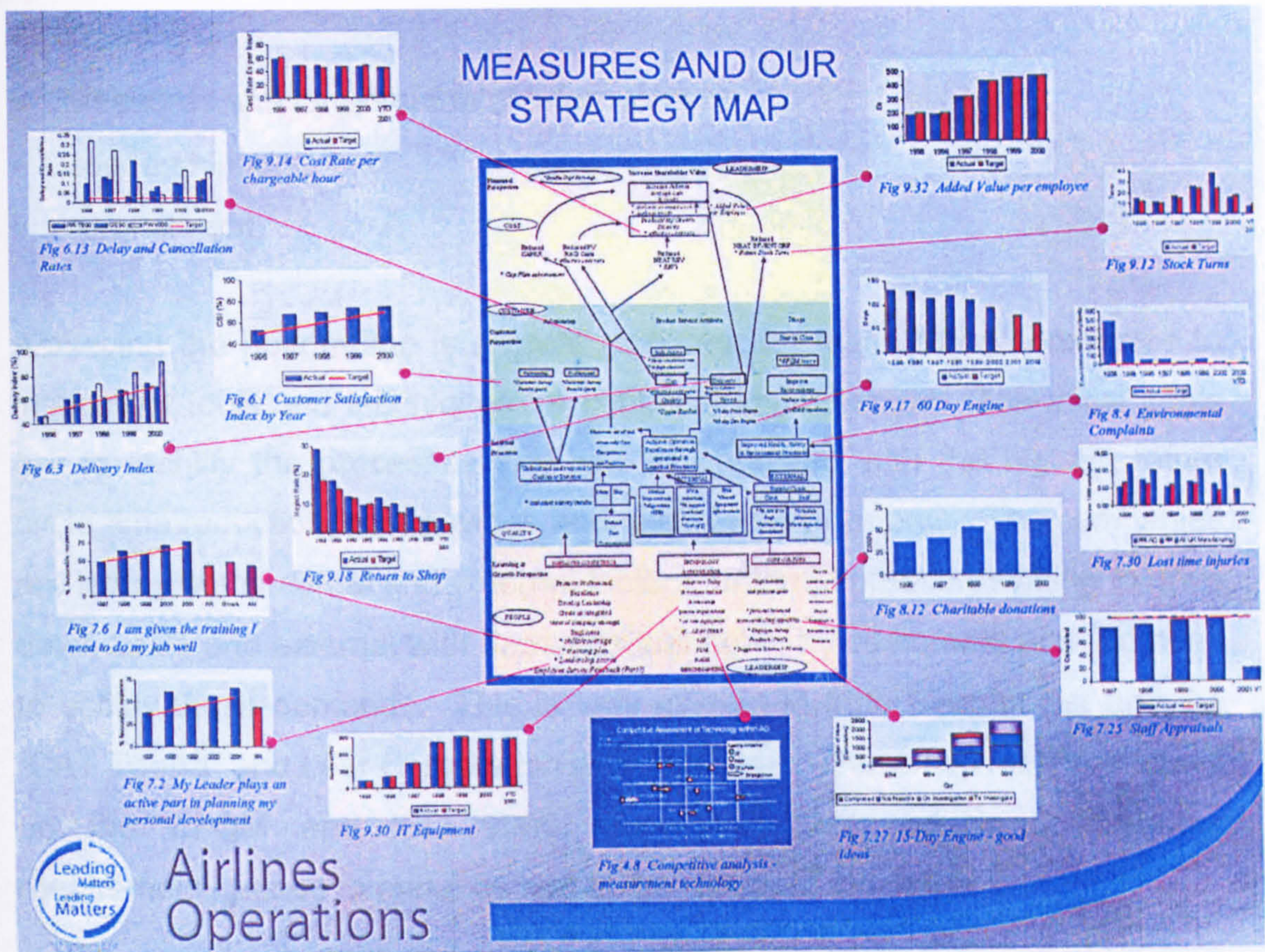


Figure 6.6: Measures and Our Strategy Map

Source: Rolls Royce, 2004

6.9 A COMPARATIVE DISCUSSION OF THE THREE TARGETED COMPANIES

From the results of the analysis and the interviews it can be observed that, for the three targeted companies, six factors dominate the implementation of the various business models and approaches in their companies and hence the focus of their continual improvement. These are:

- Finance

- Customer demand/satisfaction
- Training
- Measures and target areas of improvement
- Leadership; and
- commitment

Achieving the bottom line is a great motivator for these three companies to implement tools and techniques for continual improvement. The initial goals are to identify the processes that can be improved with the highest return cycle time reduction, cost savings and quality improvements. The companies are led by both internal and external factors. Internal pressures being to drive down costs and external with demands laid down by customers and the need to satisfy these demands. This is very evident in both Morgan Est and the "CAT Toolkit" and Lear Corporation with TS16949. These two tools are based on the EFQM and ISO 9000 respectively with additional customer requirements added to enhance and fit the needs of the industry.

Both Juran and Deming pointed to the fact in their messages and briefs that training needs to be provided and that the costs of education and training for quality will be repaid many times over by greater output. All three companies in the Case Studies have seen the wisdom in doing this with a clear training programme in place from educating personnel on the meaning of quality through to the understanding of ISO 9000 to the tools and techniques of continual improvement. Although in Morgan Est, despite a comprehensive list of training courses and scope available on the company intranet the up take can be slow.

There is evidence in all three companies that measures and areas for improvement are taken seriously. Measures are an integral part of both Lear and Rolls Royce, intrinsically linked to their company values. In Morgan Est key performance indicators (KPI's) are available but they are not linked to the company values and have been lead by such reports such as Egan's Rethinking Construction. However, the process mapping, which is now well underway with its integrated approach, will present a more pragmatic and specific approach providing in process KPI's as well as out-turn KPI's.

Leadership and commitment are key requirements of the implementation for any tool or technique. These key words are advocated by all the Guru's especially Crosby with his first step in his fourteen steps to Quality Improvement stating "*make it clear that Management is committed to quality*". This can be substantiated further by the results and analysis of the questionnaire in Chapter 6. In both Lear and Rolls Royce all individuals have accountability and ownership to problems. Within Lear they have made a clear commitment to Six Sigma in cost alone for its rollout, \$20 million approximately, as well as having specific resource such as Deployment Champions, Project Champions and Black Belts. However, within Morgan Est although Senior Management do involve themselves the resource provided is from the Business Improvement Team and any tools used tend to be on the back of demands laid out by their external customer.

In both Lear and Rolls Royce the long-term commitment of their Senior Managers in terms of resource, time and lead has provided a long-term relationship with both their employees and partners who have significantly influenced the implementation of these tools and techniques in their companies and their business sectors. It has provided areas of real

improvements, in process management the relationships with their customers and provided savings both in time and money which, ultimately will be a mutual benefit to all parties. Although Morgan Est does not have this maturity it is a company that has grown quickly where there is scope to improve on what has already been achieved.

All of the companies found the evaluation model developed in chapter three for use in organisations as useful and helpful as they contend with the plethora of the many business models and approaches. Comment was made on the usefulness of having a model that not only provided a key summary of each of the approaches but also, and more, importantly the degree of change in both systems and people that would be required and the level of benefit and investment that would be required from the whole organisation.

6.10 SUMMARY

This chapter has employed a case study analysis and a “focussed” interview with the Business Improvement Managers to evaluate the strategic approach of TQM in each of the three targeted companies. The analysis revealed that six factors dominate the implementation of TQM. These were finance; customer demand/satisfaction; training; measures and target areas of improvement. The evidence from the analysis suggests that there is different emphasis on different types of models and approaches but all of which strive to achieve the same result - to deliver a total business improvement. The holistic approach of these models ensures that all aspects of the business are covered.

One or two inferences could be drawn from the outcome of the analysis. First, that construction contractors give consideration to the factors of cost

reduction, in their search for meeting their target for the implementation of TQM. Second, and the most obvious is that each of the companies continue to strive to meet the demands of their customers and ensure measures are in place to demonstrate customer satisfaction. However what is significant is that if change is required and to realise the full potential of these business models and approaches is that the process must be driven by top level leadership. It must be accepted as the central part of core business development critical to business and not just as another initiative that has little effect on business performance.

Table 6.2 provides a comparative summary of the three targeted companies whilst table 6.3 provides a checklist which should be used in conjunction with the evaluation model developed in Chapter three and shown in figures 6.7 and 6.8 in this chapter for the achievement of business excellence within the Construction Industry.

ISO	9001 Elements	Morgan Est	Lear	Rolls Royce	Comments
A	Management Responsibility	x	✓	✓	<ul style="list-style-type: none"> • Within Morgan Est there is a "lack of top management leadership" with the "emphasis on short term objectives" • There is "a tendency to cure symptoms rather than getting to the root cause of a problem" within Morgan Est
B	Resource Management	✓	✓	✓	<ul style="list-style-type: none"> • There did not appear to be a lack of available resource in any of the three companies.
C	Process Management	x	✓	✓	<ul style="list-style-type: none"> • In Lear and Rolls Royce reduction of costs; increased customer satisfaction; involvement and participation of employees; improved teamwork; reduction in rework and improved processes are important factors. At the other end of the continuum, reduction of costs, improved delivery performance and improved processes received a score of less than four within Morgan Est.
D	Measurement and Analysis	x	✓	✓	<ul style="list-style-type: none"> • Measures are an integral part of both Lear and Rolls Royce, intrinsically linked to their company values. In Morgan Est key performance indicators (KPI's) are available but they are not linked to the company values and have been lead by reports such as Egan's Rethinking Construction. However, the process mapping, which is now well underway with its integrated approach, will present a more pragmatic and specific approach providing in process KPI's as well as out-turn KPI's
E	Improvement	✓	✓	✓	<ul style="list-style-type: none"> • Demand from customers in all cases was a motivator as well as the need to reduce costs/improve profitability/improve performance

Table 6. 2 : Comparison of the Three Targeted Companies

•	
•	Use the model/approach as a way of managing the business
•	Cascade the model/approach at the level defined in the evaluation model through the business and make all managers aware
•	Measure what is easily measurable
•	Understand the potential return on the cost of each measurement
•	“Hold the gains”, ensuring that improvement and learning points are not lost
•	Manage measurement to create useful knowledge of what needs improving and what has successfully been improved
•	Improve one thing at a time, so you know what makes a difference
•	Ensure continuous improvement is a built in approach
•	Train and ensure capability before giving responsibility
•	Communicate carefully and continually
•	Focus on preventive not corrective maintenance. Eliminate rather than fix
•	Use small groups to help one another succeed

Table 6.3: A Checklist for the Construction Industry

Factor	Description	Options
Link to main ISO 9001 requirements	Where the approach supports ISO 9001	Management responsibility (MR), Resource management (RM), Process Management (PR), Measurement and analysis (M&A), Improvement (Imp)
Scope of use	Type of organisation	Private, public/voluntary, SME
	Where the approach was designed for use	UK, Europe, USA, global
	Industry	Manufacturing or service
Degree of change in systems	Where the approach may be used	Function, division and/or organisation
	How much change to the systems and approaches will be encountered day to day within the organisation	Large, medium, small
Degree of change for people	How much people will be affected by the change	Large, medium, small
Level of benefit	How much benefit will be derived from the change	Large, medium, small
Level of involvement	How people will be involved in the change	Fully inclusive, inclusive, coercive
Maturity level	Who should use the approach	Beginner, experienced, world-class
Timescale	How long it will take to implement the approach	Less than 3 months, 6-12 months, over 12 months
Level of investment	What it will cost in terms of resource and expenditure	High, medium, low
How to implement	How to get started	Evolution, project or programme

Figure 6.7: Key to using the Evaluation Model

Approach	Balanced Scorecard	BPIR	PCF	Six Sigma	TQM
Thumbnail description	A framework for defining performance measures	Provides a framework that identifies how an organisation prioritises and responds to the needs of the stakeholders	A list of common processes that aids process identification and benchmarking activities	Compares performance process against capability and empowers people to improve	A managed programme for improving all aspects of an organisation through the involvement of its people
Link to ISO 9001	<ul style="list-style-type: none"> ✓ MR RM ✓ PR ✓ M & A ✓ Imp 	<ul style="list-style-type: none"> ✓ MR ✓ RM ✓ PR ✓ M & A ✓ Imp 	<ul style="list-style-type: none"> MR RM ✓ PR M & A Imp 	<ul style="list-style-type: none"> ✓ MR ✓ RM ✓ PR ✓ M & A ✓ Imp 	<ul style="list-style-type: none"> ✓ MR ✓ RM ✓ PR ✓ M & A ✓ Imp
Scope of use	Function, division and/or organisation	Division or organisation	Function, division or organisation	Organisation	Division or organisation
Degree of change in systems	Large if no Measurement is In place already	Medium	Not applicable	Medium	Small
Degree of change in people	Large if no measurement is In place already. The change in approach to measurement is likely to change people's behaviour	Medium	Not Applicable	Medium	Large

Figure 6.8: The Evaluation Model for Organisations

Level of benefit	Medium	Medium	Medium	Medium	Large	Large to medium depending on the success of implementation
Level of involvement	Usually inclusive if scorecards are used	Fully inclusive	Inclusive	Fully inclusive	Fully inclusive	Fully inclusive
Maturity Level	Any	Beginner, experienced and world-class	Beginner	Beginner	All levels	Beginner
Timescale	Less than 3 months, but could be longer if there is no existing measurement	6-12 months	Less than 3 Months	Less than 3 Months	Over 12 months	Over 12 months
Level of investment	Low	Medium	Low	Low	High, due to training costs	High
How to implement	Project	Project	Project	Project	Programme	Programme

Figure 6.8: The Evaluation Model for Organisations

Chapter Seven

Conclusions and Recommendations

7.1 Conclusion

7.2 Contribution of the Research

7.2.1 The New Focus for the Construction Industry

7.2.2 Focus of the Construction Industries total quality approach

7.2.3 The Exemplar Model

7.2.4 Limitations of the Research

7.2.5 The Role of the Researcher

Chapter Seven

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The motivation of this research was the need to examine the business improvement models and approaches in a construction context. In a business environment such as construction which traditionally earned a reputation as a costly, inefficient and confrontational business, the need to improve its structure, image, education/training and R & D cannot be over emphasised. The nature of the construction industry's business and the pressures it is facing has been depicted in Chapter one and three as changing from a national outlook to a global one. This change has meant that reliance on the present as the basis for the future of the industry may no longer be satisfactory. The industry needs to anticipate and shape their long-term future, while remaining flexible enough to respond to changing situations.

As a first step to improving the industry's effectiveness and efficiencies of its practices, the main objectives of this research, as stated in Chapter one, Section 1.2, was to define what the business improvement models and business improvement approaches are; to demonstrate the overlap between these business improvement models and business improvement approaches; demonstrate how these models and approaches are TQM in another guise with ISO 9001 as the starting point; develop the an evaluation model for use in the construction industry; determine by the means of a checklist how the construction industry would implement the evaluation model and determine the benefits, if any on the selected companies that have introduced business improvement models and approaches and analyse the effect that it has had

on their employees and bottom line. An industry's approach and the importance it places on the implementation of the various business models can depend on the importance that its clients place on it. The research was developed by using a questionnaire and structured interview approach for assessing the implementation of the business improvement models and approaches in the three targeted companies. The rationale of the questionnaire and interview was to provide evaluations that would facilitate continual improvement. The following conclusions which relate to the various objectives and hence sections of this thesis have been drawn from the research.

Objective One

Establish the current thinking on improvement from a state of the art review-The overriding theme and conclusions that may be drawn from the current thinking is that price is no longer the determining factor. Customers are now placing a higher value on the quality and reliability of that product or service. Companies are now competing on three issues – quality, price and delivery. Quality needs to be managed, have clear leadership and vision.

ISO 9000 in its revised format has moved from a standard based on twenty clauses to one that sets out to meet the customer needs; business objectives; processes and managing by fact. This has ensured compatibility with other tools such as the EFQM, Six Sigma, TQM, BPIR, PCF and the Balanced scorecard. It was noted in other industries one has to be prepared to implement an industry standard such as TS 16949 developed by leading clients within the manufacturing industry. Companies have to be prepared to review their current business objectives and directives to see whether they will be a company in the future.

Objective Two

Identify existing business improvement models and business improvement approaches –The plethora of business improvement models and approaches are a way of improving the effectiveness, flexibility and competitiveness of a business as a whole. It involves teamwork, is applicable to any industry and involves everyone in the supplier/customer chain, each person and each activity affecting the other in turn. If successfully implemented the rewards can be tremendous. It enables a company to focus clearly on its markets, critically and continually examine all processes to remove non-productive activities and waste, it enables effective communications and involvement and it encourages improvements and suggestions from individuals and work groups.

Objective Three

Demonstrate how these models and approaches are TQM in another guise with ISO 9001 as the starting point -There is always a perceived need to be different or to be following the latest trend which adds to the confusion. Titles such as, EFQM, Six Sigma, BPIF, PCF are essentially TQM in another guise. TQM aims at providing a customer-driven organisation using ISO 9001 as its bedrock. Of all the models and approaches discussed ISO 9001 is the starting point for the journey towards world-class performance and provides the platform for taking the organisation forward by achieving control over leadership, customer focus and continuous improvement.

Objective Four

Develop an evaluation model for use in the construction industry -

An evaluation model was developed outlining the factors to consider for the use of each of the business models and approaches discussed. An important factor for organisations was that it has considered the link to ISO 9001; the degree of change which would be required in both existing systems and people and the level of benefit and investment that an organisation could expect. By developing this model it decreases much of the confusion associated with choosing between the various tools and techniques available.

Objective Five

Determine by the means of a checklist how the construction industry could implement the evaluation model – A checklist was developed to support the evaluation model with emphasis on management commitment and measurement.

Objective Six

Determine the benefits, if any on the selected companies that have introduced business improvement models and approaches and analyse the effect that it has had on their employees and bottom line– Within Morgan Est the various tools and techniques used have brought cost savings, greater teamwork, awareness and involvement from all employees. In addition to this it has identified and encouraged areas for improvement enabling them to compete and successfully win work as clients move away from the traditional approach of tendering. The topic of greater efficiency has also been experienced within their supply chain as they adopted a less traditional way of procuring low value goods and services. No doubt the success within Lear has been enhanced by the total commitment of its

American owners both in terms of resource and money. This has been further improved with the interest of their major customers and the necessity of TS 16949. Rolls Royce through the commitment of their leaders and the aftermath of 9/11 has seen considerable growth within their Airlines Operations which is now acting as a role model for business excellence within the other business units.

7.2 CONTRIBUTIONS OF THE RESEARCH

The research has made three main contributions. These are: the mapping out of the activities with regard to the “total quality” approach in the three targeted companies; identification of the focus and deficiencies in the expressed approach in the three companies; and the development of an evaluation model which should encourage a proactive stance for all industries especially construction in their pursuit of excellence.

7.2.1 The New Focus for the Construction Industry

Previously very little information had been available on how the construction industry was to move from a costly inefficient business to one that was cost effective and efficient. Although reports such as those by Egan and Latham provided targets to strive for and Case Studies had been conducted, an industry wide perspective of how they would achieve them was not available. The research addressed this by providing an insight into the activities of other established industries.

7.2.2 Focus of the Construction Industries Total Quality Approach

Having examined the focus of the three targeted company’s business improvement approach from analysis of questionnaires and structured

interview, the research identified key areas that the construction industry needs to address as part of an implementation plan for a total quality approach, in order to enhance competitive advantage. Of particular significance here is the leadership and commitment, which was revealed to have a secondary role to the construction industry.

7.2.3 The Exemplar Model

The third major contribution of the research was the evaluation of the different approaches. Of importance here was that in order to achieve a total quality philosophy and culture the various models and approaches discussed cannot be used in isolation as each provided a strong and essential basis for business excellence and world-class performance with ISO 9001 providing the platform for taking the organisation forward

7.2.4 Limitations of the Research

Current practice of the business improvement approach within three targeted industries, one of which was construction, and hence companies has been characterised by a structural formal approach. However, the need to observe confidentiality in issues of current practice has meant that academic knowledge of organisational processes and the extrapolation of information that related to business improvement within the construction industry has been limited.

It should be noted that only one construction company was looked at for this research and therefore generalisations cannot be made from that one base.

7.2.5 The Role of the Researcher

Care had to be given to potential bias as the researcher was also the researched. As Cordaro and Ison (1963) have stated, consideration had to be given to the possible effects of the experimenter expecting particular results, and the resultant consequences. It was therefore important to be aware of any potential bias as the “expectations” could distort the results and the researchers interpretation of data.

7.2.6 Future work and Recommendations

A number of issues have been identified from the research, for further development which could yield useful results both for academic development and practical applications to enhance the effectiveness of the construction industry.

- As with all performance models, the model is only as good as whoever uses it. Meaning, the model is merely a tool that clarifies what needs to be measured and how this can be done, but in no way can guarantee success of the organisation. Further research could investigate whether organisations organisational performance has improved in relation to their competitors since adopting the model.
- The same implementation problems that face any business model exist with the developed evaluation model. For example, the resistance to change culture persistent in many organisations poses an implementation problem as well as the setting off appropriate indicators and the failure of management to take action on the resultant outputs. There is further scope to explore the cultural problems associated with implementing such models within the construction industry.

- The identification, development and deployment of an Excellence Model that incorporates the other excellence/quality models and approaches, such as six sigma, EFQM, balanced scorecard, ISO 9000, TQM and the like could be an area for further research.
- As noted earlier only one construction company was looked at. Consideration of other construction organisations view of the model and implementation of it is another area of possible research.

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List of Appendices

Appendix A The EFQM Approach

Appendix B An Example Of The Integrated Electronic Process System
Within Morgan Est

Appendix C The CAT Toolkit

Appendix D Six Sigma – Lear Corporation

Appendix A – The EFQM Approach

It is recognised that construction companies must deliver consistently high levels of quality in products and services if they are to flourish in an increasingly competitive environment. It is also recognised that to do so, fundamental changes in philosophy and culture are necessary.

Project Manager / Facilitator: Birmingham University

Industrial Partners:

- Tarmac
- Mowlem
- Amec
- Morrison Construction
- Miller Civil Engineering Services Limited

Aims and Objectives

The benchmarking study set out to:

- Develop practical "tools" to evaluate existing organisational culture,
- Develop methods for evaluating quality of products and service,
- Assess how a company's "strategic orientation" facilitates or impedes the development of a "quality culture",

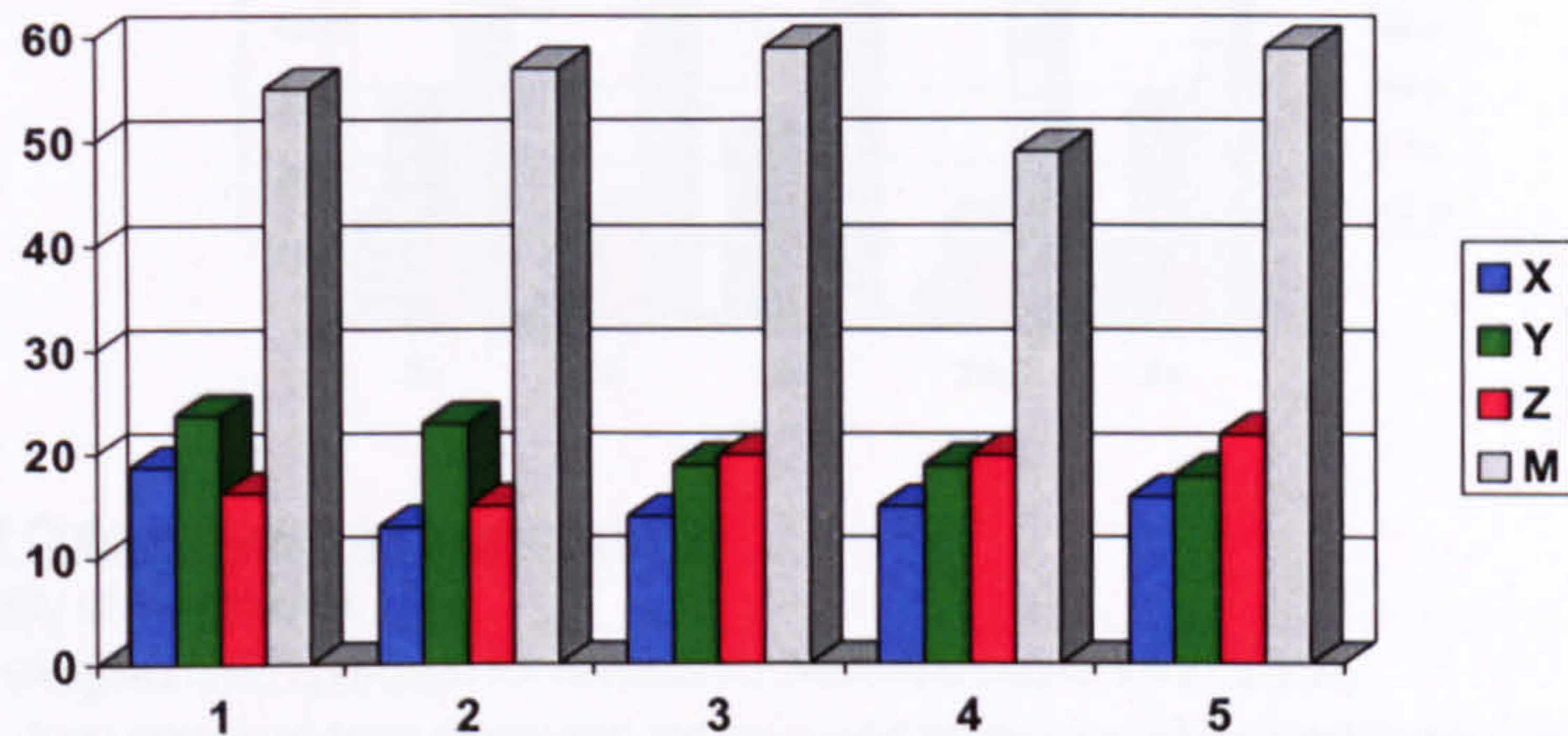
using the Business Excellence Model as a tool for methodology.

Output to Date

The output from the self-assessment using the Business Excellence Model (BEM) can be found overleaf. The main criterion for measurement may be found at the top of each page. Miller Civil Engineering Services Limited may be denoted by the letter "X". Letter "M" represents the "best in class" company. The remaining letters denote the other companies that participated in this benchmarking exercise. To date, two Business Improvement teams have been instigated. Their role has been to develop ideas for improving communication and waste minimisation with key measurables within Miller

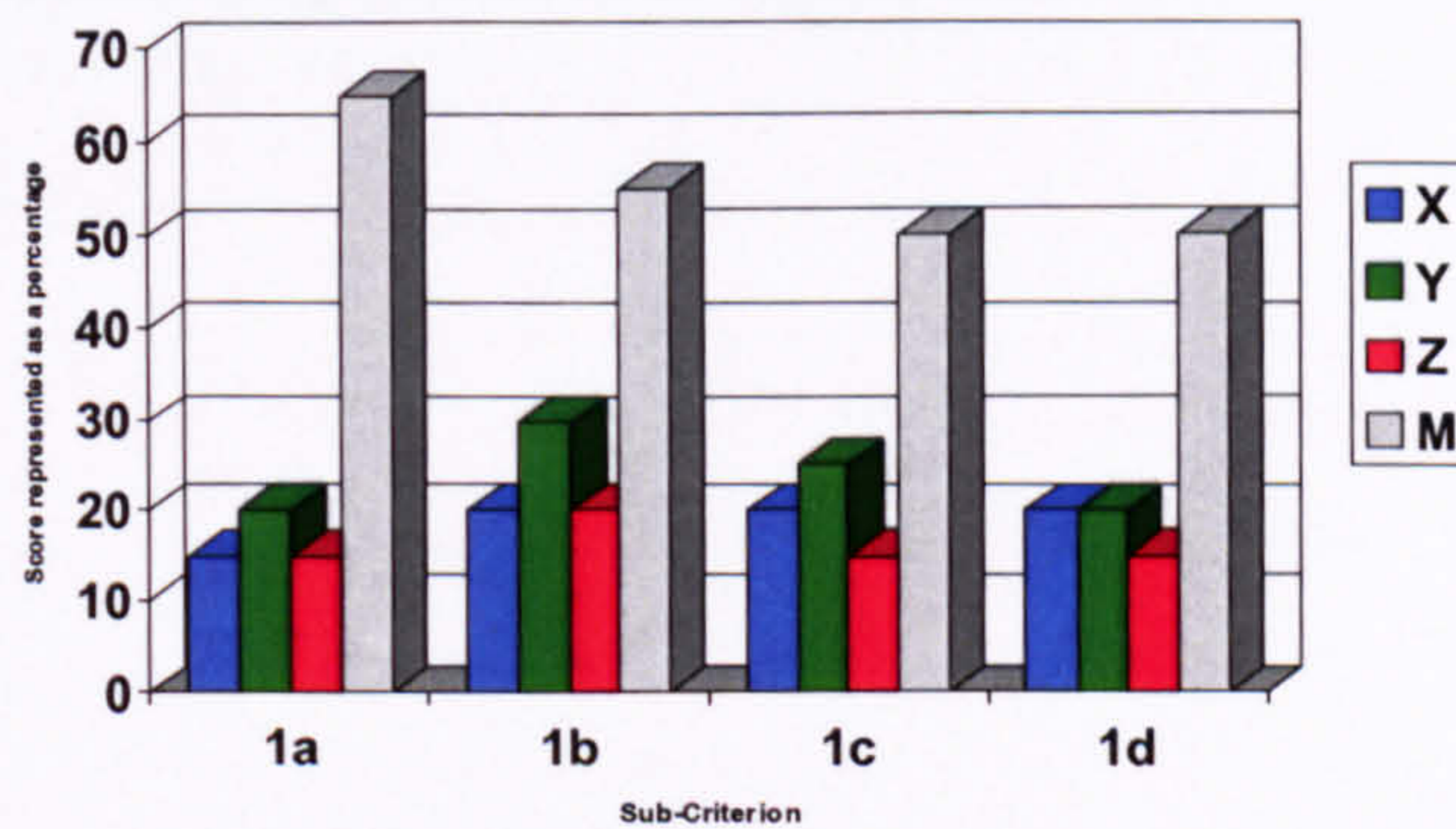
Civil Engineering Services Limited, which have been highlighted as areas for improvement within the project.

Company % scores against the five enabler criteria



Criterion One: Leadership

“Our leaders will develop the mission, vision and values and are role models of a culture of excellence; be personally involved in ensuring the organisations management system is developed, implemented and continuously improved; are involved with customers,partners and representatives of society and will motivate, support and recognise the organisation's people.”

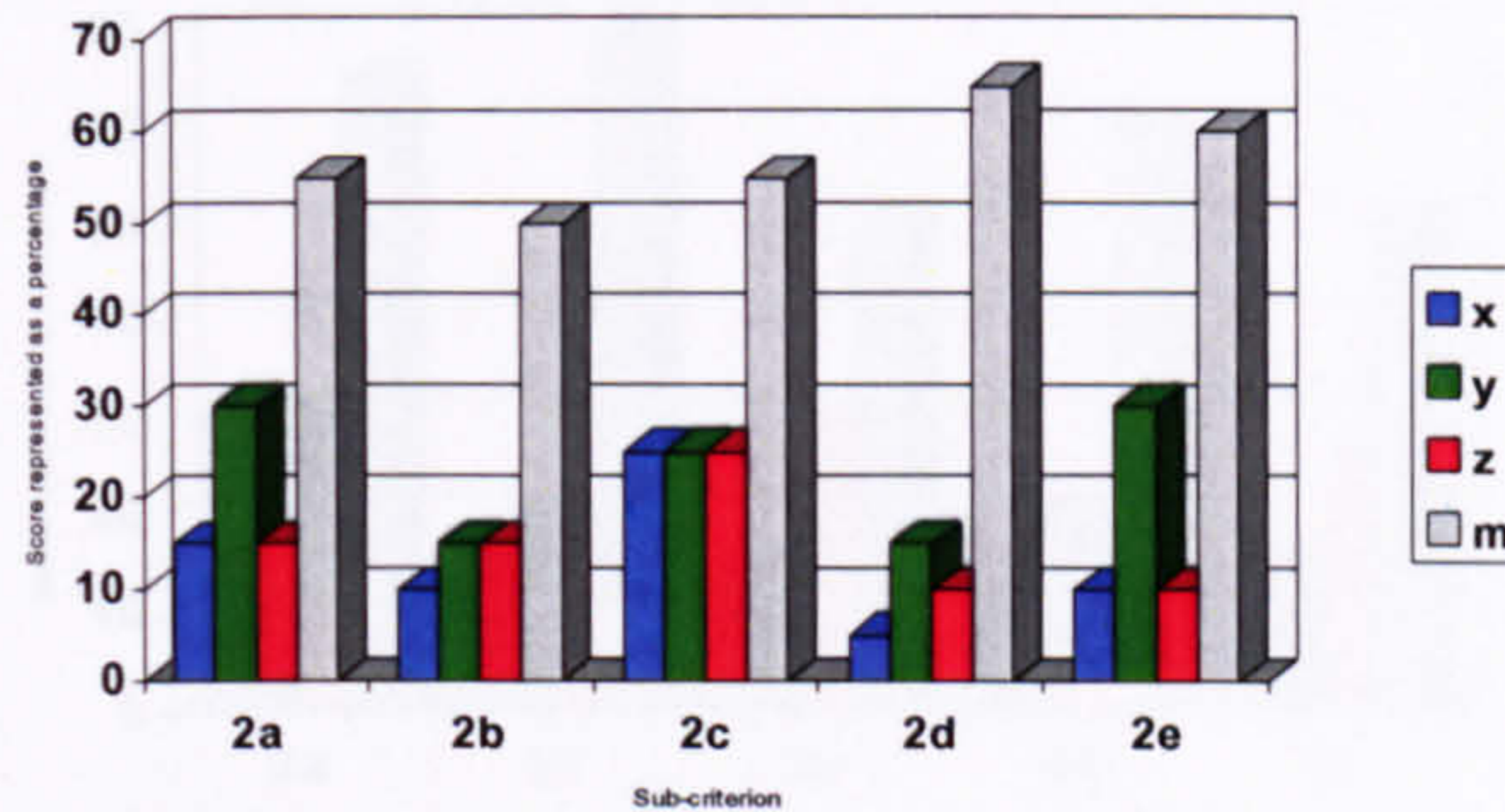


Overall Summary of Output - Areas for Improvement

- lack of consistency of approach in leadership;
- top-down communication is too narrowly focussed on direct reports, resulting in a sense of remoteness experienced by some staff;
- the extent of leaders involvement in improvement activities is not clear;
- the non-regional structure requiring specialist to cover businesses all over is perceived to be a strategy that could be improved;
- little evidence on the actual accessibility of managers;
- comparisons not presented;
- some evidence regarding measurements of customer satisfaction.

Criterion Two: Policy and Strategy

"Our Policy and Strategy are based on the present and future needs and expectations of stakeholders on information from performance measurement, research, learning and creativity related activities, they are reviewed and updated, are deployed through a framework of key processes and are communicated and implemented."

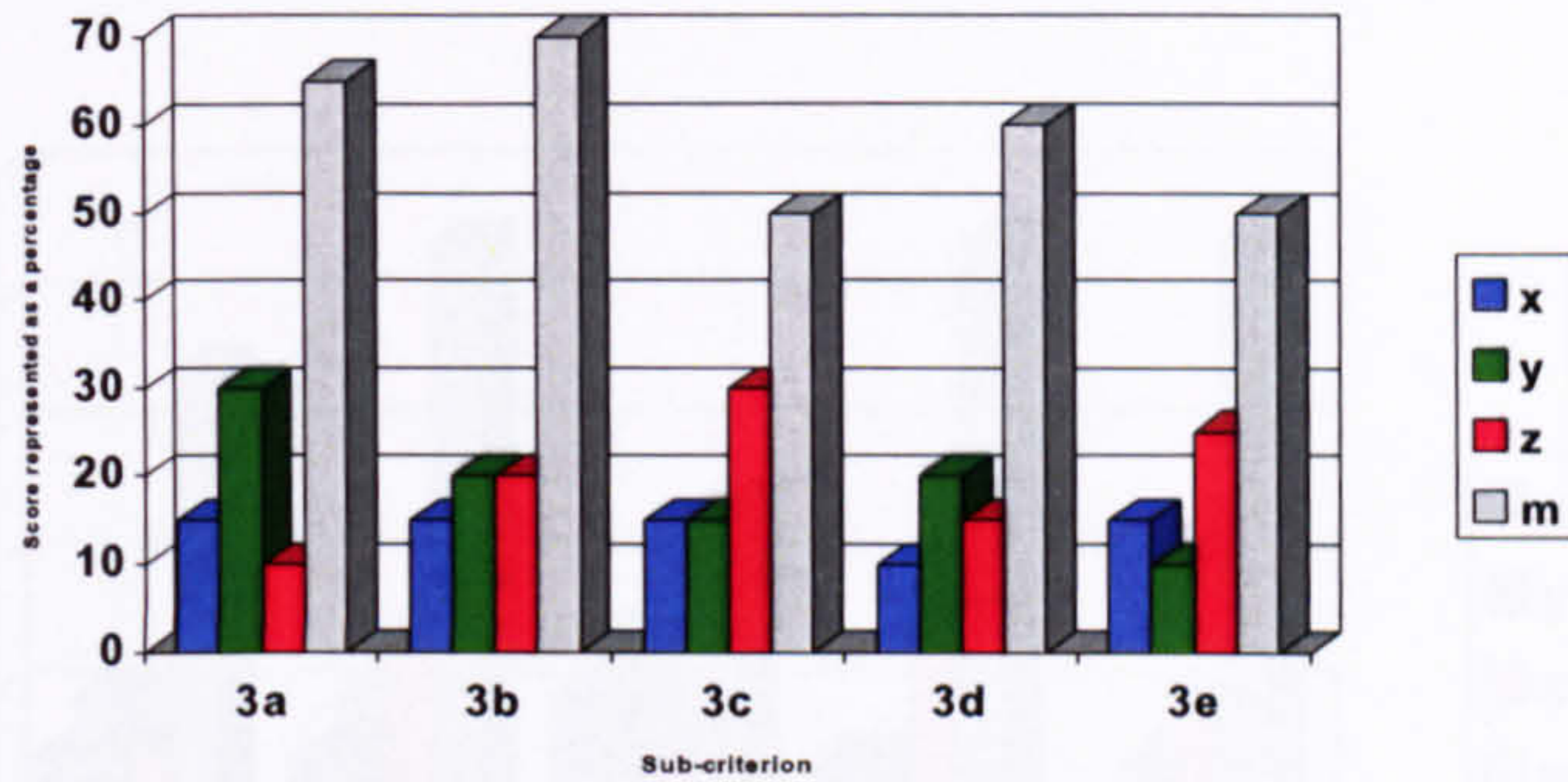


Overall Summary of Output - Areas for Improvement

- little evidence of quality of information;
- no details of an overall systematic approach for reviews for effectiveness of information;
- little evidence of how long and short term measures are balanced having acknowledged that it is a cyclic nature to the business;
- lack of evidence of effective internal communication between divisions in developing policy and strategy;
- no indication if plans are understood at all levels;
- little detail (number/facts) presented to illustrate use of the various methods mentioned in communicating policy and strategy;
- lack of a systematic approach with regards to communicating and implementing policy and strategy with people involved in short contracts;
- No clear indication of how key processes are identified;
- little indication of using any of the various methodologies available to identify processes key to the success of the organisation;
- lack of evidence of individual targets being aligned with policy and strategy;
- it is not clear if identification of tasks within overall process within supply chain management is evident.;
- no indication of non-financial performance targets;
- no details of comparison with external organisations on performance results.

Criterion Three: People

"Our people resources are planned, managed and improved. Knowledge and competencies are identified, developed and sustained, are involved and empowered and are rewarded, recognised and cared for."

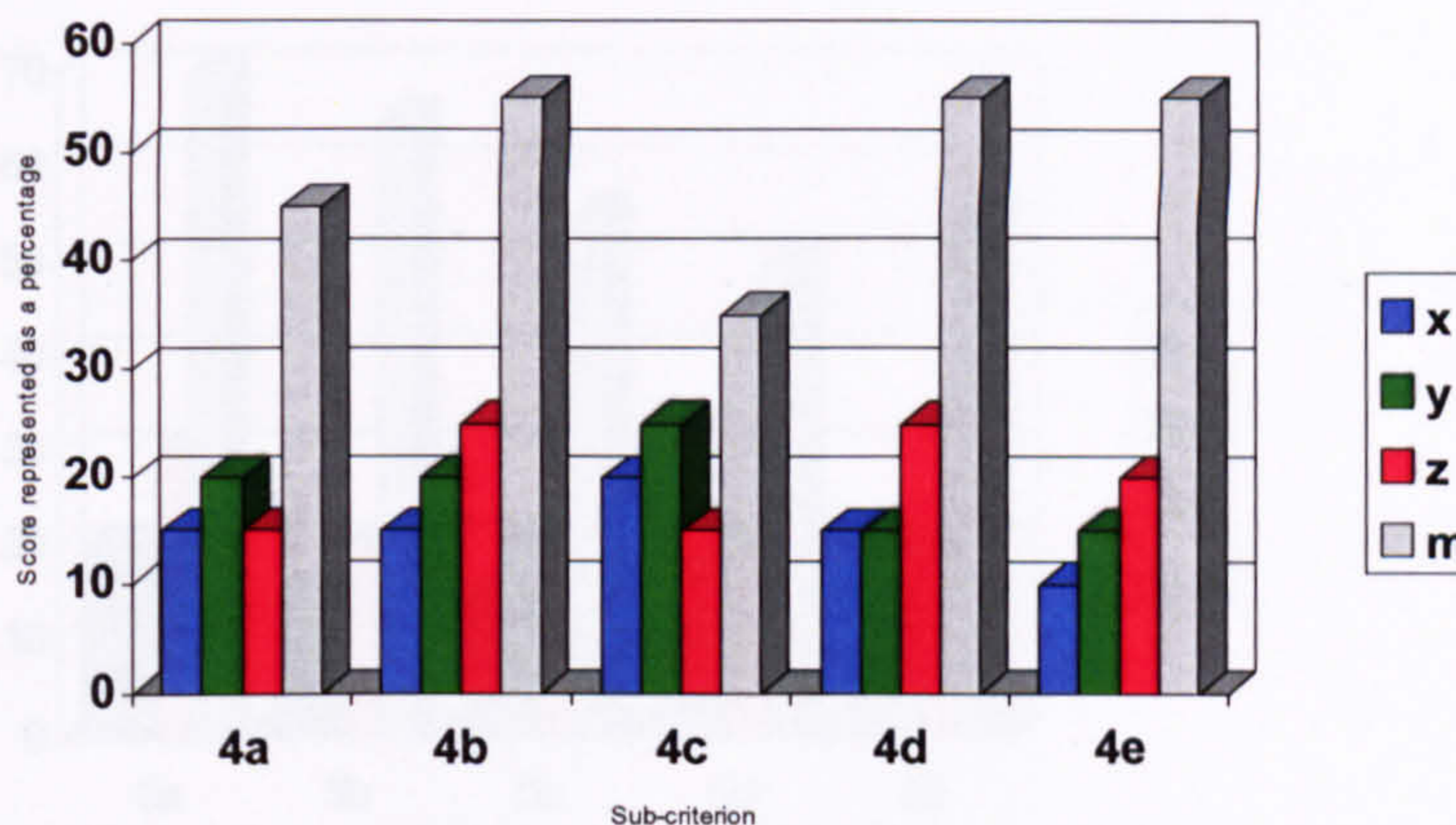


Overall summary and output - Areas for Improvement

- little evidence of aligning department objectives with company policy and strategy, as well as that of team objectives with individual targets;
- empowerment of individuals at higher levels - with people allowed to get on with their work;
- little evidence of communicating company targets and performance
- lack of timely reviews, follow-up and monitoring of MDP's with a recognition/link to performance of agreed targets
- lack of evidence of a systematic approach to the design of a recognition system in order to sustain involvement, empowerment and encourage innovation;
- lack of short-term rewards as a form of appropriate and timely recognition
- lack of evidence of evaluating effectiveness of individual's efforts/contribution, eg through evaluation of MDP.
- It is not clear how communication needs are identified, developed or are reviewed for effectiveness (perceived lack of effective mechanisms to facilitate communication and accessibility of information);
- lack of effective dialogue and sharing of information amongst people, perceived need for an "information pot" to facilitate updating and sharing of information;
- lack of a systematic approach (too informal) to top down communication of information in order to facilitate access by relevant "information stakeholders";
- little evidence of cross-functional co-operation in critical areas being addressed (with regards to achieving agreed targets, eg. IT);
- scope for involvement in improvement activities is limited.

Criterion Four: Partnerships and Resources

"Our external partnerships, finances, buildings, equipment, materials, technology and information knowledge are all managed."

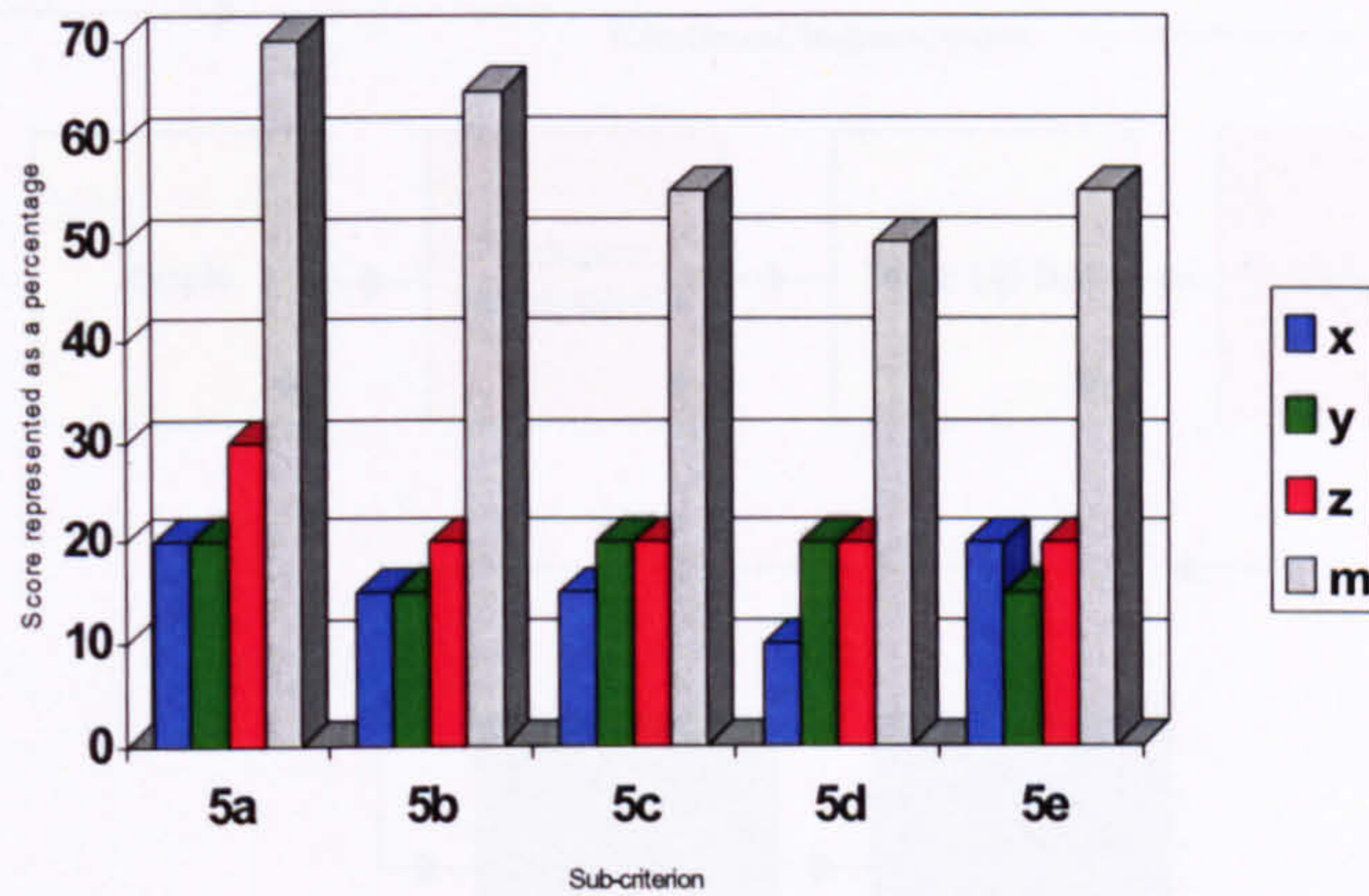


Overall summary of output - Areas for Improvement

- lack of evidence of using financial mechanisms and parameters to ensure an efficient and effective resourcing structure;
- little evidence of how financial management supports policy and strategy;
- lack of evidence of effective management of financial parameters with a view towards improvement;
- financial targets apparently only used on contracts
- lack of evidence of effective mechanisms to facilitate access to information for relevant users and information up-dates on contracts not communicated effectively;
- little indication of innovation/encouragement to effectively manage information eg. Information/knowledge sharing lacking;
- little evidence of a systematic approach towards structuring partnership relationships to create and maximise value eg. No indication that vendor and post-contract assessments are being used effectively;
- little evidence of effective review of existing approaches towards supplier relationships within all division to reflect policy and strategy;
- lack of review for effectiveness or evidence of refinement in existing approaches to managing assets;
- lack of indication of being pro-active in managing technology
- lack of evidence of effective mechanisms for identifying alternative and emerging technology which can impact on business;
- little evidence of how peoples skills and capabilities are harmonised with technical developments in a structured manner;
- there is little evidence of harnessing technology, particularly to support improvements to meet client needs.

Criterion Five: Processes

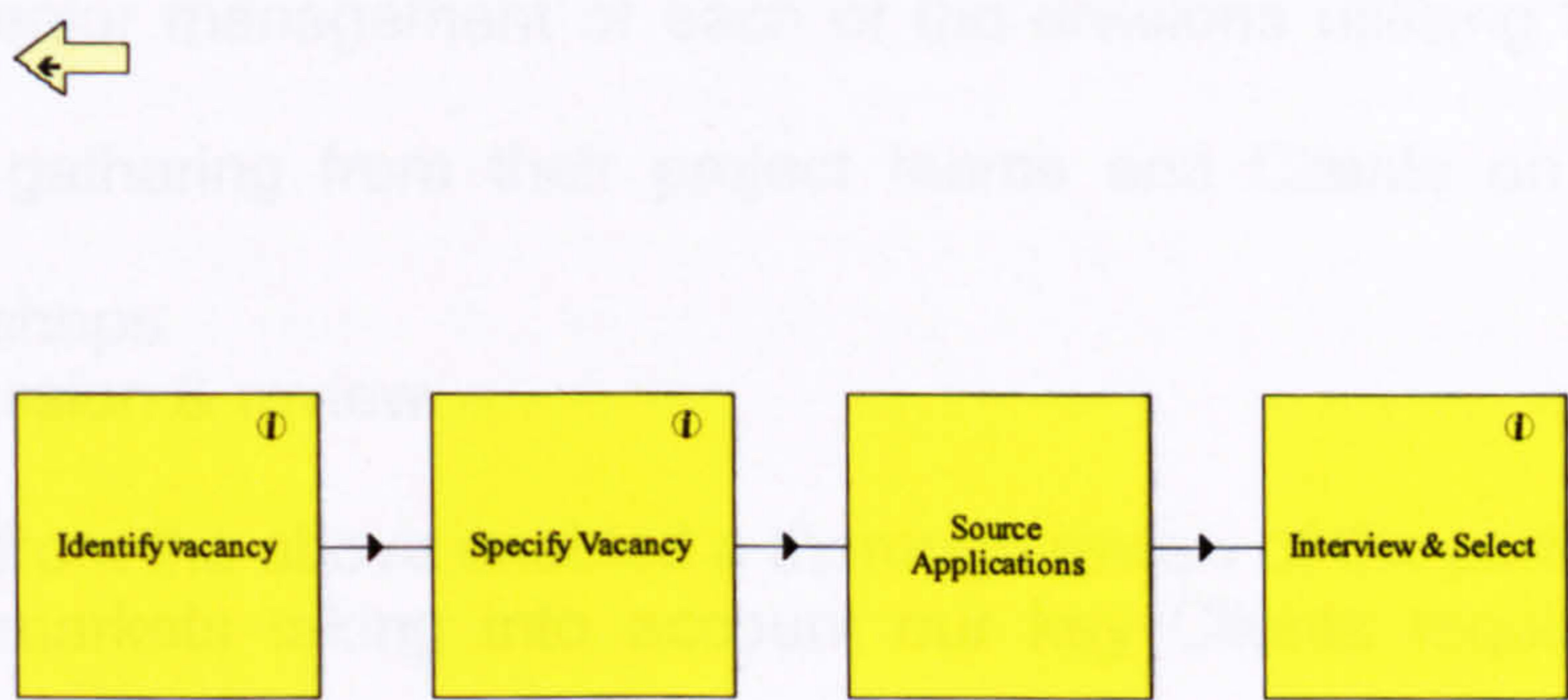
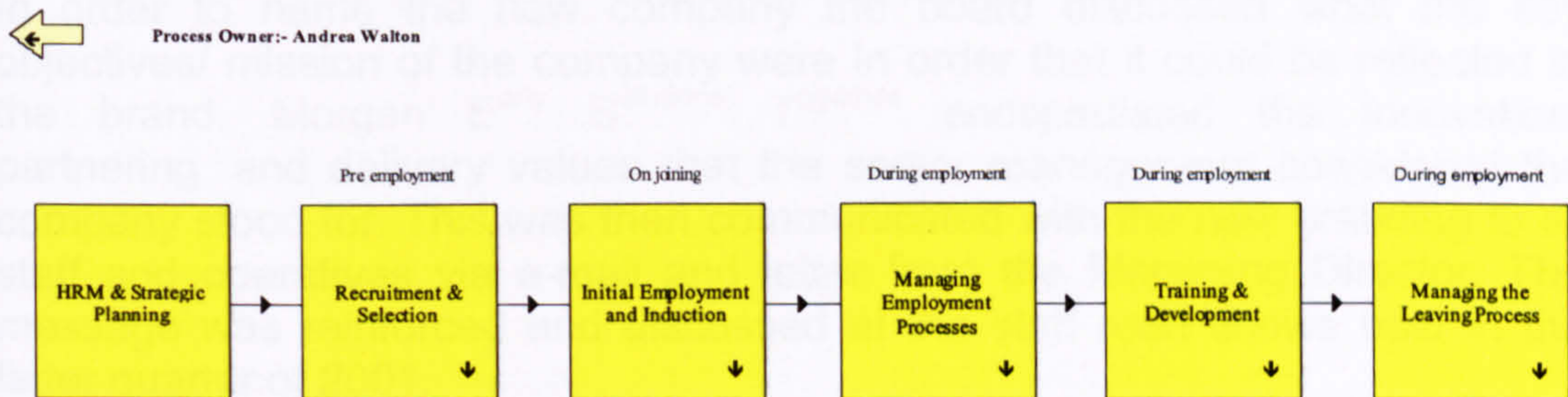
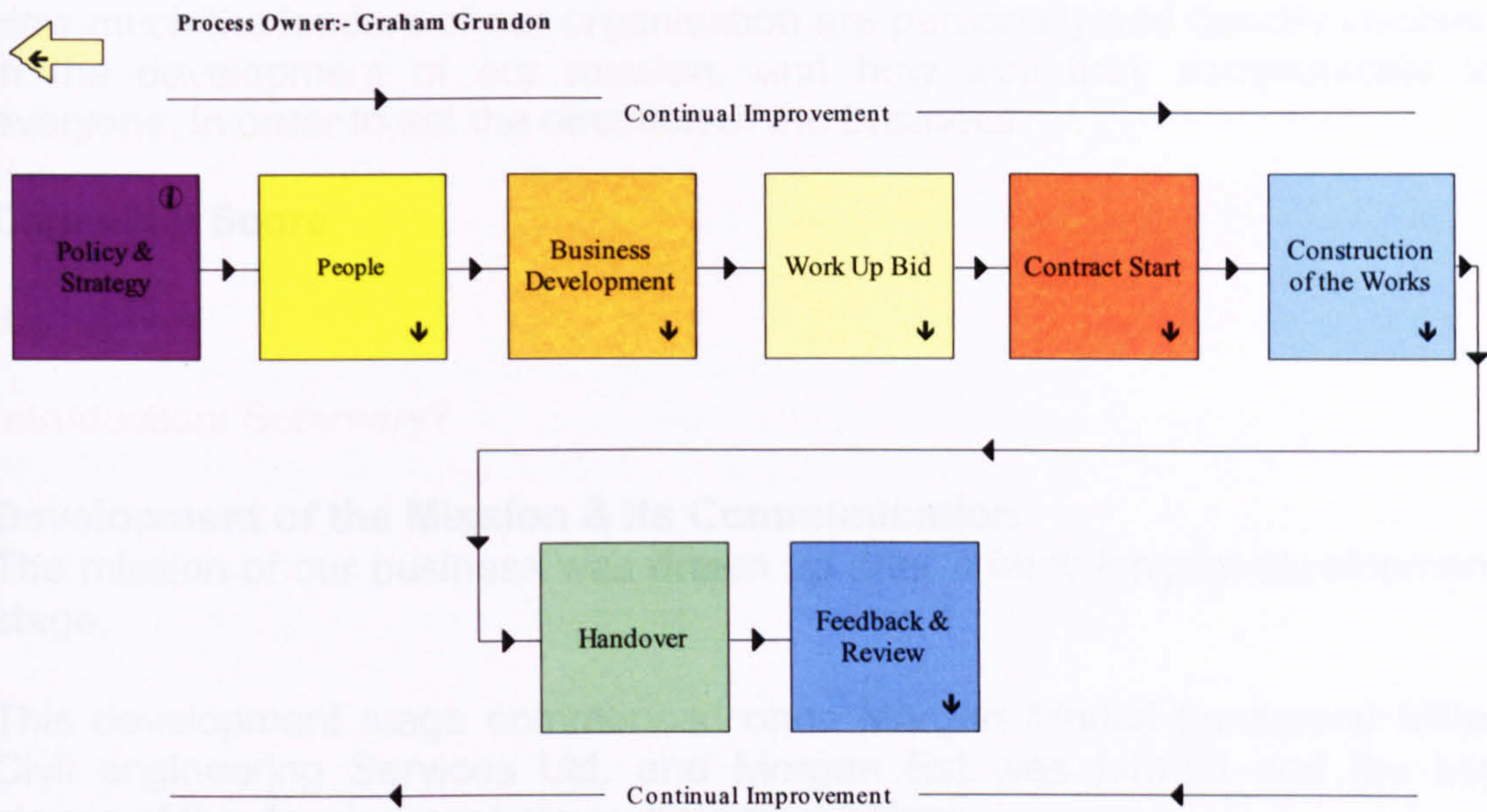
“Processes are systematically designed and managed, improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other services; products and services are designed and developed based on customer needs and expectations and are produced, delivered and services whilst enhancing and managing customer relationships.”



Overall Summary of output- Areas for Improvement

- no indication of how key processes are identified;
- lack of evidence of individual targets being aligned with policy and strategy, as indicated by lack of clarity regarding the key processes of the organisation;
- little evidence that the organisation is pro-active towards discovering and using new principles of design, technology and operating philosophies;
- lack of a systematic approach, especially in the effective use of feedback;
- evidence of a lack of effective process review, leading to perceptions of relearning often taking place;
- Interface issues between division and group are not being addressed in a systematic way;
- little indication of the use of IT (especially by using a common database for supply chain management).

Appendix B – An Example of the Integrated Electronic Process Management System within Morgan Est



Appendix C – The CAT Toolkit

Indicator 1.1

How much the leaders of our organisation are personally and directly involved in the development of our mission, and how well they communicate to everyone, in order to set the direction of the business

Capability Score

3

Introduction/ Summary?

Development of the Mission & its Communication

The mission of our business was drawn up after a fairly lengthy development stage.

This development stage commenced once Morgan Sindall purchased Miller Civil engineering Services Ltd. and Morgan Est was formed and the key stages of the development are summarised below: -

In order to name the new company the board discussed what the key objectives/ mission of the company were in order that it could be reflected in the brand. **Morgan E^{arly} S^{olutions} T^{ogether}** encapsulated the innovation, partnering, and delivery values that the senior management considered the company stood for. This was then communicated with the new branding to all staff and operatives via e-mail and letter from the Managing Director. The message was reinforced and discussed at the staff road shows held in the latter quarter of 2001.

Building on this base strategy documents for each of the divisions were drawn up by the senior management of each of the divisions utilising the following methods

Information gathering from their project teams and Clients on an informal basis

Team Workshops

Group discussion & review

Information from the above enabled a thorough review of the particular current and future markets taking into account our key Clients requirements and

expectations and assessment of our current capability. (Appendix 1 strategy documents 2001)

These strategy documents were presented at a senior manager's conference attended by the board and all senior managers from the divisions and head office support functions where discussion regarding our capabilities, strengths, weaknesses and key areas for improvement were facilitated and future actions agreed. (Appendix 2 senior managers conference output 2001)

From this background of knowledge gathering and discussion an implicit knowledge of our key aims and business values was gained.

Our divisional strategies were again reviewed and updated in late 2002 using the same methodology as 2 above and these were presented at a seniors managers workshop held over 2 days attended by the board and the management team (see appendix 3 2002- 2005 strategy). This forum agreed the future strategy and also agreed that a formal mission statement and statement of values should be drawn up and then communicated to all staff.

The mission statement was drafted and formalised by the Managing Director taking into the account the discussions held at the preceding meetings. The mission statement was then included within our management procedures and communicated to all staff via e-mail. The statement is easily accessible via our intranet Doris and is displayed on all office and project notice boards.

The mission and strategy was then communicated again by the MD and board members via road shows where discussion and feedback from attending staff was encouraged. A video of the event was commissioned for those not able to attend the road shows (appendix 4 Morgan Est news letter road show video).

Incorporation of the Mission into the fabric of the Business

Strategically

The mission statement and the strategy were both developed in tandem and as such one compliments the other.

However all strategic decisions are made against the background of the mission statement from the procurement of work, through execution to completion. Examples of this include: -

Procurement – Our business development strategy is to procure work on a repeat basis, in a negotiated manner, where the key requirements of the

project are innovation and a partnering approach. This mirrors certain aspects of the mission statement. We therefore select opportunities that will allow us to fulfil the aspirations of our mission statement. This can be demonstrated by the proportion of our order book that is undertaken through framework agreements and the method we employ for the selection of opportunities in Civils Division (appendix 5 opportunity selection process form)

Our selection of supply chain, JV and design partners also is based on our mission and strategic aims. We ensure that our partners have similar aspirations and values as ourselves to assure efficient and successful delivery of our contracts.

People – Our Mutual Development Plan procedure (see appendix 6) allows us to communicate and align the mission and strategic aims of the company with the aspirations and development of the individual thus ensuring a mutually beneficial development of both.

Everyday

Execution – Our project charters often reflect elements of our mission statement as well as our Client's (see appendix 7 for examples of these)

In addition to our head office each site we establish will have effective communication via the intranet and e-mail.

Our vendor assessment database allows us to select appropriate supply chain partners and monitors the effectiveness of these relationships.

Completion – our contract review procedure encourages us to reflect on our performance and whether we satisfied both our Client's objectives and our Company mission (appendix 8 Contract Review). The procedure allows lessons to be learnt and communicated throughout the wider team. This is an example of how the objective of embracing continuous improvement stated in our mission is translated into our day to business

Delivery of the Mission

The company recognises that the mission will only be achieved by harnessing the energy and dedication of the staff.

Individuals are encouraged to play their part and those who actively engage in delivering the mission are recognised by the senior management and supported. This is done in many informal ways such as coaching and mentoring but also in a systematic way by the use of the mutual development planning procedure, which is an ongoing process.

The company actively encourages individuals to improve in areas that are aligned with the mission and time is always freed up from core tasks to allow input into other areas of the business such as participation in the IT steering community or the Process Mapping Team.

The more individuals are willing to contribute to the achievement of our mission statement the more they will become included in the decision making processes of their Division and therefore the company. This career progression brings the usual rewards and status.

Indicator 1.2

How much the leaders of our organisation are personally and directly involved in the development of our values and attendant behaviours required for our long-term success. How well they help develop the appropriate supportive culture by acting as champions and role models for these.

Capability Score

1

Business Values and Behaviours

We do have some consistent values and behaviours in the business however they are more implicit than explicit. The values are

- Collaboration
- Innovation
- Openness
- Professional delivery through continuous improvement
- Encouraging our people to develop and contribute to their full potential
- Sustainable profitable growth.

These are demonstrated through the work we procure and execute and the relationships we form and sustain with our supply and Client partners.

Senior management from all divisions demonstrate these values in their everyday business activities both with customers, suppliers, and our own team.

By communicating with their teams via teambuilding events (appendix 9) such as project specific events and divisional events collaboration is encouraged.

A spirit of openness is engendered by the extremely good communications facilities we have such as e-mail the extranet. It is known that there are no “no go areas” the Group MDs and any of his Management team’s door is open to all. The introduction of the new Morgan Est newsletter which was delivered to every members of staff home address again demonstrates our open culture (appendix 10)

We ensure the development of our staff through the MDP process and the senior management take a lead in this process by setting targets and ensuring MDPs are carried out satisfactorily. We also ensure all new staff are inducted into the company giving an opportunity for the values to be discussed. All board members and management team are given the opportunity to attend the inductions in order that they are available to expand on any issues raised.

All senior managers are accountable for the profitability of the company and are measured against our financial targets monthly. Feedback from this process and ways of improvement are focussed upon and resultant actions taken.

We consider these values to be fundamental to our long term business success and as such are part of our brand identity Morgan E^{arly} S^{olutions} T^{ogether} and are referred to in our strategy documents.

Attribute 1.3

The leaders of our organisation are personally and directly involved in the development, review and improvements of performance management in order to bring about continuous improvement

Capability Score

1

Measurement

Currently we informally measure our mission. This is done by: -

Gaining feedback form our Clients regarding our overall performance and whether we delivered to their expectations.

Working closely with our partners and suppliers and gaining feedback

Ensuring personnel procedures are adhered to and reviewed including MDPs, succession management and the imminent introduction of Performance

Management Development.

Listening to feedback e.g. from group meetings and anecdotal responses to communications. This has led to certain improvements being made to our communications e.g. the introduction of the company newsletter, better uptake of Doris our intranet system, modifications to our structure to encourage easy communication

This process is very much driven by our senior management and feedback discussed at Board Meetings.

If change arises from review of the mission the change and the reasons will be communicated to all via the intranet and e-mail e.g. recent changes in organisation in Utilities Division.

Visibility

The mission statement is readily available to all and is posted on office and site noticeboards. In addition the mission statement is on our intranet.

Any revisions are sent out to all staff usually via e-mail.



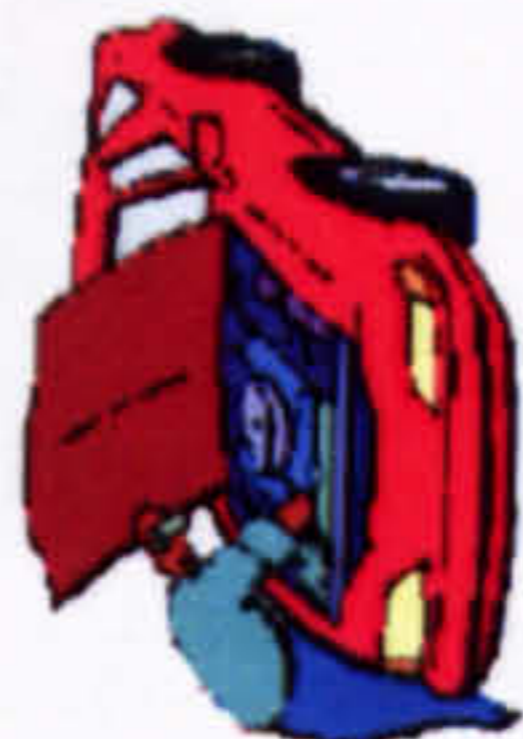



Support and Reward

Management are supported in steps they take to deliver the mission. This is done both informally by encouraging review, feedback and innovation, and formally through the MDP process where both strategic targets and personal targets are aligned and agreed.

Innovation and improvement is actively encouraged via steering and action groups e.g. IT steering committee, process mapping and time freed up to enable staff to participate. Implementation and drive for improvement is often rewarded by career progressions and greater responsibility and involvement within the company.

We value your views on the way we do things in the business, please help us in our drive for excellence by completing this short questionnaire.

Read the questions in each section, and place a tick in one of the columns to the right of each question. The column you choose should match one of the statements as follows:-

	Level 5 	Level 4 	Level 3 	Level 2 	Level 1 	Don't Know No, I haven't thought about it Having recognised the need for this, I am thinking of doing something Yes Yes, and over time we are getting better and seeing real business benefits This is fundamental to the way the business is managed and could be seen as best practice within the industry
--	---	---	---	--	---	---

Please answer all the questions as honestly as you can.
 All responses will be kept completely anonymous.

If a question appears not to be applicable, please leave it blank and move on.

Please add any additional comments that you would like to make.

SECTION 1: THE ENABLERS – HOW WE RUN THE BUSINESS
1 Leadership: Am I a good boss?

You are the one who decides most things in your company. Not only what gets done, but how. Your employees see you around all the time and your ‘fingers are in all the pies’. It is likely that if anyone is going to pick up habits, both good and bad, that it will be from you. Have you realised yet that the way you manage people and projects has significant impact on whether your business is a success or not?

Level 1



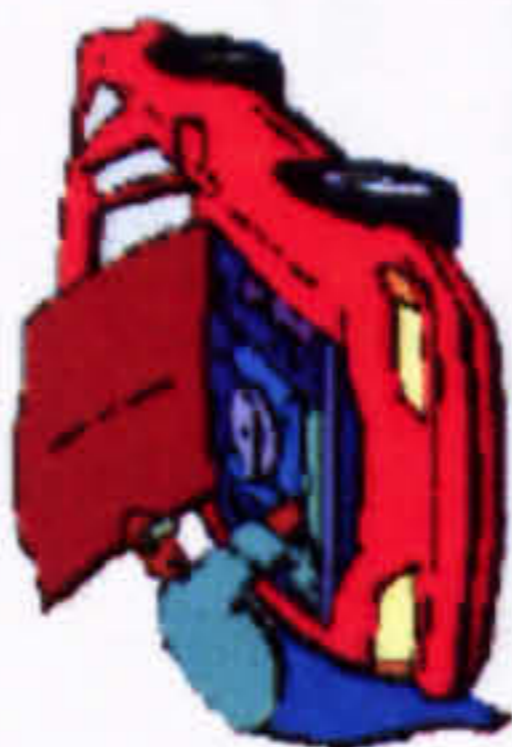
Level 2



Level 3



Level 4



Level 5



Don't Know

No, I haven't thought about it

Having recognised the need for this, I am thinking of doing something







Yes

Yes, and over time we are getting better and seeing real business benefits

This is fundamental to the way the business is managed and could be seen as best practice within the industry

	?	Man	Car	Hand	Car	Car	Car
1.0	%	%	%	%	%	%	%
1.1	-	-	-	43	-	57	-
	-	-	-	43	-	43	14

1.2	Do your management systems and methods encourage continuous improvement?	-	-	14	29	57	-
1.3	Do you have effective ways to keep your employees informed of your desires and intent for the business?	-	-	-	29	57	14
1.4	Have you improved the way you manage the business as a result of feedback from your employees?	-	-	14	43	43	-
1.5	Do you notice the efforts your employees make to improve, and always find some way of saying "well done"?	-	-	-	71	29	-
1.6	Do you have a plan to ensure you stay close to, and understand, your key customers and partners?	-	-	14	29	43	14
1.7	Do you cultivate partnership-style relationships with your customers and suppliers?	-	-	-	29	29	43

							
		%	%	%	%	%	%
1.8	To avoid assumptions and misunderstandings, is there some formality in customer and supplier relationships?	-	-	14	71	14	-
1.9	Are you coaching at least one other person to stand in for you?	-	-	29	29	29	14
1.10	Do you delegate as much as you can, letting go of things in which you no longer need involvement?	-	-	-	43	43	14
1.11	Do you recruit people to complement your own skills without feeling threatened if they have strengths you lack?	-	-	-	14	71	14
1.12	Do you understand and encourage teamwork?	-	-	-	-	57	43
1.13	Do you make sure that you update your own skills through training, conferences and other networks?	-	-	14	43	43	-
1.14	Do you share the lessons you have learned with others, either within or outside your company?	-	-	-	43	57	-
1.15	Do you ensure that resources are made available to support business improvement priorities?	-	-	14	29	57	-

Any comments: ■ Recent growth has made this a particularly challenging area – I believe we need to recognise the importance of leadership as _____ a concept then improve processes which support it.

Improve Throughput of Cluster Calibration & Test (C307)

Project Summary

Problem Statement: Excessive numbers of failures are reducing the throughput of the End of Line cluster testers. This is the constraint operation.

CTQ: A high FTT, while maintaining the standard of product shipped to our customers.

Project Objective: Improve the throughput of the cluster calibration & test units.

Opportunity/Defect Definition: Each cluster placed into the calibrator/tester is an opportunity. A defect is a failure of that cluster.

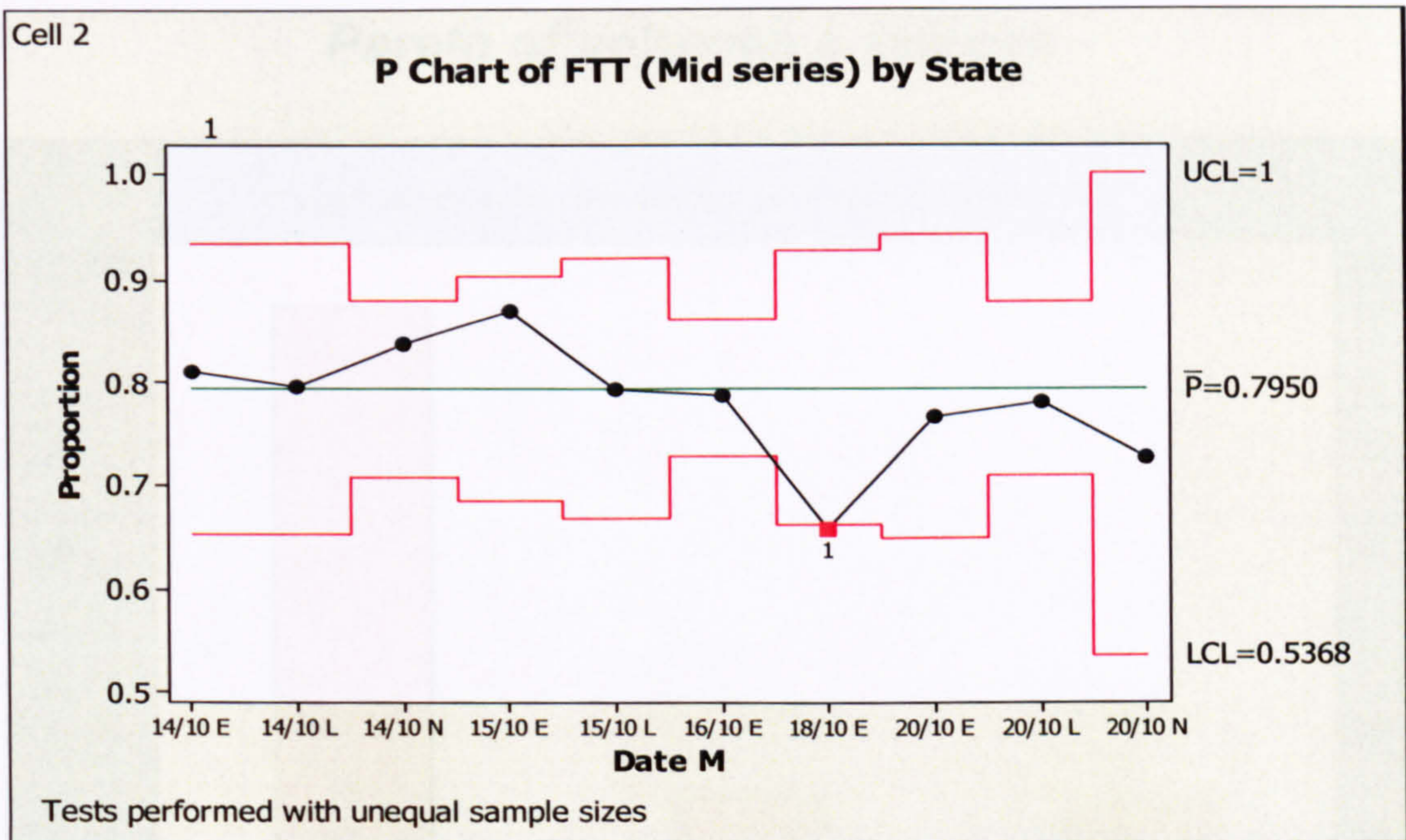
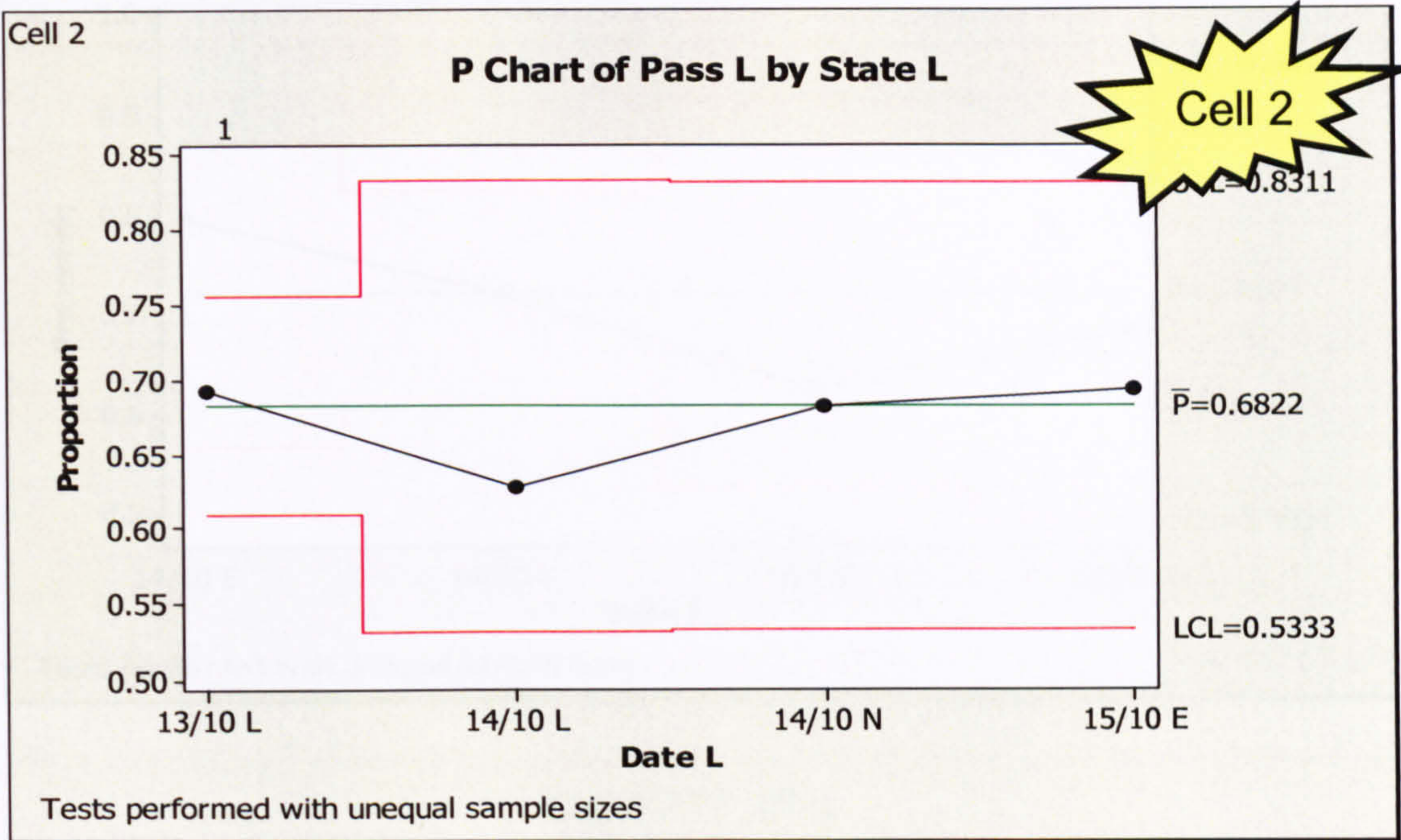
Current/Goal/Stretch Goal:

Current	60K PPM (Val Sp Mid cell 2)
Goal	18K PPM
Stretch	6K PPM

Benefits:

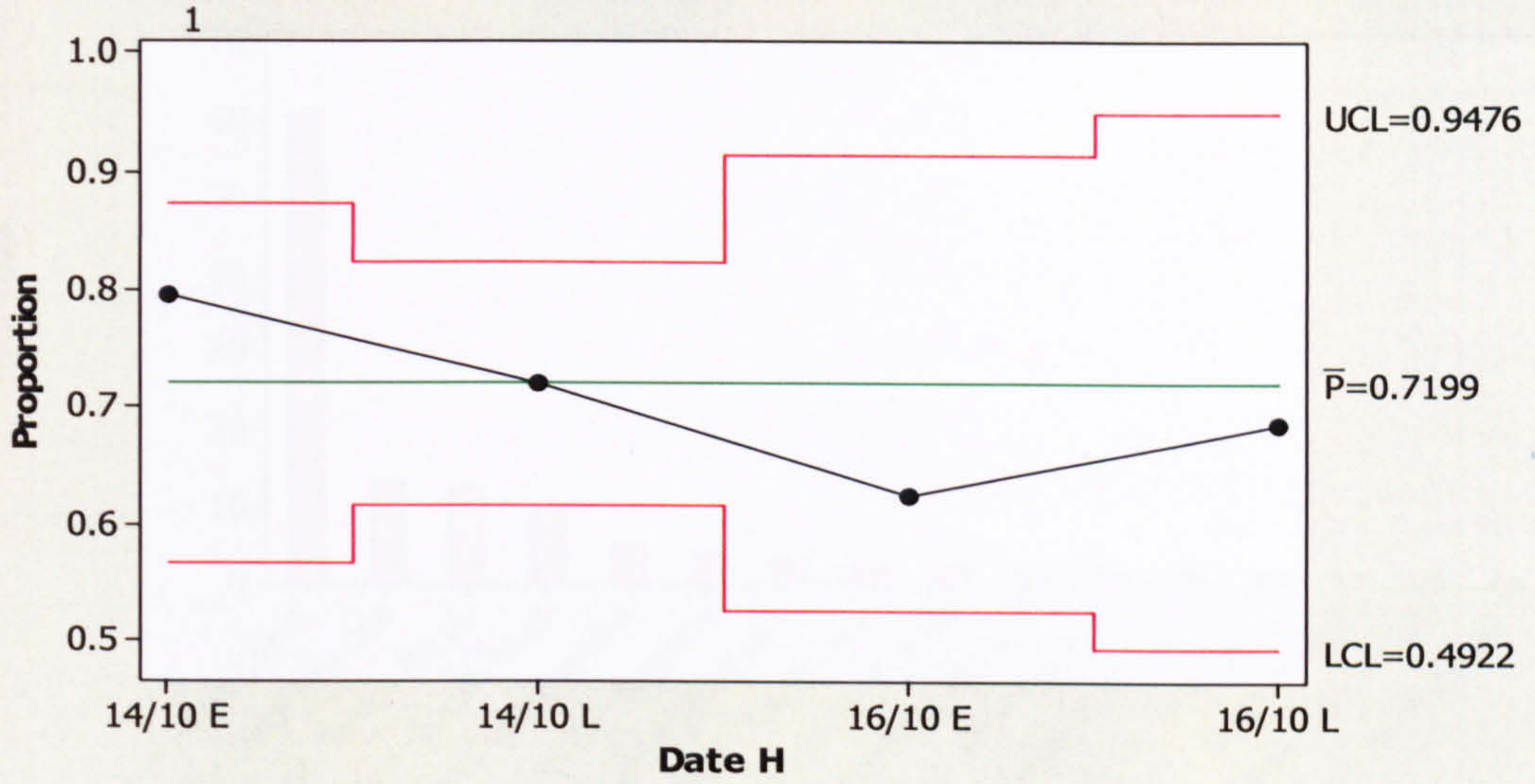
Increased throughput
Increased efficiency – reduced overtime
Ability to meet requested higher demand from Ford

TFT for each series



Cell 2

P Chart of Pass H by State H

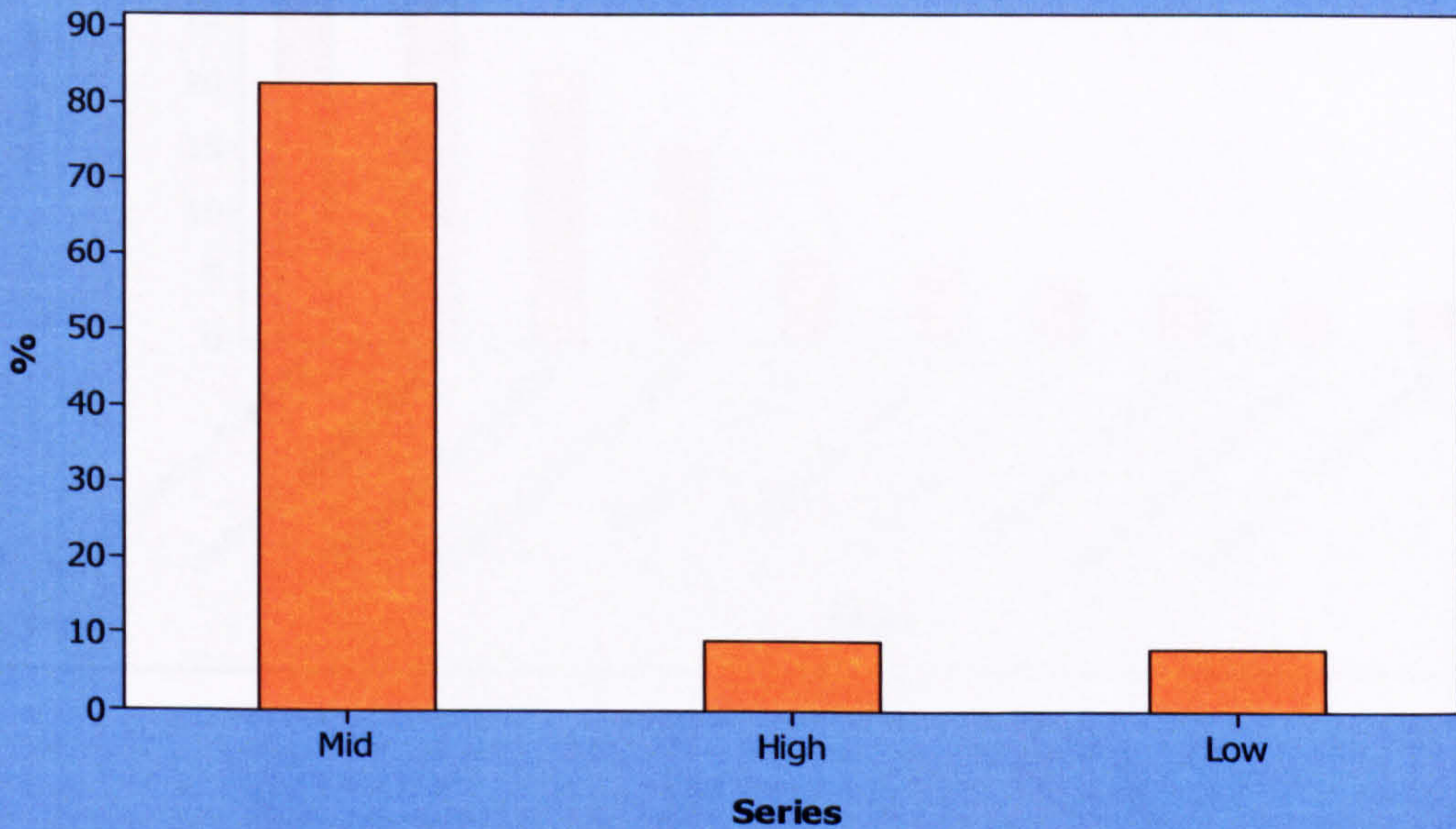


Tests performed with unequal sample sizes

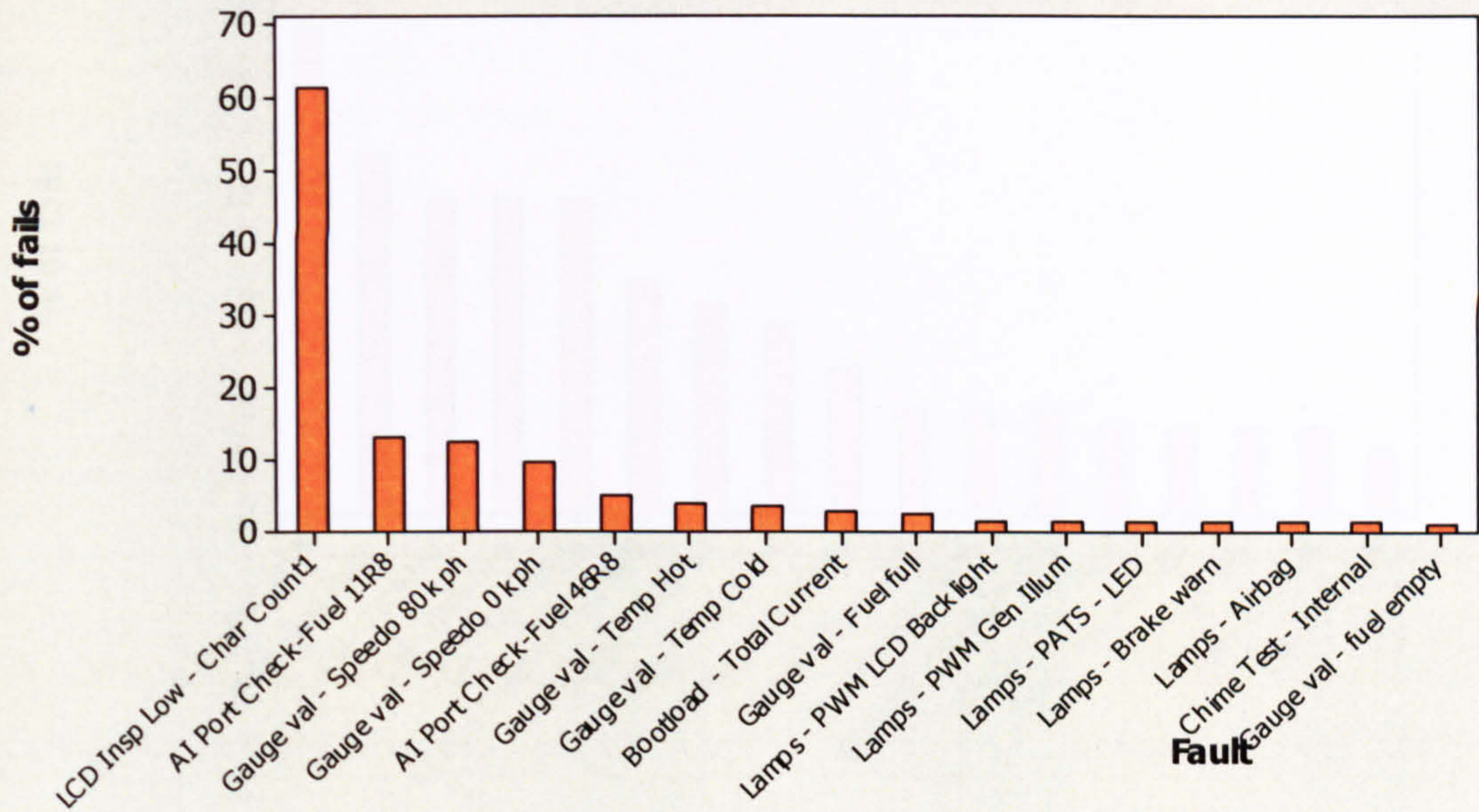
Cell 1 FTT 83%
Cell 2 FTT 71%

Pareto of volumes & failures

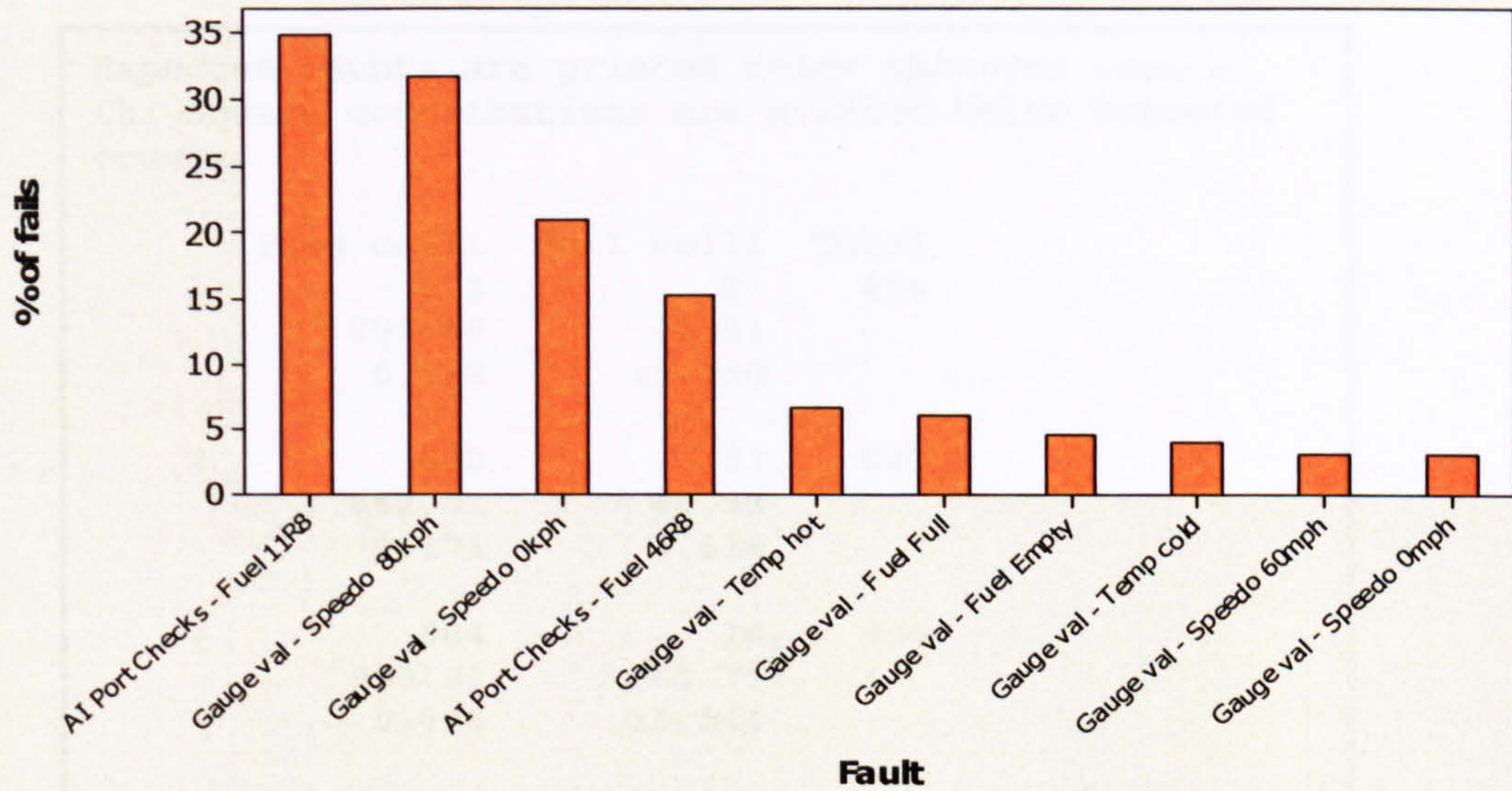
Chart of % take for each C307 series (Sept 04)



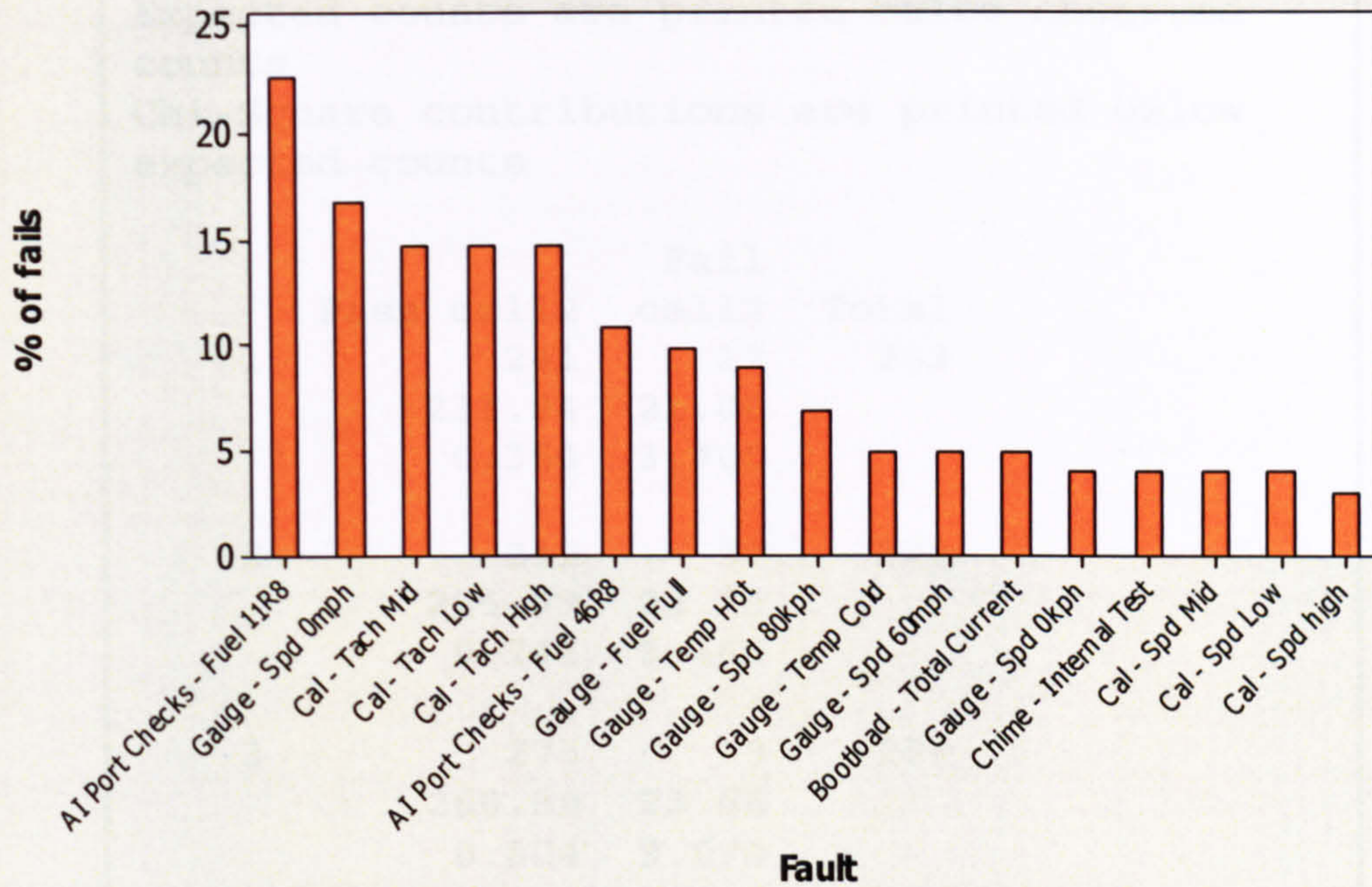
Pareto of failures. Low series. Cell 2



Pareto of failures. Mid Series. Cell 2



Pareto of failures. High series. Cell 2



Failure rates between nests (Val Spd 80kph)

By looking at the different frequencies of failure for each nest on each tester, it appears that there is a difference. The Chi Squared test (below) will examine if these differences are significant.

Expected counts are printed below observed counts
 Chi-Square contributions are printed below expected counts

	Pass cell1	Fail cell1	Total
1	873	21	894
	852.49	41.51	
	0.493	10.130	
2	830	53	883
	842.01	40.99	
	0.171	3.516	
3	884	16	900
	858.22	41.78	
	0.775	15.911	
4	802	75	877
	836.28	40.72	
	1.405	28.868	
Total	3389	165	3554

Chi-Sq = 61.269, DF = 3, P-Value = 0.000

Expected counts are printed below observed counts

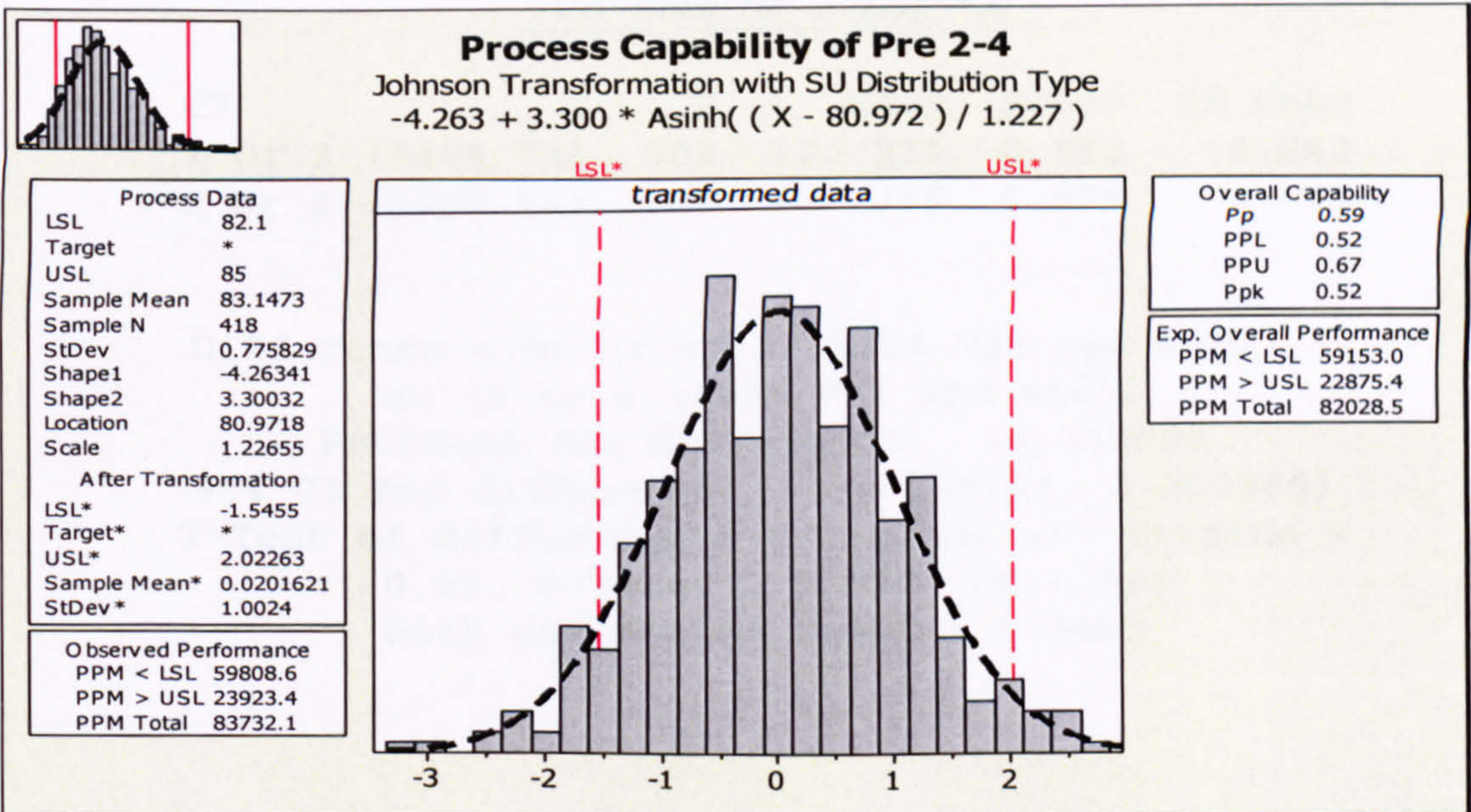
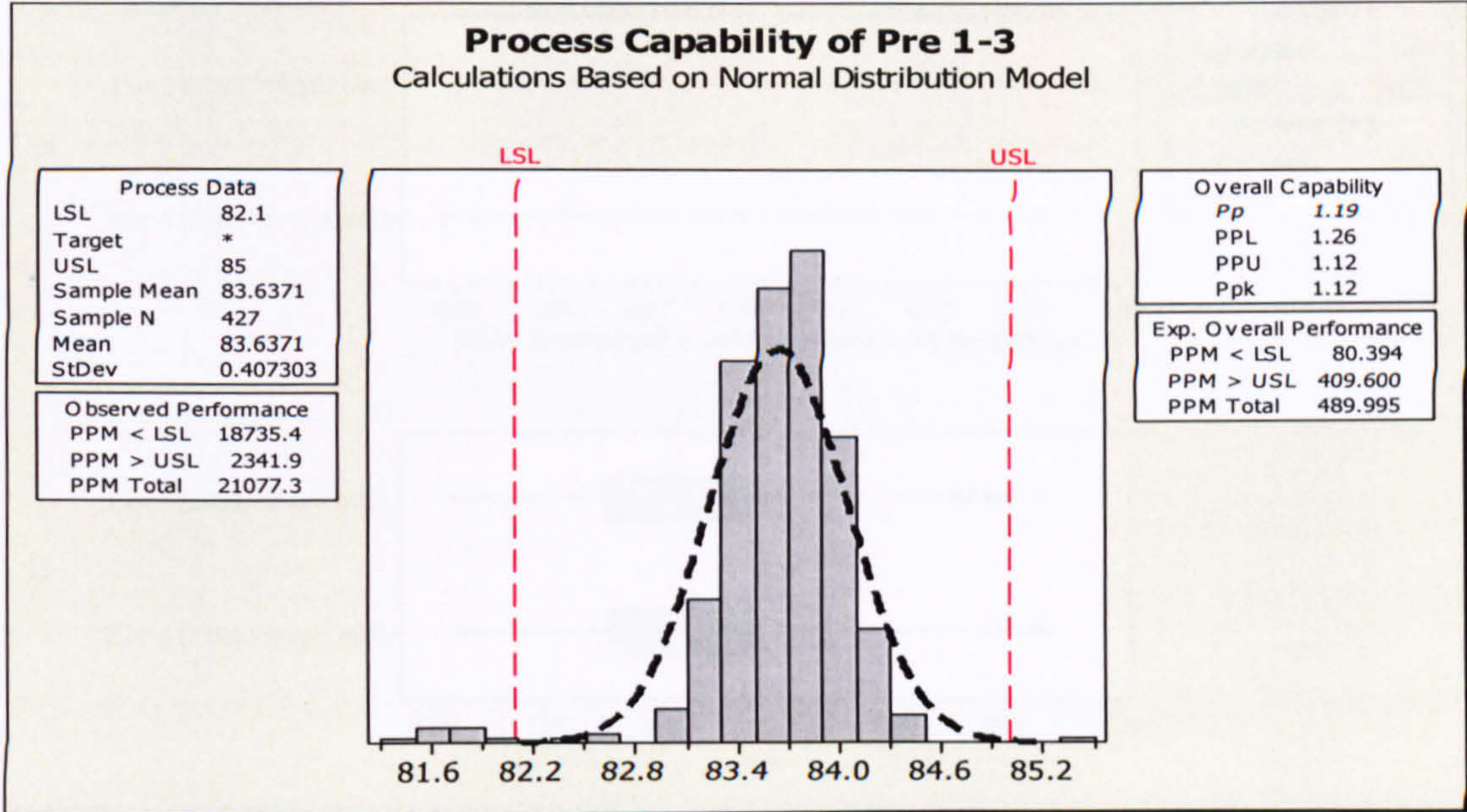
Chi-Square contributions are printed below expected counts

	Pass cell12	Fail cell12	Total
1	241	12	253
	231.94	21.06	
	0.354	3.900	
2	242	37	279
	255.77	23.23	
	0.741	8.165	
3	275	9	284
	260.36	23.64	
	0.824	9.070	
4	233	32	265
	242.94	22.06	
	0.406	4.476	
Total	991	90	1081

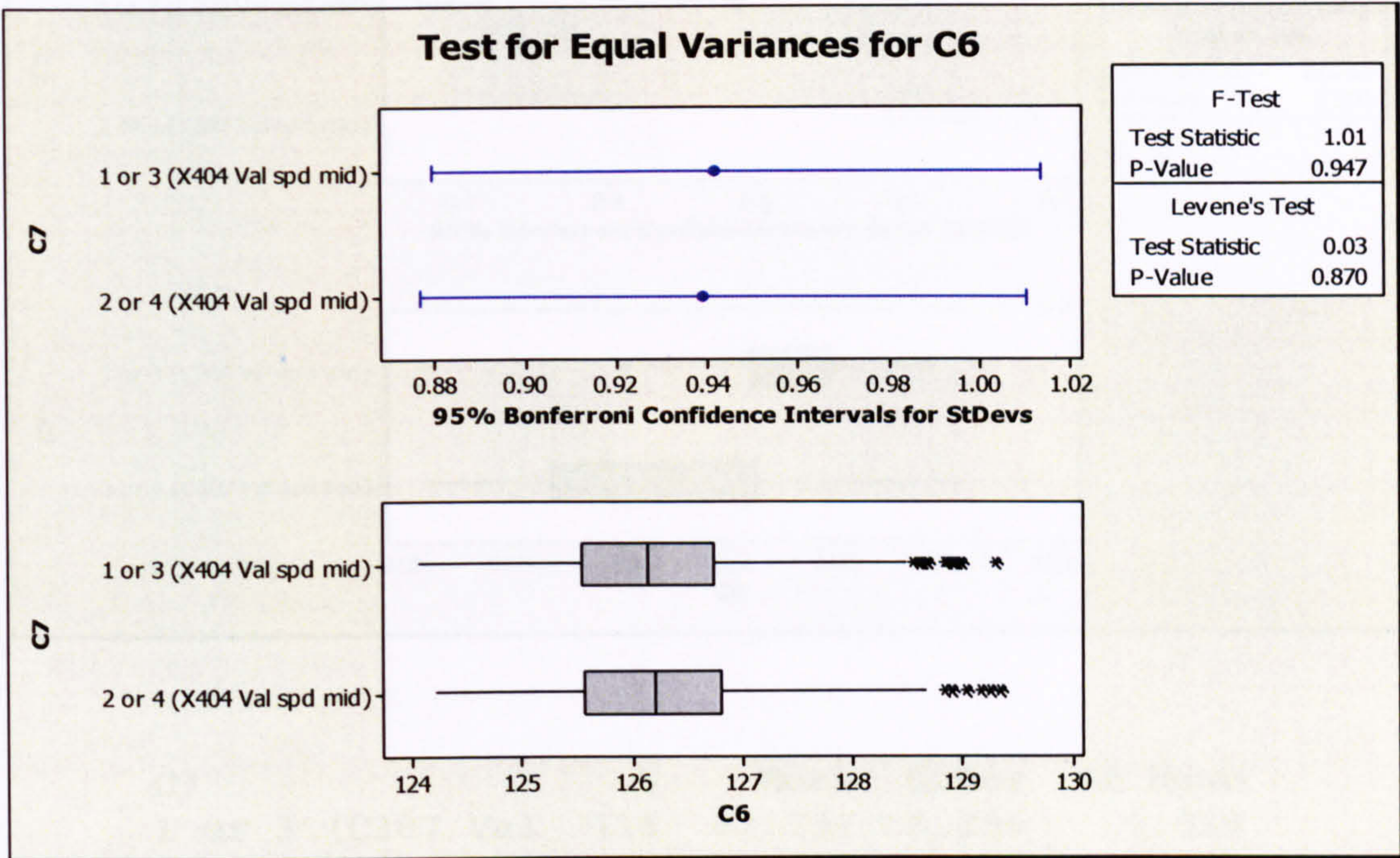
Chi-Sq = 27.937, DF = 3, P-Value = 0.000

The test confirms that for cell 1, nests 2 and 4 show significantly higher fallout than nests 1 and 3. The same applies for cell 2. Therefore, nests on the bottom of each tester are the worst performers.

Speedo val mid (Top nest vs Bottom nest)



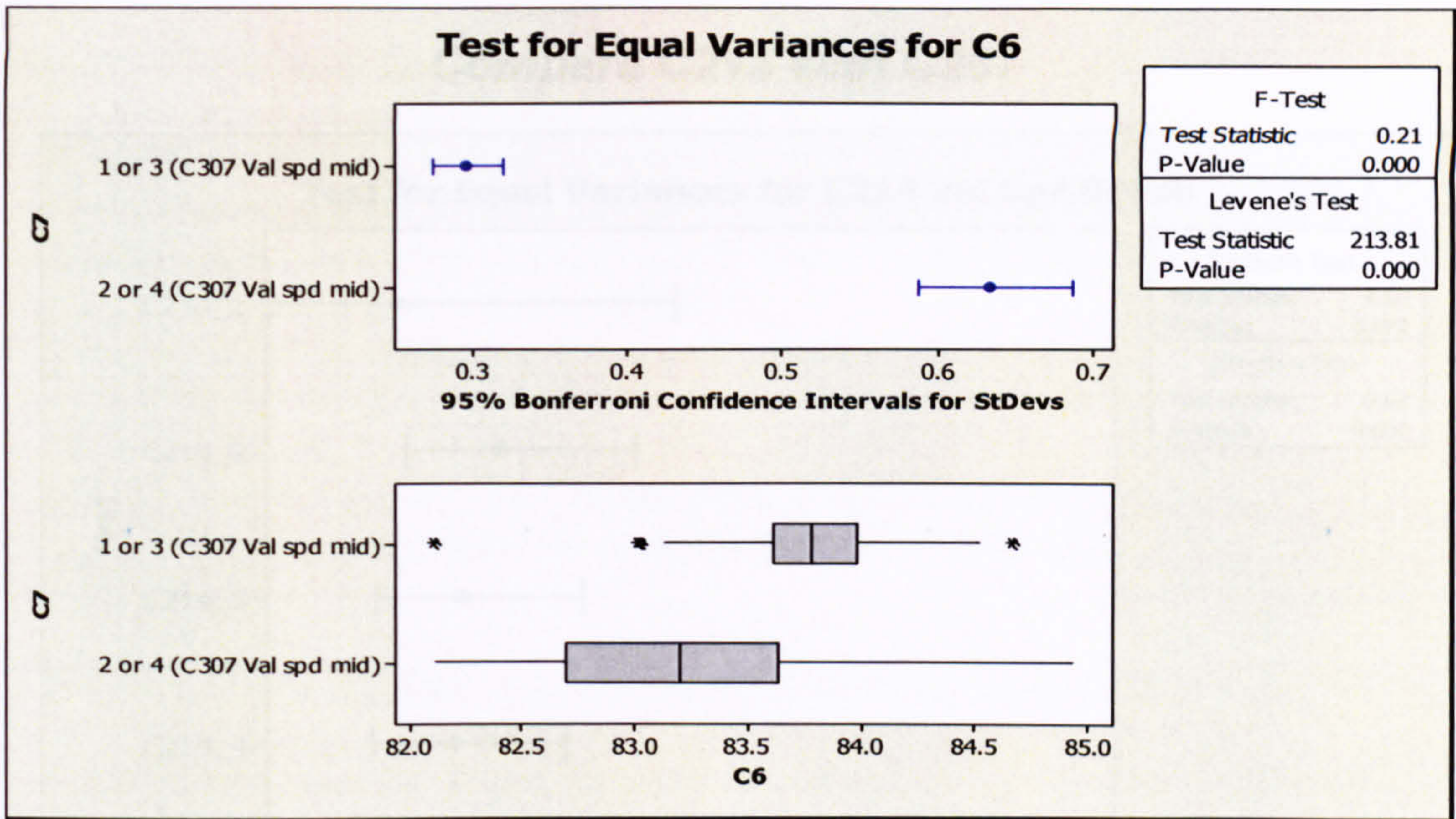
X404 vs C307 (Val Spd Mid)



Two-sample T for C6

C7		N	Mean	StDev	SE Mean
1 or 3	(X404 Val	500	126.211	0.942	0.042
2 or 4	(X404 Val	500	126.245	0.939	0.042

Difference = μ (1 or 3 (X404 Val spd mid)) - μ (2 or 4 (X404 Val spd mid))
 Estimate for difference: -0.033808
 95% CI for difference: (-0.150501, 0.082885)
 T-Test of difference = 0 (vs not =): T-Value = -0.57 P-Value = 0.570 DF = 998
 Both use Pooled StDev = 0.9402



C7	N	Mean	StDev	SE Mean
1 or 3 (C307 Val	418	83.796	0.294	0.014
2 or 4 (C307 Val	415	83.223	0.635	0.031

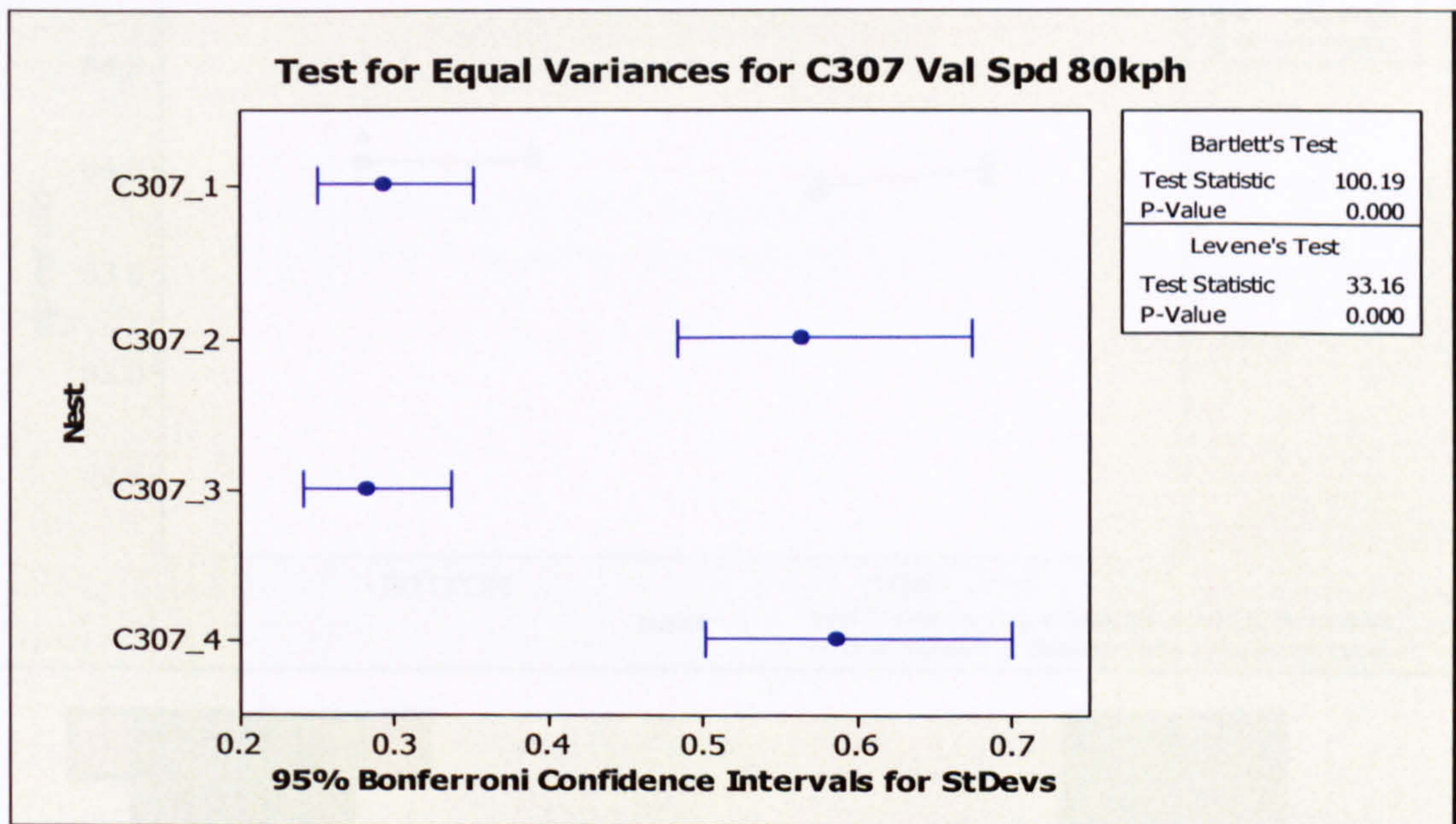
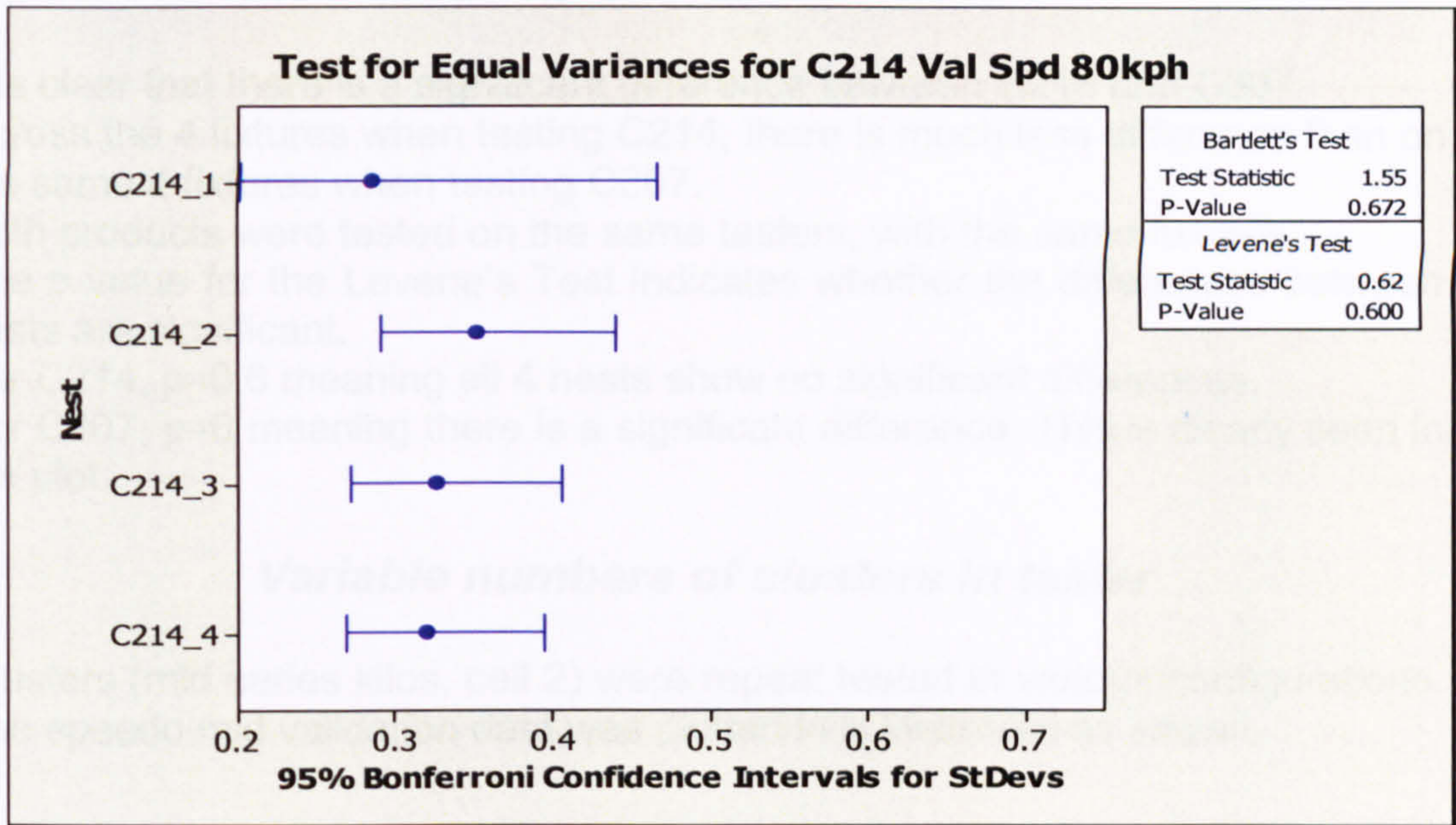
Difference = μ (1 or 3 (C307 Val spd mid)) - μ (2 or 4 (C307 Val spd mid))

Estimate for difference: 0.572804

95% CI for difference: (0.505395, 0.640213)

T-Test of difference = 0 (vs not =): T-Value = 16.69 P-Value = 0.000 DF = 583

Compare C214 with C307



Variances are equal for C214, but not for C307
 The scale is the same on both graphs shown here.

It is clear that there is a significant difference between C214 and C307.
 Across the 4 fixtures when testing C214, there is much less difference than on the same 4 fixtures when testing C307.

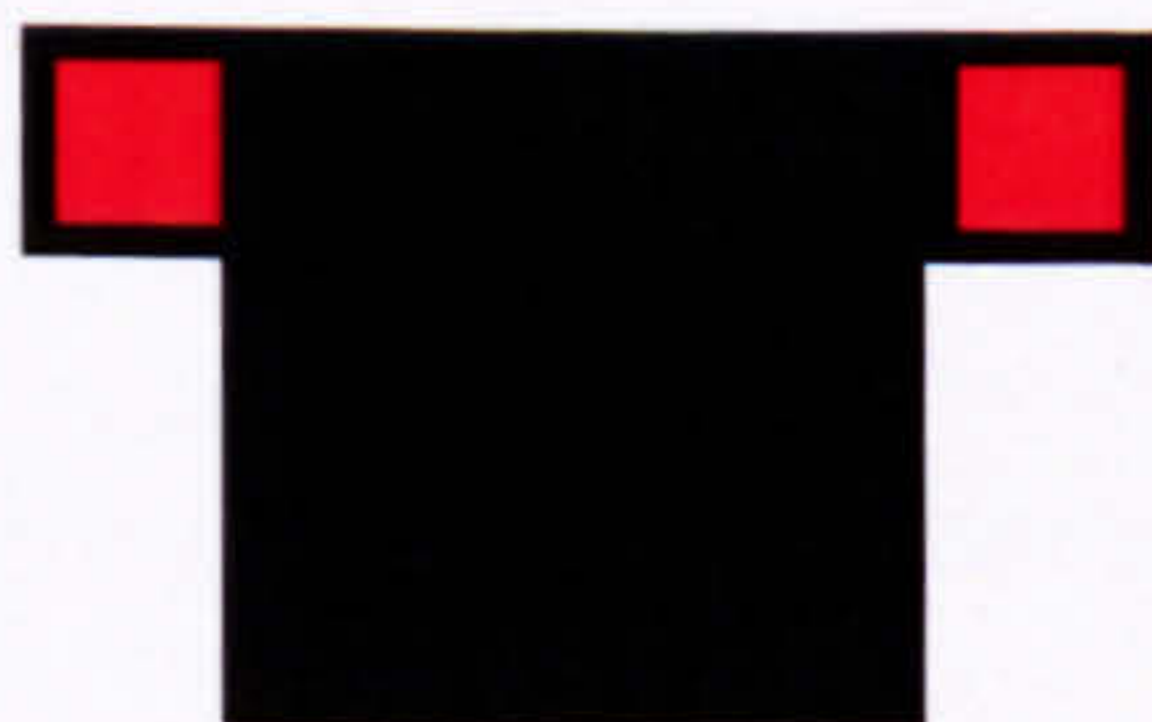
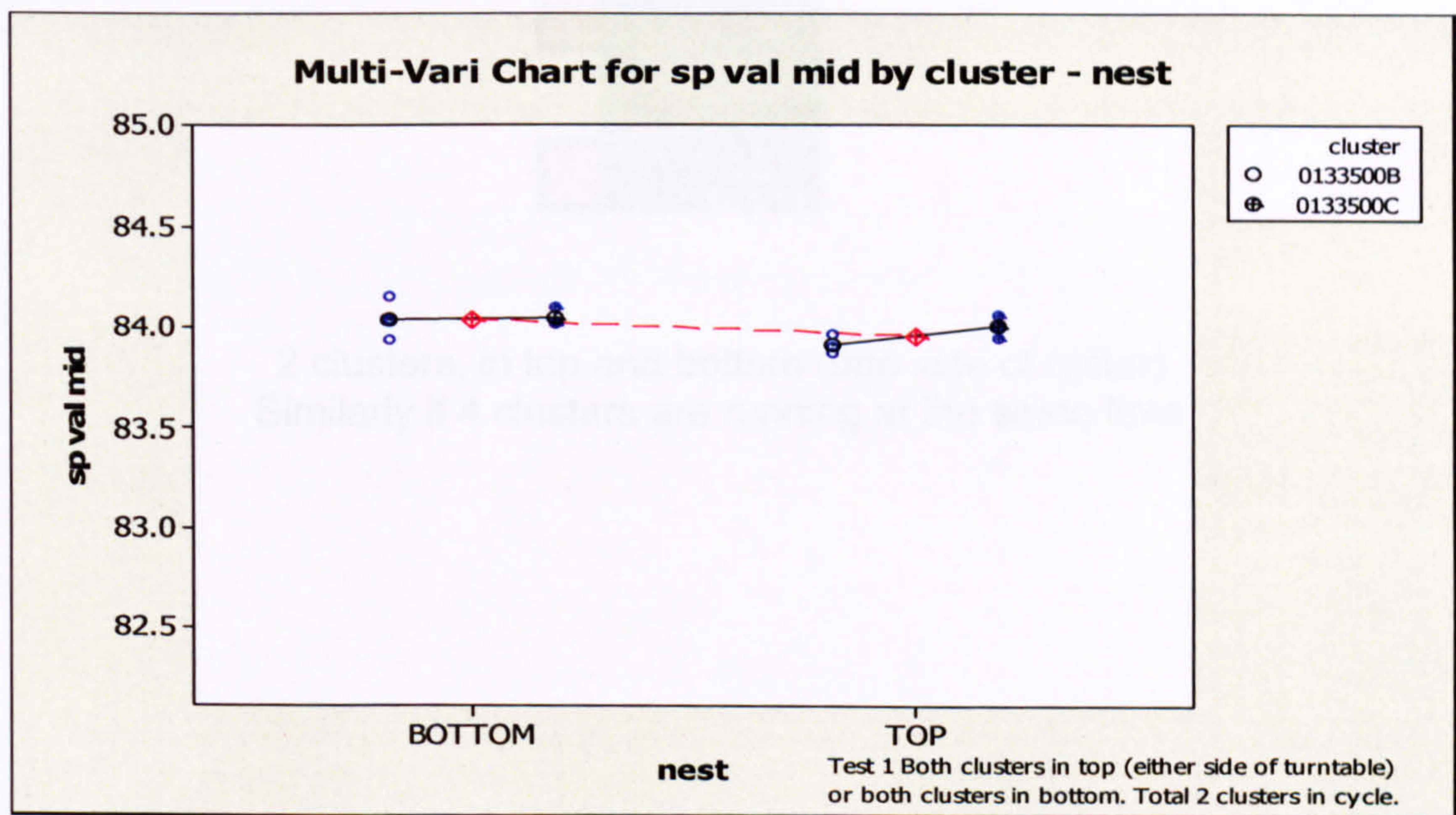
Both products were tested on the same testers, with the same fixtures.
 The p value for the Levene's Test indicates whether the differences between nests are significant.

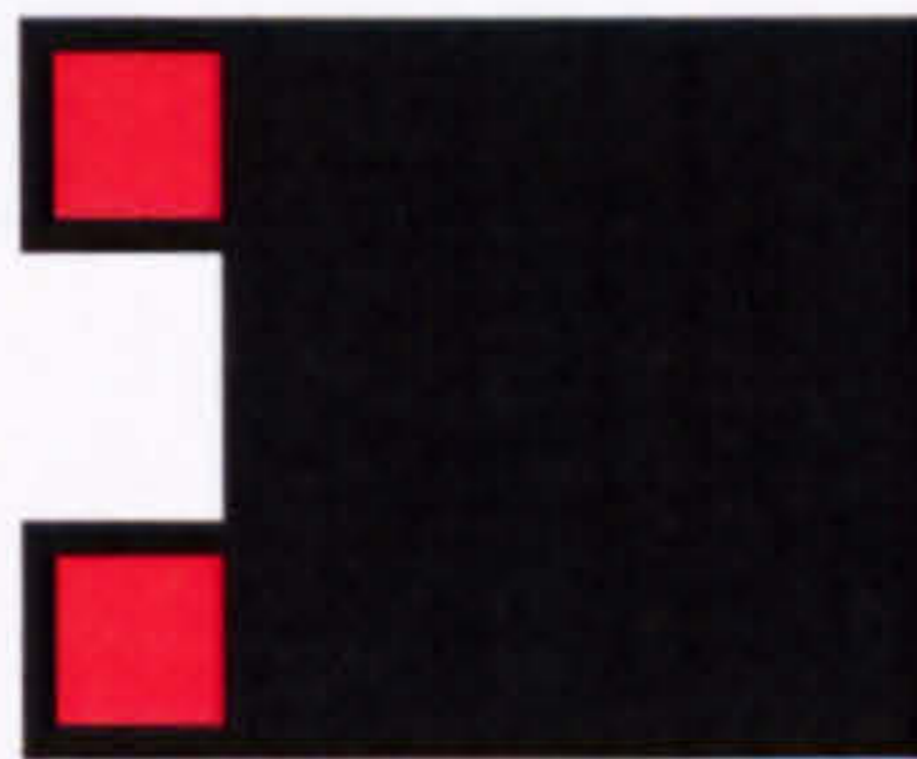
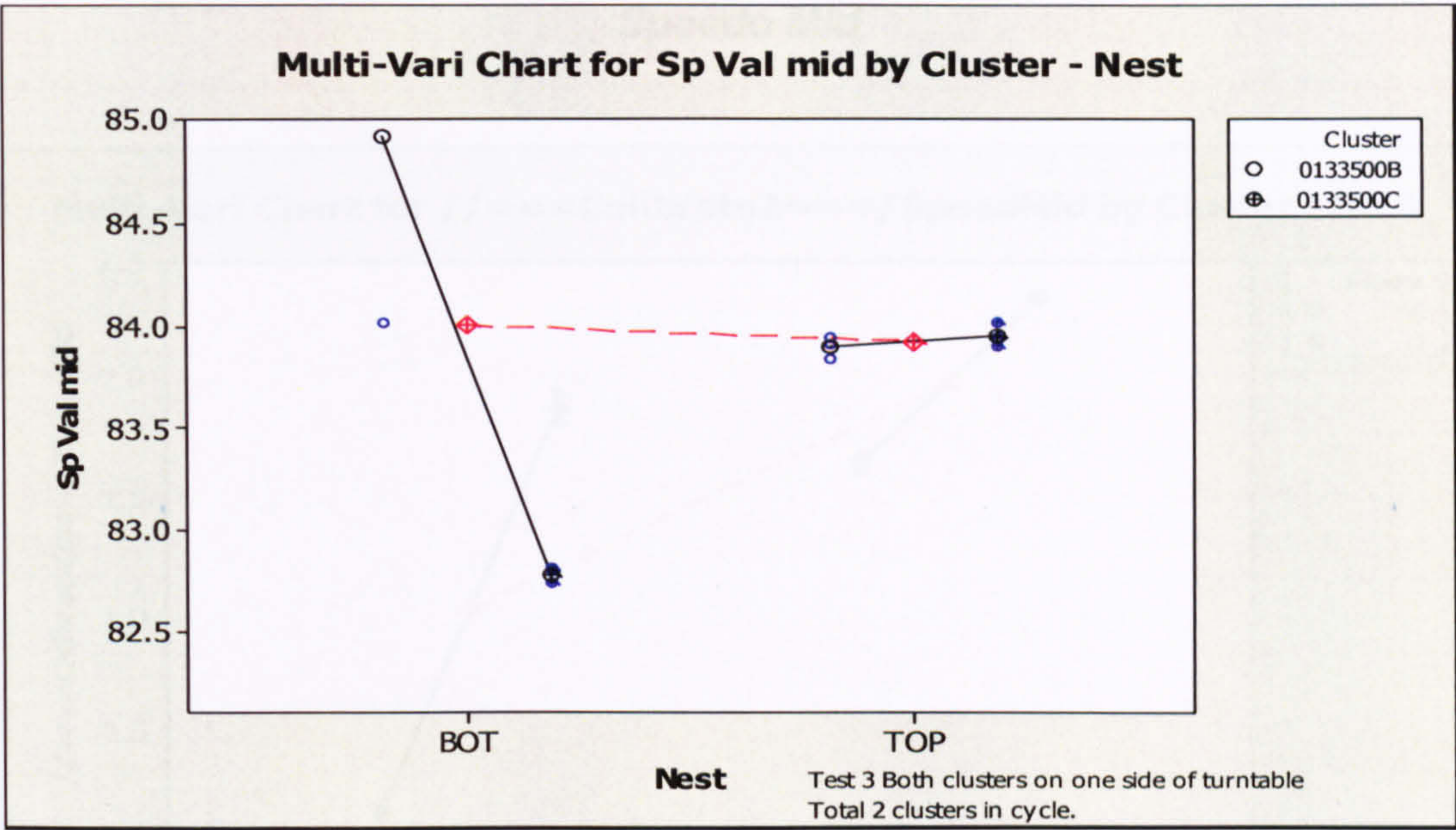
For C214, $p=0.6$ meaning all 4 nests show no significant differences.

For C307, $p=0$ meaning there is a significant difference. This is clearly seen in the plot.

Variable numbers of clusters in tester

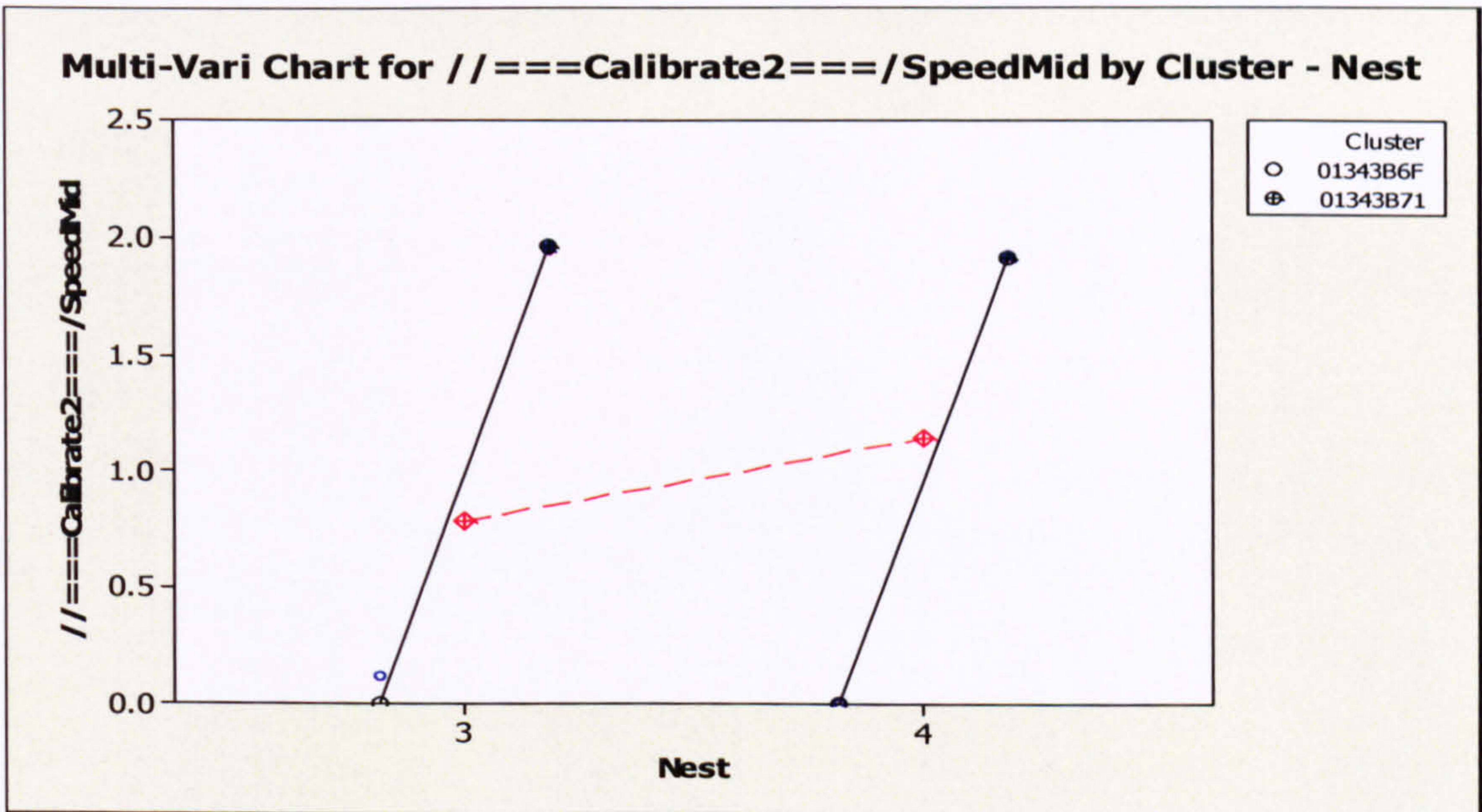
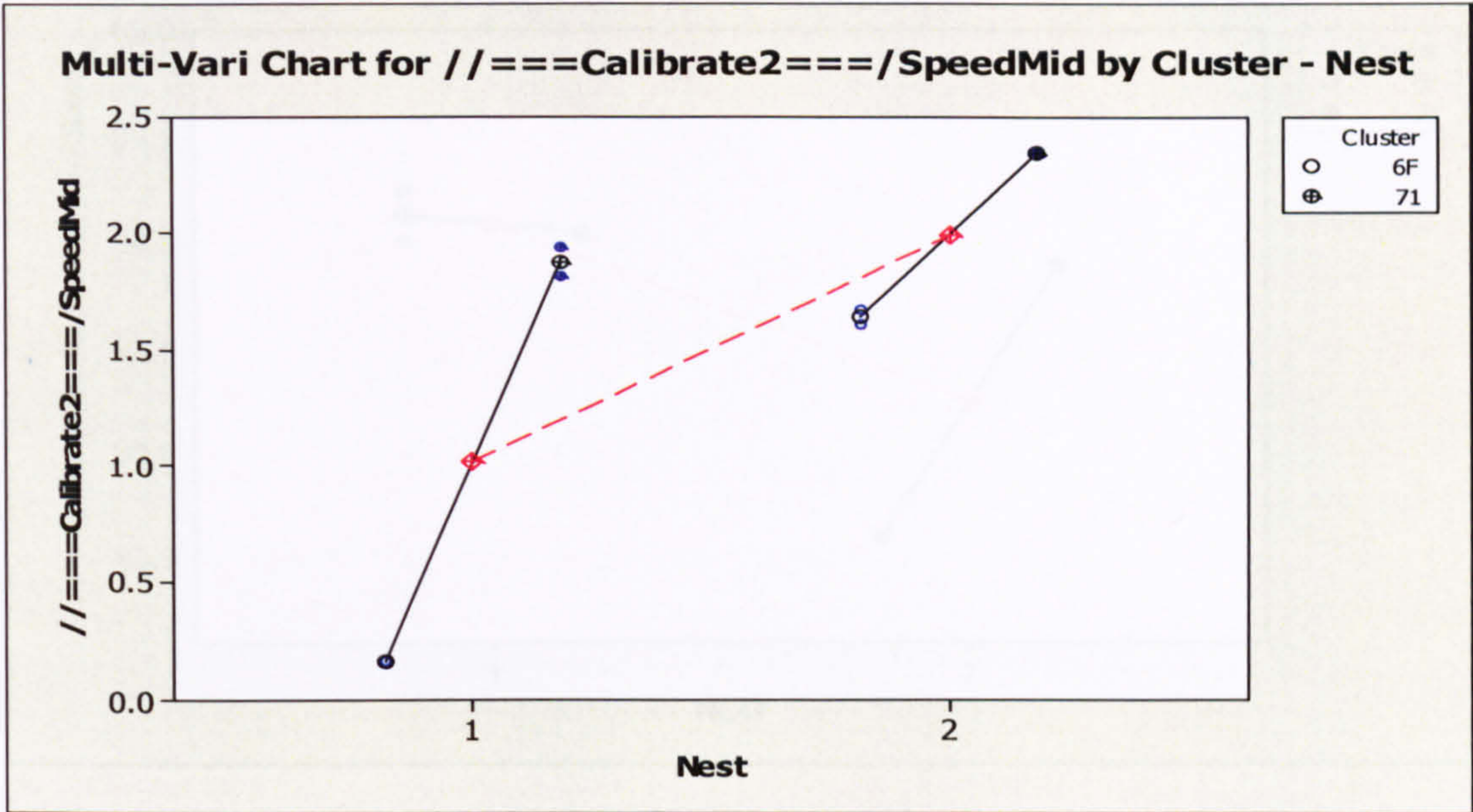
Clusters (mid series kilos, cell 2) were repeat tested in various configurations.
 The speedo mid validation data was plotted in a Multi-Vari as shown.



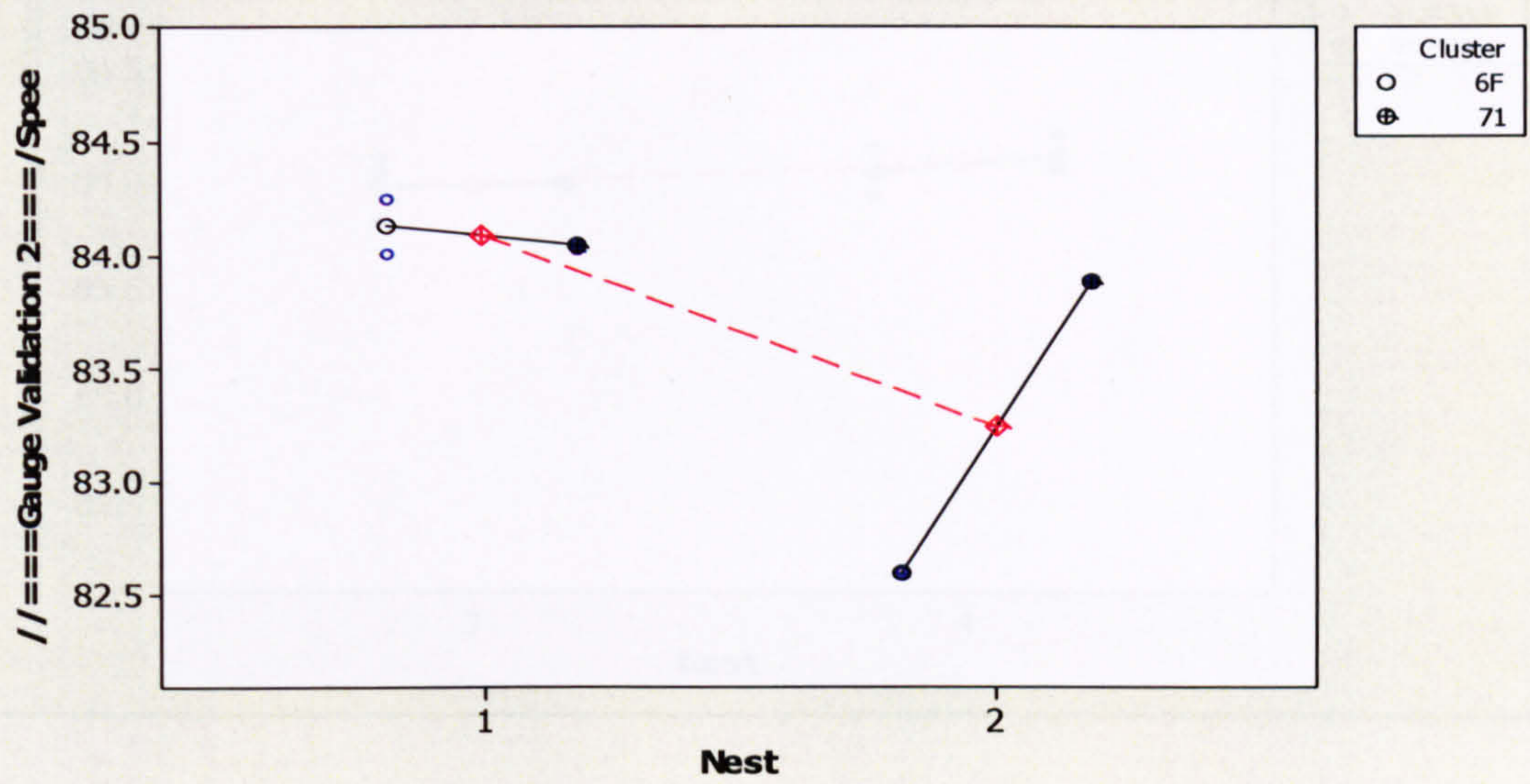


2 clusters, in top and bottom (one side of tester)
Similarly if 4 clusters are running at the same time

Speedo Mid



Multi-Vari Chart for //===Gauge Validation 2===/Spee by Cluster - Nest

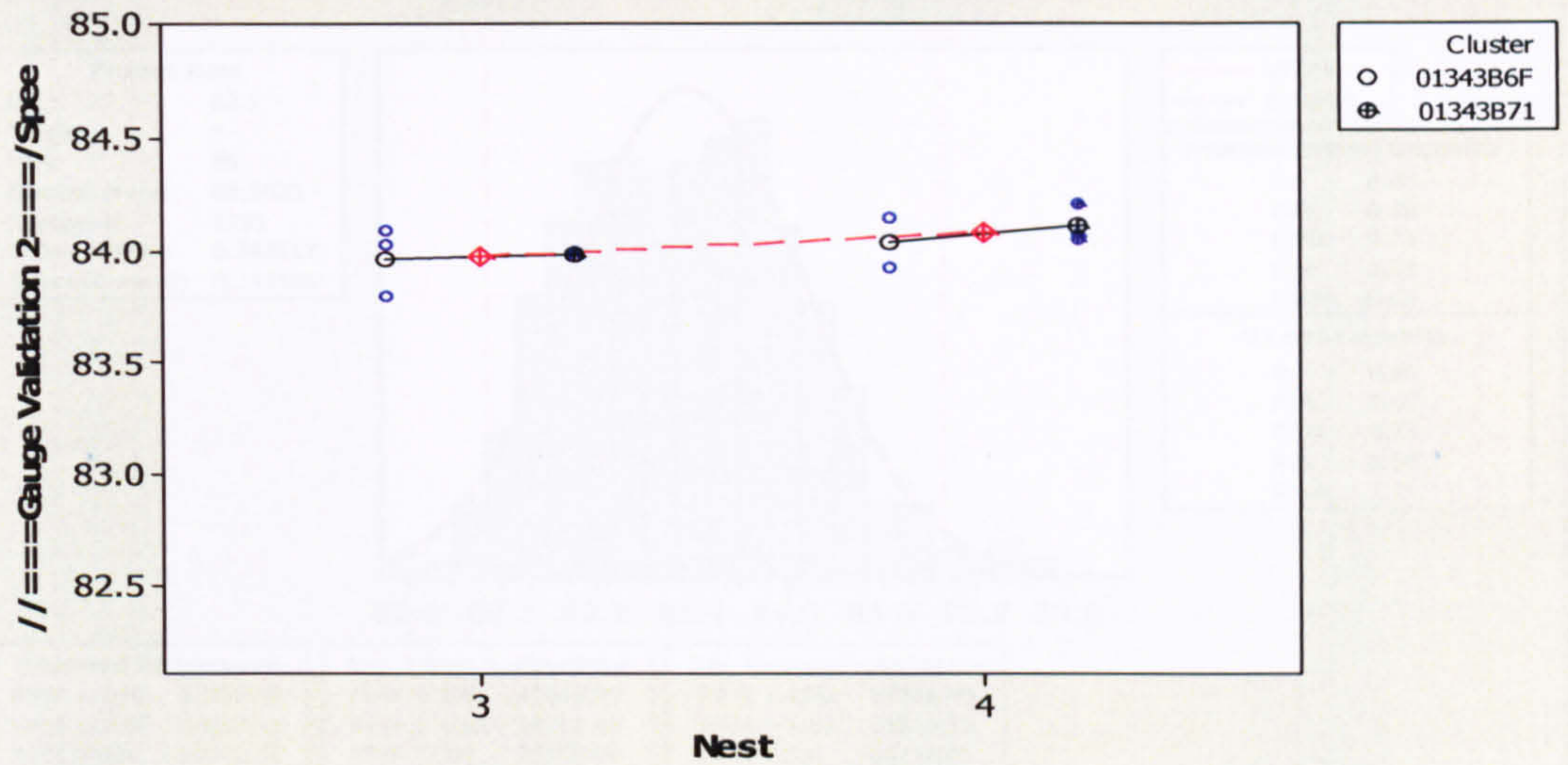


Val Mid Before & After

Process Capability of the Spec (2000-2005) (1.34-1.37)



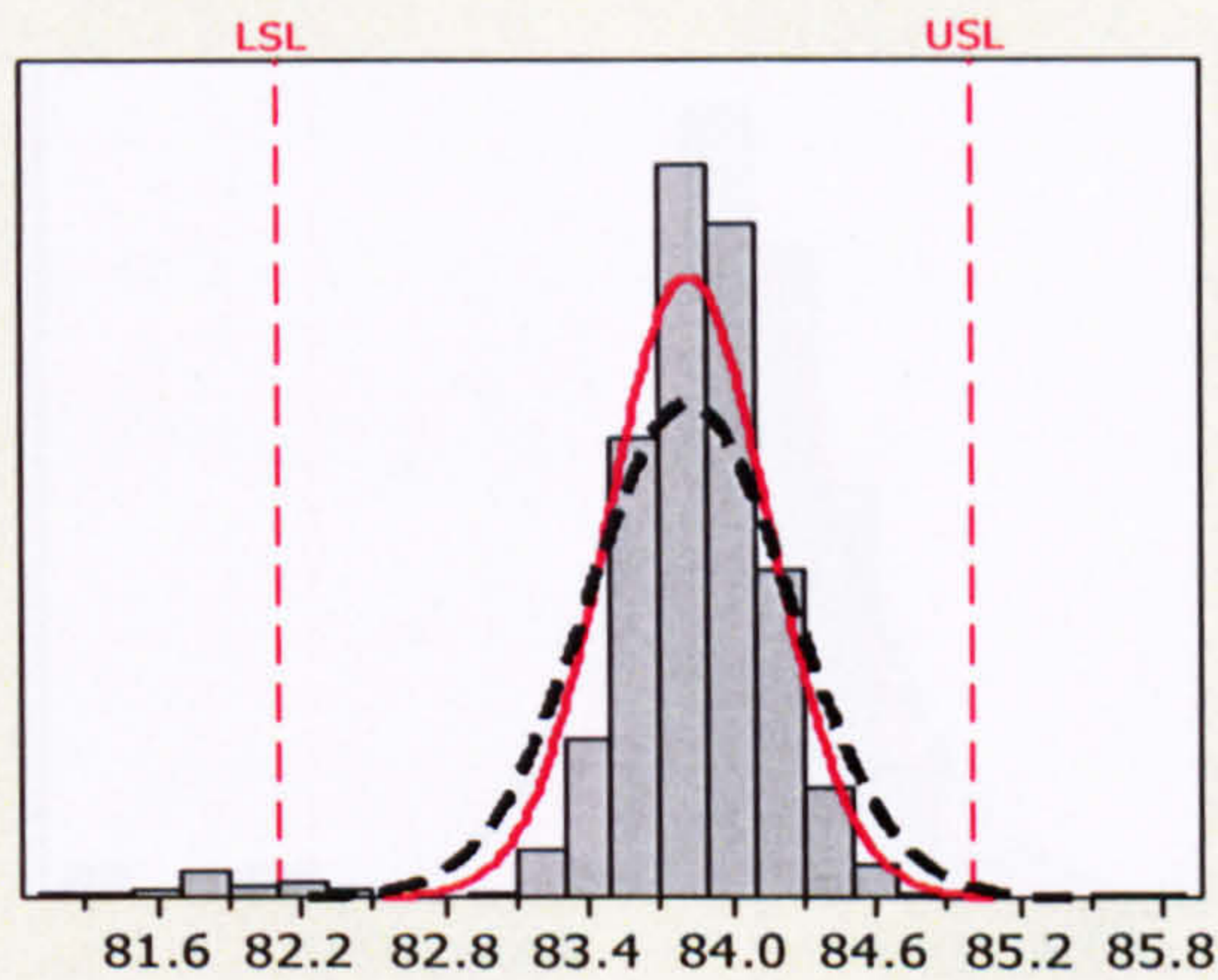
Multi-Vari Chart for //===Gauge Validation 2===/Spee by Cluster - Nest



Val Mid Before & After

Process Capability of Val Spd 80kph mid series pre fix (1&3)

Process Data	
LSL	82.1
Target	*
USL	85
Sample Mean	83.8209
Sample N	1284
StDev (Within)	0.340253
StDev (Overall)	0.425669



Potential (Within) Capability	
Cp	1.42
CPL	1.69
CPU	1.16
Cpk	1.16
CCpk	1.42

Overall Capability	
Pp	1.14
PPL	1.35
PPU	0.92
Ppk	0.92
Cpm	*

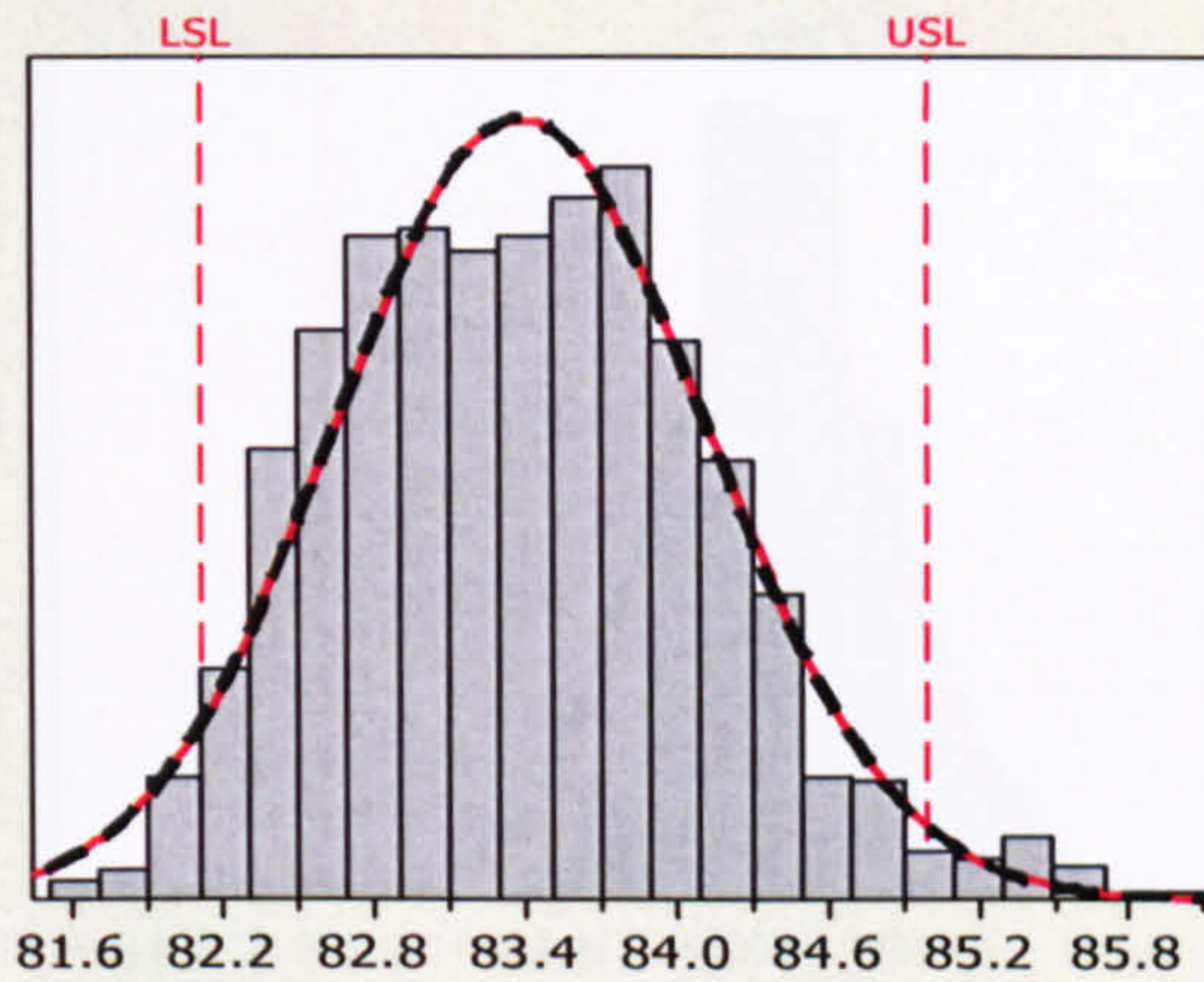
Observed Performance	
PPM < LSL	18691.59
PPM > USL	2336.45
PPM Total	21028.04

Exp. Within Performance	
PPM < LSL	0.21
PPM > USL	264.82
PPM Total	265.03

Exp. Overall Performance	
PPM < LSL	26.40
PPM > USL	2803.30
PPM Total	2829.70

Process Capability of Val Spd 80kph mid series pre fix (2&4)

Process Data	
LSL	82.1
Target	*
USL	85
Sample Mean	83.3823
Sample N	1231
StDev (Within)	0.743117
StDev (Overall)	0.741195



— Within
- - Overall

Potential (Within) Capability	
Cp	0.65
CPL	0.58
CPU	0.73
Cpk	0.58
CCpk	0.65

Overall Capability	
Pp	0.65
PPL	0.58
PPU	0.73
Ppk	0.58
Cpm	*

Observed Performance	
PPM < LSL	23558.08
PPM > USL	26807.47
PPM Total	50365.56

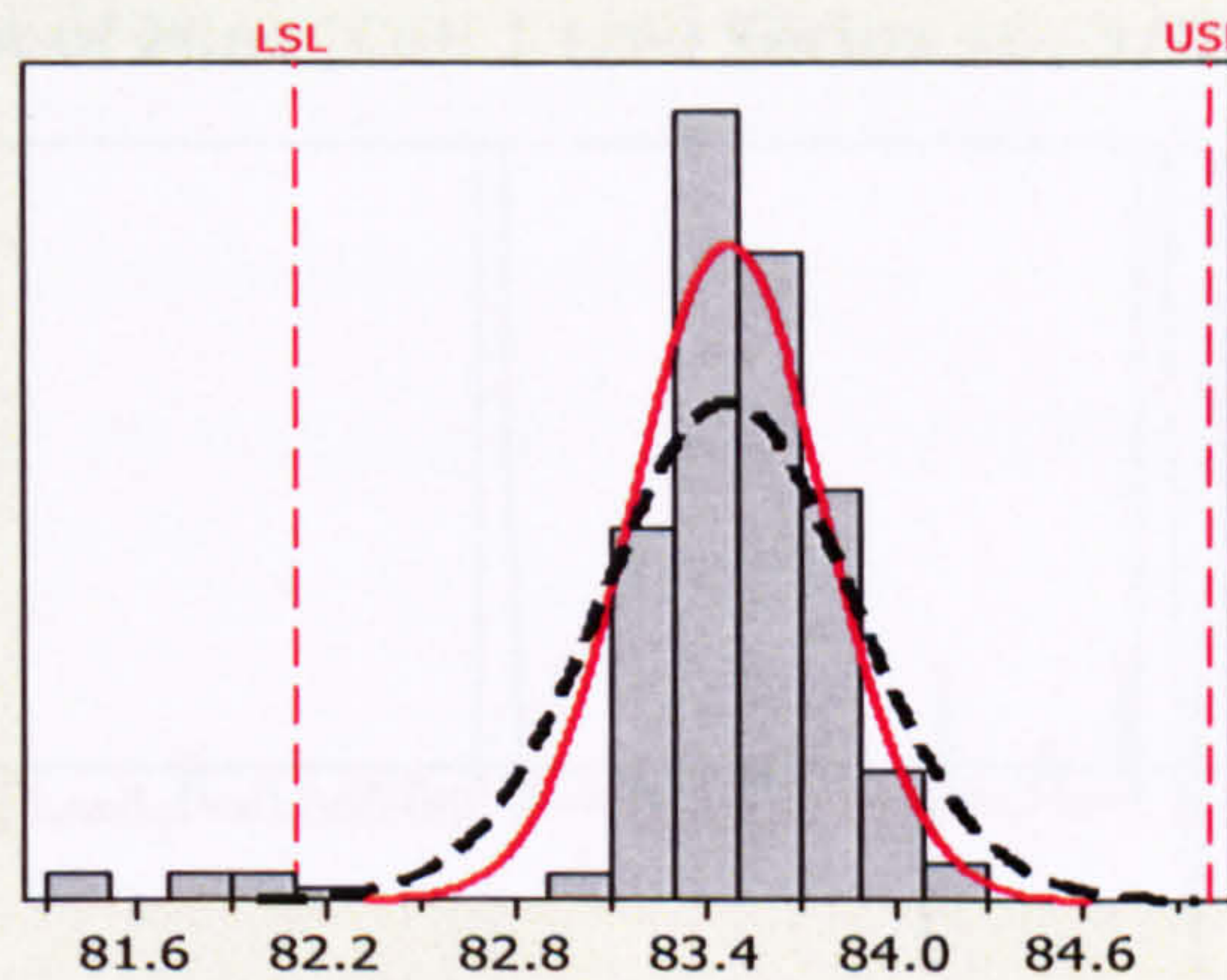
Exp. Within Performance	
PPM < LSL	42216.73
PPM > USL	14741.83
PPM Total	56958.56

Exp. Overall Performance	
PPM < LSL	41815.49
PPM > USL	14532.52
PPM Total	56348.01

Raw Performance

Process Capability of Val Spd 80kph mid series post bias (1&3)

Process Data	
LSL	82.1
Target	*
USL	85
Sample Mean	83.471
Sample N	194
StDev (Within)	0.306162
StDev (Overall)	0.401476



— Within
- - Overall

Potential (Within) Capability	
Cp	1.58
CPL	1.49
CPU	1.66
Cpk	1.49
CCpk	1.58

Overall Capability	
Pp	1.20
PPL	1.14
PPU	1.27
Ppk	1.14
Cpm	*

Observed Performance	
PPM < LSL	30927.84
PPM > USL	0.00
PPM Total	30927.84

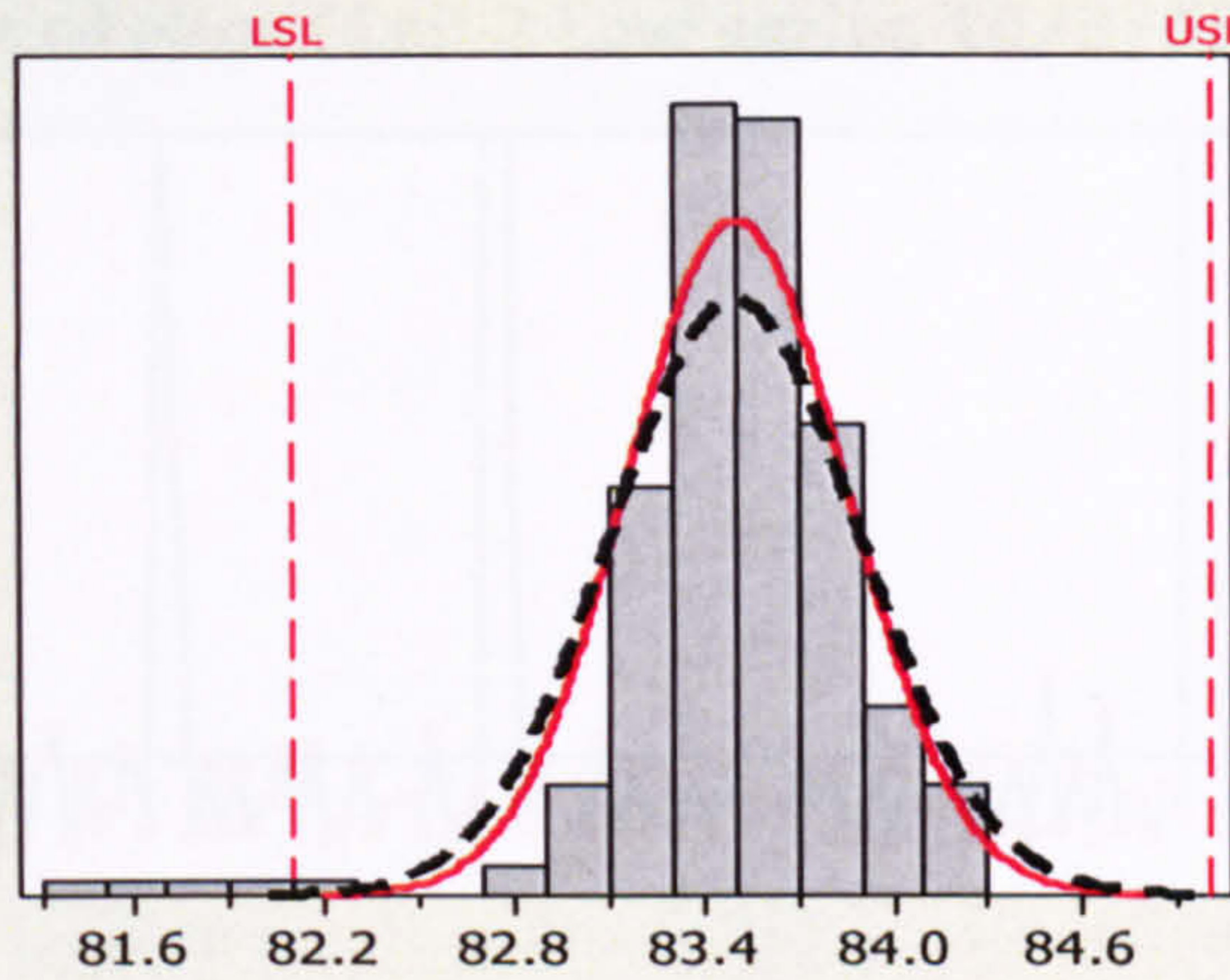
Exp. Within Performance	
PPM < LSL	3.77
PPM > USL	0.30
PPM Total	4.06

Exp. Overall Performance	
PPM < LSL	319.05
PPM > USL	69.92
PPM Total	388.97

2 clusters, either both in top or both in bottom

Process Capability of Val Spd 80kph mid series post bias (2&4)

Process Data	
LSL	82.1
Target	*
USL	85
Sample Mean	83.499
Sample N	188
StDev (Within)	0.351257
StDev (Overall)	0.398024



Potential (Within) Capability	
Cp	1.38
CPL	1.33
CPU	1.42
Cpk	1.33
CCpk	1.38

Overall Capability	
Pp	1.21
PPL	1.17
PPU	1.26
Ppk	1.17
Cpm	*

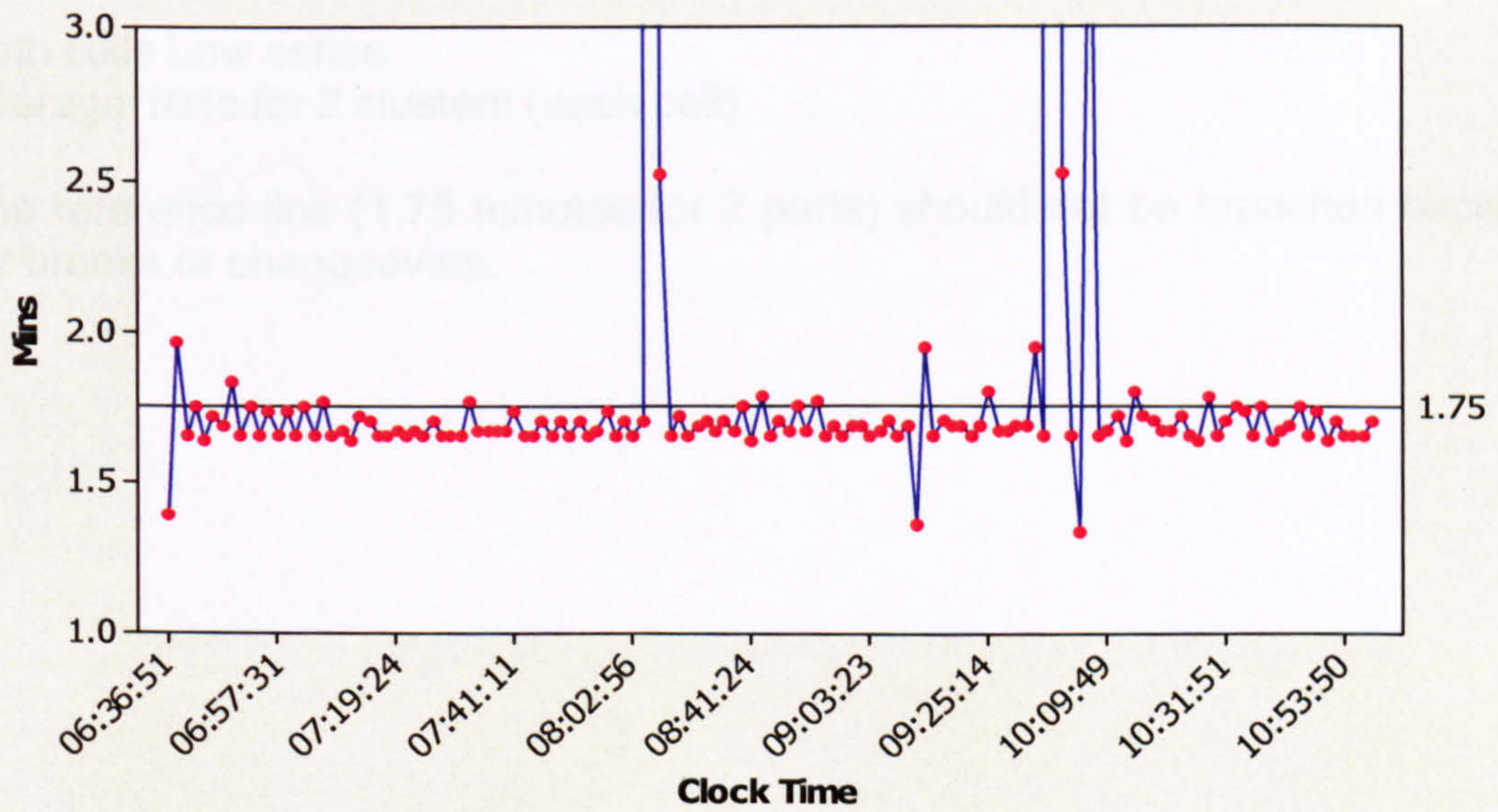
Observed Performance	
PPM < LSL	21276.60
PPM > USL	0.00
PPM Total	21276.60

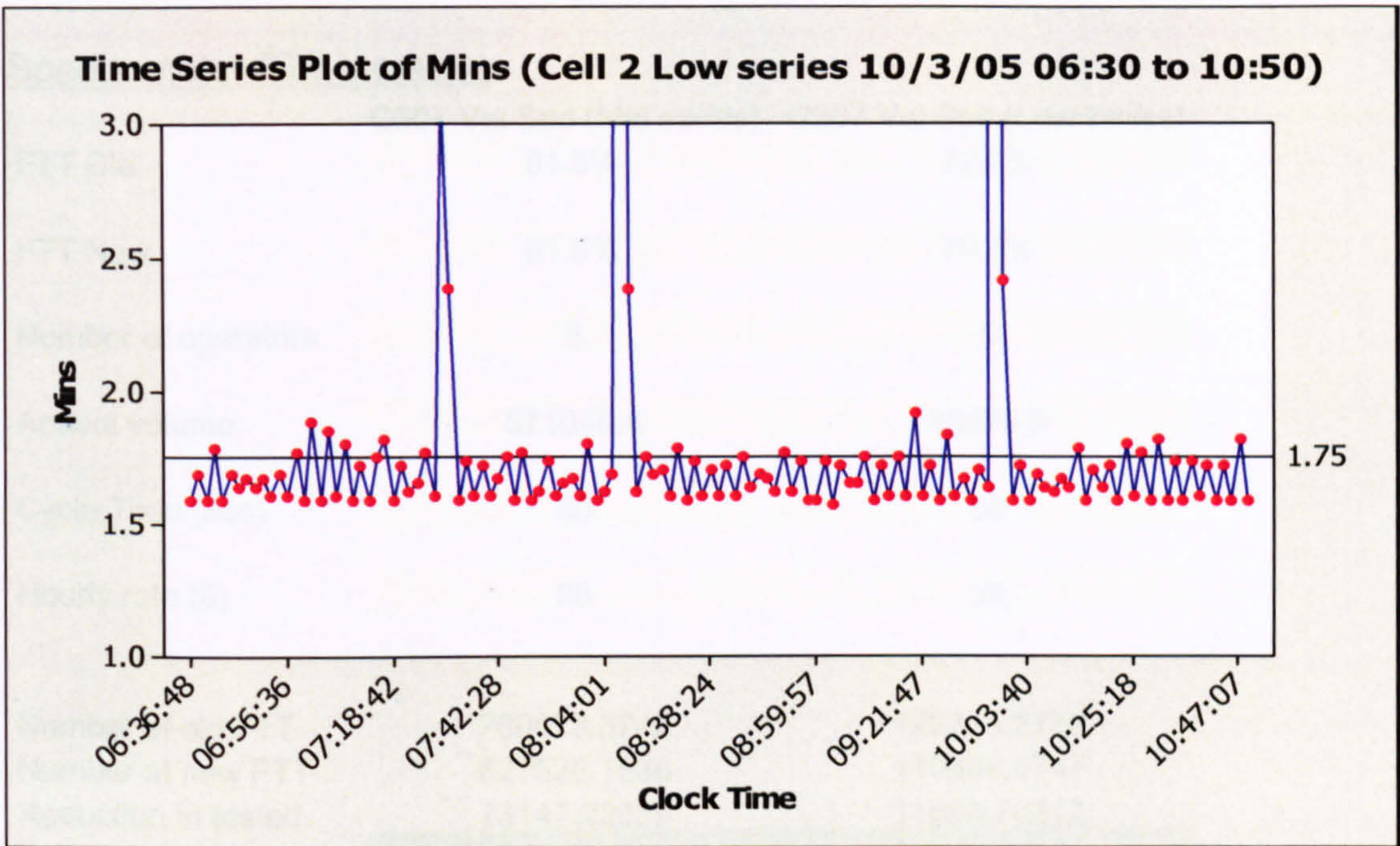
Exp. Within Performance	
PPM < LSL	34.05
PPM > USL	9.63
PPM Total	43.68

Exp. Overall Performance	
PPM < LSL	220.00
PPM > USL	81.25
PPM Total	301.25

Rate Performance

Time Series Plot of Mins (Cell 1 Low Series 10/3/05 06:30 to 10:50)





After implementation of standardised work for tester operator.

Both cells Low series
Average 101s for 2 clusters (each cell)

The reference line (1.75 minutes for 2 parts) should not be breached except for breaks or changeovers.

Cost Savings Calculation

Speedometer FTT increase

	C307 Val Spd (Mid series)	C307 Val Spd (Low series)
FTT Old	81.5%	72.0%
FTT New	91.0%	79.7%
Number of operators	5	5
Annual volume	571048.8	88376.6
Cycle Time (sec)	50	50
Hourly rate (\$)	38	38
Number at old FTT	700673.3742	122745.2778
Number at new FTT	627526.1538	110886.5747
Reduction in tested	73147.22039	11858.70312
Cost save per year (\$)	193027.3871	31293.79991

Standardised Work

Volume (Mar-Dec)	563056
Cycle time save (seconds)	5 (20 s per 4 parts)
Number of operators	5
Hourly rate (\$)	38
Cost save to year end(\$)	148584