Business success in small and medium sized enterprises through the implementation of the techniques of world class business and benchmarking

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BUSINESS SUCCESS IN SMALL AND MEDIUM SIZED ENTERPRISES THROUGH THE IMPLEMENTATION OF THE TECHNIQUES OF WORLD CLASS BUSINESS AND BENCHMARKING

DÓNAL Ó LIATHAÍN

MASTER OF BUSINESS STUDIES 2001
Business success in small and medium sized enterprises through the implementation of the techniques of World Class Business and Benchmarking.

By

Dónal Ó Liatháin

ABSTRACT

'Europe is losing its competitiveness' was the underlying message in the Tánaiste's, Ms Mary Harney, opening address, at the 3rd annual Benchmarking Conference held in the O'Reilly Hall, Dublin, on the 28th of February 2001. According to the latest figures from the European Commission, the European GDP lags its Japanese and American rivals by 17% and 33% respectively. Small and medium sized enterprises provide over 66% of the European Community employment and 65% of the turnover, which indicate the vital role played by small and medium sized enterprises in Europe's economy.

The objective of this thesis was to ascertain whether or not improved competitiveness and business success could be achieved in SMEs through the implementation of the techniques of World Class Business and Benchmarking. The research element of the thesis was recorded from two pilot projects conducted in Ireland, namely the World Class Rural Cluster project and the Innovative Management Techniques-World Class Business project. These projects examined the implementation of the techniques of World Class Business and Benchmarking in SMEs over a two-year period. The author of this thesis examines the results of these projects in addition to conducting a thorough literature review and analysing comparable national and international data.

Finally, the author concludes that indeed business success and improved competitiveness can be achieved in SMEs through the formal application in an appropriate way for SMEs of the techniques of World Class Business and Benchmarking.
Acknowledgements

Buíochas

Cead buíochas ó chroi libh a cháirde na feile
A chabhraigh leam scribhhn le díograis is éifeacht.
Do rianaigh mo chursa is do threóraigh le céil me
D’fhonn mo thaighde a bheith scrioifa go gaoismithe so-léite
Anois tugaim túise a bheith m'fhaoi thainigth leá Concentrated
Léachtóir in Instituid Árd Léinn Thrá Lí
A riaraíonn cúrsai gnó ann go tuiscintach fónta
Is lena dhea-chomhairle chuair slacht ar ma ghnó-sa

Ag gach cómhacht rannpháirtíteach tá mo bhuíochas mór tuillte
Ar a geursaí chuair gach eolas ar fáil dom gan diomait,
Guidhím rath ar a dtáirgí is cáil ar fuaid Éireann
Is saibhreas is sláinte do gach ball diobh in éinheacht
Is don Údarás Gaelach a thug dom-sa urraiocht
Guidhím toradh ar a saothar pé áitreamh ‘na mbíd
Is le Peadar mo bhrathair a cheartaigh na dréachtta
Is le Brid a dhean saothar a scriobh ghabhaim for bhuíochas.

Ta gach leathanach bán anois breacaite scriofa,
Ta deire lem ráitibh is mo dhualgas cómhlionta
Ar chursai eacnamaíochta a dhírhim mo dhreachtai
I dtir seo an Tiogair—Tír Ceilteach na hÉireann
Ach ag deire mo scéil-se ná deinim faíllí
Ar mo mháthair dhin béalí is a nigh na headai
Fé choimirce Dé sibh go seanmhar siochanta
Faoi thaithneamh na gréine gan easmhán ná gátar.

Dónal Ó Lìatháin.
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SECTION ONE
INTRODUCTION
CHAPTER 1: INTRODUCTION

1.0 OBJECTIVE.

1.1 BACKGROUND.

1.2 STATEMENT OF HYPOTHESIS.

1.3 STUDY TARGET GROUP.

1.4 SECTIONS OF THESIS.

1.5 CHAPTER CONTENT
1.0 OBJECTIVE.

The objective of this thesis is to evaluate whether or not business success can be achieved in SMEs through the implementation of the techniques of World Class Business and Benchmarking. These World Class Business and Benchmarking techniques have been tested and applied successfully by numerous large and multinational companies, in particular by businesses with strong links to Japanese and American enterprises. The application of these techniques in large and multinational companies has been proven to lead to improved competitiveness and profitability. This research studied the application of World Class Business and Benchmarking techniques to small and medium sized enterprises.

1.1 BACKGROUND.

The research element of this thesis was conducted during two pilot projects, which examined the implementation of the World Class Business and Benchmarking techniques in SMEs over a period of two years and analysed the results. One of the pilot projects named ‘The World Class Rural Cluster Project’ was conducted by Údarás na Gaeltachta with a cluster of eleven companies located in the rural Gaeltacht areas of the south-west of Ireland. The author fulfilled a project management role on this project. This project was conducted during the period January 1997 to December 1998, and is described in detail in chapter six.

Údarás na Gaeltachta, the Gaeltacht Authority, is the regional Government Agency with responsibility for the economic, social and cultural development of the Gaeltacht. The Gaeltacht areas are located mainly along the Western and South-Western seabords.
These areas are highlighted as shaded areas in Figure 1.1. They include areas of Donegal, Mayo, Galway, Kerry and Cork as well as smaller parts of Counties Waterford and Meath. Údarás na Gaeltachta pursues its core development objectives through job and wealth creation strategies in addition to a wide range of community, arts, language and cultural initiatives.

Figure 1.1 Gaeltacht areas of Ireland.

The second of the two projects was promoted by the Business consultancy division of Enterprise Ireland with a cluster of ten SMEs located near the East Coast of Ireland. Similar to the pilot project conducted by Údarás na Gaeltachta a core of World Class Business and Benchmarking techniques were tested on the participating companies.
over a period of two years and the results were analysed and documented. This project was conducted during the period January 1998 to January 2000, and is described in detail in chapter seven. Comparable research from an English project conducted by West London Technical College was also included in the research.

1.2 STATEMENT OF THE HYPOTHESIS

The hypothesis to be examined in this research is whether or not business success could be achieved by SMEs through the implementation of the tools and techniques of world class business and benchmarking. The author conducted a survey of 50 SMEs to get an interpretation of 'business success' that is representative of the group. This survey is described in chapter two.

H1: Business success can be achieved in SMEs through the implementation of the tools and techniques of world class business and benchmarking.

1.3 STUDY TARGET GROUP

The research conducted in this area to date is limited and therefore the author deemed that this particular research topic would be innovative and of potential value.

The author choose SMEs as the study target group for the following reasons:

- **Importance of group** - Small and medium enterprises constitute a vital sector in the development of national and regional economies, such as in Southwest Ireland. SMEs
provide over 66% of the European community employment, and 65% of turnover, which emphasises this importance (European Commission, 1995).

- **Competitiveness of this group**- The competitiveness of this group of companies is in question and with the advent of open markets it has never been more important for SMEs to improve their competitiveness.

- **Availability**- SMEs make up the majority of the client bases of Údarás na Gaeltachta and Enterprise Ireland. In the author’s role as a Regional Development Executive he works in the development of SMEs on a continual basis.

### 1.4 SECTIONS OF THESIS

The thesis is divided into four sections with the first presenting the background and objective to this research. Section two provides a review of the relevant literature and examines in particular the main areas of the research. These areas include:

- Small and medium sized enterprises.
- World class business.
- Benchmarking.

Section three describes the research methodology employed during this research and the basis for same. The author was actively involved in the World Class Rural Cluster project and to a lesser extent in the Innovative Management Techniques - World Class Business project. As a result of this, an action research methodology was employed by the author.
The research element of this thesis is based on the research conducted by the author during two projects, namely the World Class Rural Cluster project, and the Innovative management techniques-World class business project. A summary of these projects in addition to sample case studies are presented in section four. Two case studies from a comparative project in England are also presented in this section to give the research an International dimension.

The conclusions to be drawn from this research in addition to its finding is presented in section five.

1.5 CHAPTER CONTENT.

As previously outlined, this thesis examines the implementation of the techniques of World Class Business and Benchmarking in small and medium sized enterprises.

Initially, the author introduces the objective and background to the research statement and subsequently defines their context in this study.

Chapter two introduces the main terms of the literature review. The author endeavored to conduct as thorough a review as possible in completing same.

Chapter two also focuses on the area of small and medium sized enterprises making particular reference to the following areas: Definition, SME characteristics, Clustering in SMEs, Strengths and Weaknesses and Growth patterns.
Chapter three reviews the literature on the area of World Class Business reviewing in particular its evolution and techniques.

Benchmarking is covered in chapter four.

The research methodology employed by the author during this research is described in chapter five.

The first of two pilot projects, namely 'The World Class Rural Cluster Project', which studied the implementation of the techniques of World Class Business and Benchmarking in small and medium sized enterprises is described in chapter six.

The second project, namely 'Innovative Management Techniques-World Class Business', is described by the author in chapter seven.

Chapter eight examines two case studies taken from the World Class Rural Cluster project in addition to one case study from the Innovative Management Techniques-World Class Business project. These case studies are indicative of the experiences of the participating companies in the two projects. The author also refers to two comparable U. K. case studies in this chapter, in an effort to give an International dimension to the research.

Finally, chapters nine and ten conclude the research by examining the findings and conclusions of same.
SECTION TWO
LITERATURE REVIEW
2.0 INTRODUCTION TO THE LITERATURE REVIEW.

2.1 INTRODUCTION TO SMES.

2.2 SMES IN THE CONTEXT OF THE EUROPEAN COMMUNITY.

2.3 GROWTH PATTERNS IN SMES.

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2.8 CLUSTERING IN SMES.

2.9 BUSINESS SUCCESS IN SMES.

2.10 SUMMARY.
2.0 INTRODUCTION TO THE LITERATURE REVIEW.

This research study examines whether or not "Business Success" can be achieved as a result of the implementation of World Class Business and Benchmarking techniques in SMEs. In conducting this literature review the author researches the following areas:

1. SMEs as presented in this Chapter.
2. World Class Business as presented in Chapter three.
3. Benchmarking as presented in Chapter four.

One of the author's main objectives in completing this review was to conduct a thorough review and as a result studied books, journals, European and State papers, web-pages, conference materials and training materials in completing same. The author also attended conferences and seminars on the areas of Benchmarking and World Class Business, in an SME context, in an effort to research current best practices and methodologies in these areas. The following is a list of some of the Conferences and Seminars attended by the author in completing this review.
As a result of some of the terms of the study being coined only recently, the author notes that the literature available on some areas of the study was limited. The author also notes that in particular for the areas of World Class Business and Benchmarking in an SME context, that the literature becoming available on these areas is increasing rapidly, on nearly a daily basis, as these topics are evolving and developing.

2.1 INTRODUCTION TO SMEs.

The author, in this chapter, conducts a literature review of the definition of SMEs, their characteristics including their strengths, weaknesses and growth patterns. The author also reviews in this chapter, the applicability of the adoption of best practice to the SME in
addition to describing a survey of 50 SME managers, which the author conducted to establish a typical SME business manager’s interpretation of ‘Business Success’.

The European Commission’s (2000) definition of a small and medium enterprise is an enterprise, which has the following characteristics:

- Fewer than 250 employees.

- Has either an annual turnover not exceeding Euro 40 million, or an annual balance sheet total not exceeding Euro 27 million.

- Conforms to the definition of independence defined as follows:

   “An enterprise is considered independent unless 25% or more of the capital or the voting rights is owned by an enterprise falling outside the definition of an SME or of a small enterprise, whichever may apply, or jointly by several such enterprises”

This ceiling may be exceeded in two cases as follows:

1. If the enterprise is held by public investment corporations, venture capital companies or institutional investors provided no control is exercised individually or jointly.
2. If the capital is spread in such a way that it is not possible to determine by whom it is held and if the enterprise declares it can legitimately presume that it is not owned as to 25% or more by one enterprise, or jointly by several enterprises falling outside the definition of an SME or a small enterprise whichever may apply.

Where it is necessary to distinguish between ‘small’ and ‘medium-sized’ enterprises, a ‘small’ enterprise is defined as one which:

- Has fewer than 50 employees.

- Has either an annual turnover not exceeding Euro 7 million or an annual balance sheet not exceeding Euro 5 million and conforms to the criterion of independence earlier defined.

In an Irish context O’Kelly and Tobin (1996) put the accepted figures at less than 50 for a ‘small’ company and less than 250 for a ‘medium’ sized company. Voss et al (1995) in their study of European competitiveness define companies employing less than 50 staff as very small, companies employing 50 to 200 being described as ‘small’, and companies employing 200 to 500 described as ‘medium’.
2.2 SMEs IN THE CONTEXT OF THE EUROPEAN COMMUNITY

Table 2.1 taken from the EU green paper (1995) indicated that SMEs provided over 66% of the community employment, and 65% of turnover. The green paper also identified that 99.8% of community firms have fewer than 250 employees with 91% employing fewer than 20. The net employment created by the Communities SMEs between 1988 and 1995 exceeded job losses in the large companies in the same period.

<table>
<thead>
<tr>
<th>European Community</th>
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<tr>
<td>SMEs</td>
<td>Employment 66%</td>
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Table 2.1 EU Green paper extract (1995).

The paper identified that

"enterprises with fewer than 100 employees account for virtually all new jobs at a net rate of 259,000 per year."

These figures indicate that a significant amount of the EU workforce is employed by SMEs, particularly in the smaller sized enterprises.

The European Commission white paper (1994) states that SMEs generate over 70% of Community turnover and between 65% and 85% of value added in those countries where
data is available. Obviously, the potential contribution and importance of SMEs in achieving growth and employment and output within the community is clear. Brown (1998), in his report in the International Small Business Journal also stresses the importance of the role of SMEs to the success of the Irish Economy and highlights that the growth of Multi-national companies is dependant on SMEs as suppliers. This view is augmented by Hannigan (2000) in his report on ‘Ireland’s Economic Performance : A View From The MNCs’, in the IBAR Journal. At national level, Forfás (1996) and the PCW (Programme for competitiveness at work) (1994) have identified the importance of SMEs to future prosperity. According to the Forfás Annual Report (2000) 40% of the total growth in Ireland’s employment during the year may be attributed to growth in SMEs. This report also states that during the year 2000, 127,040 people were in full time employment in SMEs. The Tánaiste also stressed the importance of SMEs to the strength of the European and Irish Economies in her opening address at the 3rd National Benchmarking Conference in February 2001.

2.3 GROWTH PATTERNS IN SMEs.

Many entrepreneurs have a dual attitude to the growth of the company. According to Thomas Brytting (1989) a Swedish survey states that more than fifty percent of the small company managers think that there exists a market with greater potential than that which they are covering at present, and that it would be possible for them to expand their businesses. Of these, half state that they do not intend to expand their business but maintain the present size of the company. Thomas Brytting (1989) also refers to further
surveys in this report which show that there is often a limit of around 10 to 12 employees, where further expansion is no longer considered.

Colby and John (1976) were of the opinion that many of the entrepreneurs of SMEs appeared to be divided between those on the one hand who wish to maintain their company’s present size, thus safeguarding their independence and the satisfaction it brings, and on the other hand those who view the need for the businessman to expand almost as a moral imperative. In most cases, the wish for the more personal satisfaction and maintaining present size prevailed. The desire for expansion and growth was only a statement for the benefit of the public not the entrepreneur’s intention in reality. (Colby and John, 1976).

The prerequisites for growth in SMEs differ greatly. An analysis described in the illustration ‘Benchmarking Facts- A European Perspective’ edited by Richard Keegan (1998) states that there are three distinctly different categories of small and medium sized companies:

- The child company is growing and expanding on its way to becoming a larger firm. It will need nourishment, training models etc. in its process of development.

- The pygmy company has found its proper shape where its is often in a well-adapted and healthy final stage.
• The dwarf company however is held back by inhibiting factors within itself or it may lack some criteria essential for growth. Its size is a handicap, often-requiring treatment and care. It will take a thorough discussion on the future of the company to break the limits of its actions and to realise its potential. This may even be a painful process, and it is therefore not surprising to find that the dwarf company has a high threshold to overcome before the roots of its problems are identified.

This study by Keegan has proven very significant in the analysis of the growth rate of SMEs and the mindset of their managers.

2.4 SME CHARACTERISTICS.

According to the Austrian Stephen Berchtold (2000), an independent researcher and consultant, some widely found traits shown by SMEs are as follows:

• The key role of the Manager – The Manager of an SME plays a significant role in its development. The importance of this role is also stressed by Brown (1998) in his analysis of the critical success factors to implementing TQM in SMEs.

• SMEs do not have resources comparable to those of large organisations (in terms of time, workforce etc).

• In most cases, they are new to the world of benchmarking and continuous improvement (lack of know-how).
• Their organisational cultures do not support change and learning, as they are often family owned and thus very focused on continuity.

• Process thinking is unfamiliar or new to them.

The author from his experience of working with SMEs would add the following characteristics to this list:

• The formal education of entrepreneurs varies widely. Many of them have a surprisingly short education in view of the tasks they are undertaking and the competence they show. Managers of SMEs will usually possess distinct skills in some areas of their business but will be lacking in some others. The balance of the company’s operations will be tilted in favour of those of which the manager possesses distinct skills on more often than not.

• The financial base of SMEs is often weak.

• Incentives for the entrepreneurs are to make money, to be independent and to achieve a higher degree of self-esteem.

• The SME is usually working against the clock. It usually lacks specialist resources and it has a minimum of administration.
• Its contact with the world around it is dependent on the local business environment.

### 2.5 THE STRENGTHS AND WEAKNESSES OF SMEs.

The EU White Paper (1994) identified a number of strengths and weaknesses of SMEs.

#### 2.5.1 STRENGTHS.

- Their presence in expanding new markets.
- Their internal organisation and flexibility.

#### 2.5.2 WEAKNESSES.

- Their structured capacity to deal with the complexity of the administrative and legislative environment.
- Their capacity to overcome financing difficulties.
- Their capacity to come to terms with the complexity and to develop strategic policies.
O’Kelly and Tobin (1996) identified some negative characteristics of SMEs as being:

“lack of management training and qualifications, low competence levels, difficulty in attracting and retaining skilled labor, limited financial resources and dependency on a limited customer base”.

Tann (1992) agreed that lack of resources in SMEs was a significant negative characteristic of these companies.

Herluf (1992) discussing the stimulation of innovation within companies stated that

“Most SMEs have problems, and many of their problems have to do with a lack of managerial skill”.

In the very small company, Herluf (1992) stated that the ‘manager’ is the enterprise. This can make the development of the operations both easy and difficult. If the manager is open to development it is often easy to introduce changes. If the manager has a closed mind then it can be difficult if not impossible to introduce real change to the operation.

This study is concerned with the capability of SMEs to change and adopt best practices. Globdain and Gallear (1996) examined this idea and described as follows the advantages and obstacles to introducing best practices to SMEs:
2.6 THE ADVANTAGES OF INTRODUCING BEST PRACTICES IN SMEs.

Best practices are defined by C.J. Scott (2000) in the illustration 'Helpmate Definition of Best Practice' as

'Best Practices are policies, procedures and technologies implemented in functional areas by leading companies. Best Practices produce significant improvements in customer satisfaction, time, cost and quality'.

In the context of this research, the term 'Best Practice' describes those recognised 'Best in World' techniques which are implemented in companies to effect improved competitiveness. World Class Business and Benchmarking techniques are recognised Best Practices. Some of the advantages of introducing best practices in SMEs as proposed by Globdain and Gallear (1996) include:

- Leadership, visibility and participation by the top managers are points emphasised by all the best practice gurus, including Deming, Crosby and Juran. As the manager is often dynamic and entrepreneurial and enjoys a high visibility it should be easier for an SME to implement best practices.

- SMEs have better vertical visibility i.e fewer lines of authority.
• In SMEs, employees tend to be closer to the firm's products and to the customers, creating an increased sense of responsibility.

• Smaller companies have a natural tendency for cross-functional training because they have fewer layers of management and staff. With fewer people to mobilise, change can come quickly because it is easier to get all the groups together to initiate the change.

• It is easier for SMEs to create the kind of atmosphere that fosters personal growth. This shows people how their jobs fit into the organisational goals and encourages them to come up with ideas for improving or expanding their business.

• An SME is inherently a meritocracy, in that individuals can see their efforts translated into tangible results.

• An SME can make decisions quickly, communications and co-ordination between staff members is easier and less bureaucratic, and line managers and personnel members have better access to management.

• The larger the organisation the greater the resistance to change and as SMEs are usually located on a single site, the launching and introduction of best practices should be easier.
2.7 THE OBSTACLES TO INTRODUCING BEST PRACTICES IN SMEs.

The obstacles to introducing best practices in SMEs as proposed by Globdain and Gallear (1996) are as follows:

- In SMEs the manager's personality may dominate the culture.

- SMEs because of their size offer limited career opportunities and as a result often find it difficult to retain or recruit experienced staff. The absence of this type of personnel in a SME makes it difficult to implement Best Practices.

- The knowledge base within an SME is usually weak and difficult to develop with the available manpower.

- SMEs are often under pressure to gain registration to a standard quality management system. Meeting these requirements can be a formidable task, requiring motivation by the management and the necessary technical skills and resources to appreciate and implement the standards.

- Perhaps the most prominent disadvantage SMEs have over their counterparts is the lack of resources necessary in the development of a quality culture. The scarcest resource for these smaller firms is time. In order to implement the quality programme properly some staff members have to leave their normal activities to
concentrate on the programme and this causes considerable difficulties in an SME unable to profit from economies of scale.

- SME's are often skeptical of outside help, and there is generally less interaction and information sharing between them. With an unsystematic management style and the fact that market research is usually incidental, potentially valuable knowledge from external resources is often neglected.

SMEs are very important to the success of Europe on world markets. Multinational companies rely on SMEs for work they out-source to them. Unless the SMEs can perform to 'World Class Standards' they will hinder multinational companies who are competing on the world stage. Hum and Ng (1995) make the point that many of the multinational companies operating in Singapore are operating under JIT (just in time) purchasing policies. These policies put the emphasis on local suppliers to embrace the concept of 'JIT supply' to avoid the risk of losing business through 'JIT lockout' from the multinational companies.

The author works for a state development authority namely Údarás na Gaeltachta whose portfolio is comprised totally of SMEs. The author chose SMEs in his research for a number of reasons some of which have been previously outlined:

- Importance to economy.

- The limited number of studies of this nature completed on SMEs to date.
To gain invaluable insights on the success patterns of SMEs.

Availability.

2.8 CLUSTERING IN SMEs.

The concept of clustering, in the context of SME’s was examined by the author during this research. The objective of the concept of clustering according to the Wellington Business Center, New Zealand, is to facilitate

“The growth of successful world class industry through collaboration to overcome roadblocks and constraints for the benefit of businesses and the wider community” (2001)

Professor Michael E. Porter, guru of competitive strategy concurred with this view of clustering in his address at the MBA Association held in University College Cork in October 2000. The merits of clustering are also illustrated by Van Dijk et al (1996) and Casaburi (1999)

Clustering played a significant role in the two research projects in this research. This clustering was conducted on three different levels:

1. Physical Clustering

Because of the rural location of the companies that participated in the research projects the cost of consultants was prohibitive. Consultants in some cases had to travel for four
hours to reach the sites of these companies and then conduct their consultations. The majority of SME's because of their size and limited resources could not afford to dedicate days at a time to these consultations. By arranging companies in physical clusters these issues were satisfactorily addressed. A consultant could spend half a day with one company in the cluster and the other half with another company. This resulted in consultancy being delivered in a cost effective and appropriate way to SME's.

2. Project Clustering

By having a significant number of companies in a greater geographical area, off-site training sessions could be arranged in a cost and time effective way. Experts in specific topics could present to seven to ten companies at a single session, greatly improving the level of their input.

3. Company Clustering

The staff and management of the companies developed links during the research projects. They visited each other's sites and discussed solutions they had developed to constraints in their businesses. This proved to be the most significant aspect of clustering as the companies collaborated to develop their competitiveness.

In terms of the negative aspect of SME clustering, Professor Porter expressed the view that the mix of companies in any cluster is an important factor in its success. A conflict of
interest between companies in the cluster may have a detrimental effect on the success of
a cluster. The author, based on the insights gained during this research agrees with this
view and would add that companies in a cluster should be of a similar level of
competence for maximum effectiveness to be achieved. All the companies in the cluster
can benefit in this type situation, including the strong ones.

2.9 BUSINESS SUCCESS IN SMEs.

People's interpretation of 'Business Success' varies. An owner-manager with little
business qualifications and a professional manager's interpretation will certainly vary.
On this basis, the researcher in an effort to evaluate a representative interpretation of
business success in SMEs surveyed 50 managing directors from SMEs located in the
southwest Gaeltacht regions of Ireland.

The Managing Directors of the SMEs were simply asked to define 'Business Success' in
the context of their businesses. The majority of the SME's surveyed were owner
managed manufacturing companies ranging in size from 15 employees to 200. Figure 2.1
illustrates the interpretation of the respondents.
As evident from Figure 2.1 profitability and improved competitiveness equate to the interpretation of 90% of the respondents. The researcher therefore concludes, to prove the hypothesis of this research, that is "Business Success can be achieved in SMEs through the implementation of the techniques of World Class Business and Benchmarking", the participating companies in this research must have experienced profitability and improved competitiveness.

2.10 SUMMARY.

This chapter is a literature review of SMEs which reviews in particular the definition of SMEs, their characteristics including their strengths, weaknesses and growth patterns. The suitability of SMEs to the adoption of best practice is also reviewed in this chapter.
The contribution SMEs make to the GDP, both on a national and European basis is emphasised in this chapter.

One of the key points made in this chapter is the importance of the manager to the SMEs, Herluf (1992) emphasises this point by stating that the enterprise is the manager. This a valid point and verifies that all SMEs are different and that the emphasis on their operations corresponds with the preference of their managers. As a result of this, flexibility is key to the successful implementation of a world class business programme in a SME. The world class business programme must be appropriate for each SME. This point is dealt with in detail by the author in the final section.

The next chapter reviews the literature of World Class Business.
CHAPTER THREE : WORLD CLASS BUSINESS

3.0 INTRODUCTION.

3.1 BACKGROUND.

3.2 THE TECHNIQUES OF WORLD CLASS BUSINESS.

3.2.1 JUST IN TIME (JIT).

3.2.2 PROCESS AND PHYSICAL FLOW.

3.2.3 KANBAN – TWO BIN SYSTEM.

3.2.4 SET-UP TIME REDUCTION.

3.2.5 TOTAL PRODUCTIVE MAINTENANCE (TPM).

3.2.6 TOTAL QUALITY MANAGEMENT (TQM).

3.2.7 EMPLOYEE INVOLVEMENT.

3.2.8 BENCHMARKING.

3.3 WORLD CLASS BUSINESS IMPLEMENTATION PROCESS.

3.4 SUMMARY.
3.0 INTRODUCTION.
This chapter conducts a literature review on the area of World Class Business. The author initially reviews the background to the concept of World Class Business in addition to its evolution. Following this, the author reviews the literature on the tools and techniques of World Class Business employed during the research element of this thesis, making reference to some practical examples. Finally, the author reviews the World Class Business process implemented during these initiatives.

3.1 BACKGROUND.
World Class Business is a phrase that has been recently coined to describe the application of World Class Manufacturing techniques, as identified by Schonberger (1986) and Hayes and Wheelright (1988), to other areas of the business in addition to manufacturing.

In the late seventies and early eighties an American researcher Dr. Richard Schonberger, visited both Japan and Japanese manufacturing facilities in America. He coined the phrase 'World Class Manufacturing' to encompass what he had observed happening in the best of the Japanese companies he visited. Dr. Schonberger observed that the principles of Total Quality Management, Employee Involvement and Just in Time techniques were being applied to those companies.
World Class Business stems from the definition of World Class Manufacturing which is illustrated by Mr. Richard Keegan in the book ‘World Class Manufacturing in an Irish context’ (1995) which states

“In simple language, World Class Manufacturing is about making products or providing services quicker, better, cheaper…..together”.

Many researchers have conducted studies of the application of the techniques of World Class Manufacturing, more recently termed World Class Business, in many world leading companies in manufacturing. Research conducted by Hayes and Wheelwright (1988) Flynn et al (1995) have described in detail how the world leaders in manufacturing engaged the techniques of World Class Business. These companies were typically very large manufacturers, well resourced and of Japanese or American origin. The World Class Business process engaged by theses companies has been described by Mr. Peter Mac Cannon, Irish Development Board as

“similar to heart surgery”,

where it can be a costly process and where a company’s processes and systems are assessed and possibly changed. This view of the World Class Business process is shared by many and has acted as a significant deterrent to SMEs in applying the process.
As illustrated in Figure 3.1 the concepts of World Class Manufacturing have since developed to be known as World Class Business. The reasoning for this is that the principles of Total Quality Management, Just in Time and Employee Involvement are now being applied to other areas of the business in addition to manufacturing. This approach is a holistic approach to company improvement. World Class Business may be defined as

"the pursuit of best practice in all areas of a company's operations" Keegan (1995).

In the context of this research, Mr. Peter McCarron's definition of 'World Class Business' as presented at the '2nd Annual Benchmarking Conference, 2000' is most applicable. Mr. Peter McCarron's (Irish Development Board) definition reads as follows:

"The application of the techniques of World Class Manufacturing to other areas of the business in addition to manufacturing".
Evolution of WCM

Waste Elimination
Supplier Development
Total Quality Control
Employee Involvement

Evolution of World Class

Figure 3.1 The evolution of World Class Business (World Class Business handbook, Údarás na Gaeltachta, 2000)

Each of the aforementioned topics covers a wide range of tools and techniques that can range from the very simple to the very complicated. A company irrespective of its size must come to its own understanding of any concept. The company needs to take ownership of the concept and modify and apply those elements that are appropriate for them at that particular time. The ideal scenario occurs when a company starts at a low level on specific tools and increases their use of them as their capabilities increase and their understanding develops.
3.2 THE TECHNIQUES OF WORLD CLASS BUSINESS.

The author wishes to highlight the methodology of two pilot projects, which have implemented the tools, and techniques of 'World Class Business' successfully in Irish SMEs. The objective of these projects was to simplify the tools of WCB and to develop a core of these tools applicable to SMEs.

The following sections will illustrate the tools and techniques of 'World Class Business' which were implemented in SMEs during two pilot projects, namely the 'World Class Rural Cluster Project' and the 'IMT-World Class Business Project' which are described in detail in chapters six and seven respectively.

These projects endeavored to apply the World Class Manufacturing Techniques proposed by Schonberger (1986), Suzaki (1987), Hayes and Wheelright (1988) and Keegan et al (1995) to other areas of the business other than manufacturing.

The following is a summary of some of the techniques that were applied during this research.

- Just In Time (JIT)
- Process and Physical Flow
- Kanban – Two bin System
- Set-up Time Reduction
- Total Productive Maintenance
- Total Quality Management
- Employee Involvement
- Benchmarking.
3.2.1 JUST IN TIME (JIT).

The Japanese created an Inventory Management system for manufacturing based on the Toyota Manufacturing System, which they termed 'Just in Time Manufacture'. JIT as its name suggests means making parts or providing a service, as it is needed, not earlier and certainly not later. The Japanese created JIT to suit their own culture and national characteristics as the Japanese operate under limited production space availability and difficult infra-structured conditions. They needed to adopt a method to allow them remove waste from their production processes. JIT focuses on waste. Not waste as it is understood in the Western World but waste in a true sense. ‘Waste’ is defined simply by Professor Yamashina in his lecture on JIT in Kyoto, Japan, October 1998 as follows

“Any cost added to a product or service that does not add value to it”.

By actively and aggressively addressing the causes of waste within an operation one can significantly reduce the costs associated with a product.
This type of waste has been identified by the Toyota Corporation as the following:

1. Waste from overproduction.
2. Waste from waiting time.
3. Transportation waste.
4. Processing waste.
5. Inventory waste.
7. Waste from production defects.

The primary thrust of JIT is identifying these wastes in production environments and eliminating them where possible or reducing them significantly where elimination is not possible. Management research in the U.S. (Deming, Juran et al, 1982) have studied the question of waste within the manufacturing process extensively and have concluded that up to 90% of the waste was attributable to the systems methods and processes that management had introduced to the manufacturing floor. Only the balance of this waste may be attributable to the operators.

The following are some of the JIT tools and techniques as proposed by Schonberger (1986), Suzaki (1987), Hayes and Wheelright (1988) and Keegan et al (1995) that were implemented in SMEs during the pilot projects described in chapters six and seven.
• Process and Physical Flow.
• Kanban – Two Bin System.
• Set-up Time Reduction.
• Total Productive Maintenance.

3.2.2 PROCESS AND PHYSICAL FLOW.

According to Schonberger (1986) and Keegan et al (1995) the area of Process and Physical Flow is the key starting point for JIT. As illustrated in Figure 3.2 the Process and Physical Flow lists the stages a product passes through on its way from being a series of raw materials to being a finished product.

Process Flow

![Diagram of Process Flow]

Figure 3.2 An example of process and physical flow analysis. (The world class manufacturing book, Údarás na Gaeltachta, 2000)
By critically examining these steps in the manufacturing process it is possible to identify wastes in the process enabling reductions in inventory, lead-time, transportation and scheduling to be achieved.

3.2.3 KANBAN-TWO BIN SYSTEM.

The Kanban (Japanese term for signal) or the two-bin system is an extremely simple method of stock control. Parts are stored in either of two bins. Parts are used from the first bin. When it is empty, the bin itself acts as a stimulus for replenishment. It can be an actual bin, a stores location, a bag of parts or even barrels or vats of material. The following example as described by Keegan et al (1995) in the illustration “World Class Manufacturing ........ in an Irish Context”, demonstrates the concept.

Bin A contains a chosen number of a particular part. Initially, the bin quantity is generally set to meet the requirements of a set number of days production. As the system is proven, this quantity can be significantly reduced to meet the material requirements of a number of hour’s production. When Bin A is emptied, it is left in a collection area for the materials staff to fill it. The bin usually carries a label identifying the part, part number and quantity.

The manufacturing staff uses the parts in Bin B while Bin A is returned to the store. At the stores, Bin A is replenished from larger Bin C, one of two in the stores. It is then returned to the manufacturing area, for the cycle to be repeated.
Sizing the contents of Bins A and B is done to balance frequency of filling and matching space needs in the manufacturing area.

![Diagram of bins A and B with quantities](image)

![Diagram of bins C and D with quantities](image)

Figure 3.3 Kanban. (The world class manufacturing handbook, Údarás na Gaeltachta, 2000)

### 3.2.4 SET-UP TIME REDUCTION.

According to Ichiro Majima (1992) companies need to be able to change over and set-up machines with optimum efficiency to compete effectively. This technique allows companies in a market led economy to be able to supply product in the quantities and varieties demanded by the marketplace.
The standard classification of changeover actions according to Keegan et al (2000) is:

- **Internal** - they can only be performed when the machine is stopped i.e. replacement of tooling, forming sections, moulds etc.

- **External** - work that can be carried out when the machine is running i.e. getting the parts and tools ready, initial settings, material location and preparation etc.

The use of brainstorming activities and team solving is very useful in the reduction of set-up times. The use of standardised tooling, quick release mechanical and electrical connectors, standardised datum points and a host of other detailing can have a significant impact on the overall set-up time. The following steps as proposed by Keegan et al (2000) describe the world class business process to set-up time reduction:

1. Analyse what is internal and external.
2. Move work from being internal to external.
3. Reduce and simplify internal work, improve attachments, reduce settings etc.
4. Reduce overall set-up time. Appendix I illustrates a typical set-up time reduction sheet.
A video recorder can provide valuable insight to possible areas where set-up times can be reduced and they can also be used to train staff in the new method.

### 3.2.5 TOTAL PRODUCTIVE MAINTENANCE (TPM).

The Western World and the Far Eastern Nations have significantly different attitudes towards machines and maintenance. In the Western Countries, companies have traditionally focused on super machines running for 24 hours a day, while showing a jaundiced attitude towards maintenance and the maintenance department. The maintenance in those companies is usually seen as a necessary evil. According to Keegan et al (1995) Senior Management in Western companies usually show little regard for the importance of machine care and development.

In the Far-Eastern Countries, maintenance of machines is viewed positively. Machines tend to run up to 16 hours per day, with the non-running time devoted to cleaning, oiling, adjusting and maintenance. The three basic steps to ensure machines operate as required are as follows:

1. Know the normal operating conditions for the machine.
2. Detect early when something is going wrong.
3. Put it right immediately.
3.2.6 TOTAL QUALITY MANAGEMENT (TQM).

Total Quality Management is defined by the Consultancy Group ‘Integrated Quality Dynamics’ in the journal ‘The Benchmarking Review’, (1999), as

"a structured system for satisfying internal and external customers and suppliers by integrating the business environment, continuous improvement and maintenance cycles while changing organisational cultures”.

One of the keys to implementing TQM can be found in this definition. It is the idea that TQM is a structured system. In describing TQM as a structured system, it is meant that it is a strategy derived from customers and suppliers wants and needs. Pinpointing these requirements allow businesses to continuously improve, develop and maintain quality, cost, delivery and morale. TQM is a system that integrates all of this activity and information.

In the context of this research, Total Quality Management, provides a series of techniques to identify the causes of wastes within a manufacturing operation. The core of the TQM tools utilised in this research centres around the areas of waste identification and elimination as previously defined by the Toyota System and Flynn et al (1995).

These techniques stem from the quality systems proposed by Deming (1986), Juran (1989) and Crosby (1992),
The following is a summary of the literature review of some of the TQM tools and techniques as proposed by Suzaki (1987), Hayes and Wheelwright (1988), Keegan et al (1995) and Creech (1995), which were implemented during this research:

(i) Flow charts
(ii) Check sheets
(iii) Pareto charts
(iv) Run charts

(i) Flow Charts
The flow chart represents the steps in a process. The majority of quality systems engage flow charts for key processes. These charts relate to the theoretical steps involved in producing a product or providing a service. According to Creech (1995) the key point in the successful use of this tool is the identification of what actually happens in a process compared to what theoretically should be happening. The difference between the actual and the theoretical processes form the basis for an improvement plan.

(ii) Check Sheets
The check sheet is a powerful tool in separating fact from fiction - what actually happens from what people think is happening. Check sheets record how many times something happens. A number of parameters are proposed by Keegan et al
(1995) in the illustration “World Class Manufacturing ……… in an Irish Context” which need to be defined to use check sheets effectively.

1. What is being recorded?
2. Over what period of time?
3. Structure the check sheet in such a way that it is easy to record the date.
4. Make sure data is recorded honestly.

A typical example of a check sheet as used by the author in the research element of this thesis is presented in Appendix II

(iii) Pareto Charts

A Pareto-type chart may often develop from the basic check sheet. A pareto chart is regarded by Joiner Associates et al (1995) as the representation of the ordered data from a check sheet. This information then enables the user to affect improvements based on fact. The assumption of the Pareto Charts in the context of this research is that 80% of the inefficiency is the result of 20% of the problems.

(iv) Run Charts

A run chart is used to display trends over a period of time. By presenting data in a graphical way, trends can be detected very easily. Common examples of such charts are production output, customer complaints received, sales etc.
As illustrated in Figure 3.4 the charts are particularly useful in determining if action taken has had an appreciable effect on the underlying process. As illustrated in this chart the production output of this example improved by approximately 25% when the management structure of the firm was re-organised with better focus on the primary task of making products.

![Output Chart Image](image_url)

**Figure 3.4** An example of a run chart (The world class manufacturing handbook, Údarás na Gaeltachta, 2000).

Other TQM techniques as proposed by Suzaki (1987), Hayes and Wheelwright (1988), Keegan et al (1995) and Creech (1995) which were used to a lesser degree during this research include:
1) Control Charts
2) Fishbone Charts
3) Histograms

3.2.7 EMPLOYEE INVOLVEMENT.

Employee involvement is of critical importance in a World Class Business environment. This view is supported by W.E. Deming when he states in the book 'Out of the Crisis' that

"It would be better if everyone work together as a system with the aim for everybody to win" (1986)

The importance of employee involvement to the success of companies is also stressed by Graham-Moore et al (1995), Gordon (1997) and Johnson et al (1998). Employee involvement requires staff to look beyond their day to day tasks to work at problems facing the company rather than those just facing themselves. In short, World Class Business expects people to think as well as do. The World Class Business process requires employees to become actively involved in their company. The employees become integrated into the problem solving ability of the company. The development of this aspect of employee involvement frequently demands additional training. The concept of empowerment of staff is integrated to employee involvement in a World Class
Business programme. In this research the following tools and techniques of Employee Involvement as proposed by Keegan et al (1995) were central to the WCB process:

1. Group problem solving
2. Improvement teams
3. Brainstorming teams

3.2.8 BENCHMARKING.

Benchmarking proved most significant in the World Class Business process. According to Voss et al (1995) and Hanson (1995) Benchmarking is a tool for improving performance by learning from best practices and understanding the process by which they are achieved. Application of benchmarking involves four basic steps as follows:

- Firstly understand in detail your own process.
- Next analyse the processes of other companies.
- Then compare your own performance with that of others analysed.
- Finally implement the steps necessary to close the performance gap.

This subject matter is dealt with in detail in chapter four.
3.3 WORLD CLASS BUSINESS IMPLEMENTATION PROCESS.

The process for implementing the tools and techniques of World Class Business in participating companies during two research projects described in this thesis is presented as a five-step process. This process is describes in detail in chapter six.

3.4 SUMMARY.

This chapter conducts a literature review on the area of World Class Business, initially reviewing the definition of the term and its evolution. This chapter also reviews the world class business techniques that were employed in the research element of this thesis and the applicability of these best practice techniques to the SME.

The world class business techniques reviewed in this chapter include:

**JIT**
- Process and Physical Flow
- Kanban
- Set-up time reduction
- Total productive maintenance

**TQM**
- Check sheets
- Pareto charts
- Run charts

**Employee Involvement**

**Benchmarking**
These techniques are effectively World Class Manufacturing techniques, but as they are applied to other areas of a business in addition to manufacturing they are termed ‘World Class Business’ techniques.

In the author’s opinion, the description of these techniques was necessary at this stage in order to translate their simplicity and to justify their use in the process employed.

The next chapter will complete the literature review by examining the area of benchmarking.
CHAPTER FOUR : BENCHMARKING

4.0 INTRODUCTION.

4.1 DEFINITION.

4.2 EVOLUTION OF BENCHMARKING.

4.3 BENCHMARKING PROCESS.

4.4 TYPICAL BENCHMARKS.

4.5 BENCHMARKING TOOLS.

4.6 BENCHMARKING IN IRELAND.

4.7 THE IRISH BENCHMARKING FORUM.

4.8 THE MICROSCOPE BENCHMARKING TOOL.
   4.8.1 BACKGROUND.
   4.8.2 MICROSCOPE CHARACTERISTICS.
   4.8.3 MICROSCOPE PROCESS.

4.9 A MICROSCOPE STUDY.
   4.9.1 RESULTS OF MICROSCOPE STUDY.
   4.9.2 CONCLUSIONS OF THE MICROSCOPE STUDY.

4.10 SUMMARY.

4.11 CONCLUSION OF LITERATURE REVIEW.
4.0 INTRODUCTION.

Benchmarking is one the most recent words to be introduced into the lexicon of modern management. In this chapter the author will examine the relevance of the concept of Benchmarking to the SME. The author will refer to studies of pilot initiatives that have been completed to examine same. The author will also review the literature on current Benchmarking tools available and Benchmarking events in Ireland. Prior to this the author will describe the concept of Benchmarking, its evolution and the various types.

4.1 DEFINITION.

Benchmarking has been defined as

"a continuous, systematic process for comparing performances of organisations, functions or processes against the 'best in the world', aiming not only to match those performance levels, but to exceed them" (O’ Réagáin, 2000).

An IBM consulting, UK, definition for Benchmarking, as presented in the ‘Made in Europe III’ study reads as follows

'The most powerful process any company can adopt and that delivers immediate, measurable and sustainable productivity improvements is the transfer of best practice' (Voss et al, 1998).
The use of benchmarking has evolved exponentially in recent times and is described by Bjorn Svedberg (2000), Chairman of the high level group on Benchmarking as:

"A powerful tool, in the case of competitiveness policy, to implement the most effective solutions and best practices by continuous improvements. Benchmarking aims to increase the productivity of enterprises, the quality and performance of services to industry and thereby eventually to the customer."

Robert C. Camp, the Best Practice Institute, captures the essence of benchmarking where he compares benchmarking to the Japanese word ‘dantotsu’ meaning striving to be the best of the best.

Benchmarking allows us to analyse and improve key business processes, eliminate waste, improve performance, profitability and market share. The advantage of Benchmarking is that it allows decisions to be made based on facts, not intuition. The benchmarking process is of significant potential benefit to industry when used as a continuous process, as an identifier of areas for improvement in addition to a measurement process to monitor the success / failure of changes implemented.

Three levels of benchmarking exist in Europe today:

- **Framework benchmarking** – where governments compare their relative position on competitiveness, infrastructure, education etc.

- **Sectoral benchmarking** – This type of Benchmarking analyses the performances and practices of a particular sector. An example of this would be the study of the automotive industry completed by JP Womack, D.T. Jones and D. Ross (1990) in their book titled ‘The machine that changed the world’.
Company or enterprise-level benchmarking - Enterprise Benchmarking is described by Keegan and Sean Ó Réagáin (2000) in the illustration titled "Benchmarking Facts 2000" as a tool for supporting management strategies. It is geared towards continuous improvement through the identification and adaptation of best practices at process, organisation and management levels, so leading to improved competitiveness. It is a tool that can be applied irrespective of company size. Best practice examples are frequently found outside the industry sector, in which a company operates, this practice is referred to as 'benchmarking outside the box'. Thus it is neither necessary nor desirable to confine a benchmarking exercise to competitor companies.

4.2 EVOLUTION OF BENCHMARKING.

Over the past ten years Europe has experienced difficulty in competing with the Japanese and US manufacturers. With many countries within the European Union experiencing low growth rates and high levels of unemployment, European companies are coming under increasing pressure on even their traditional markets and areas of operations.

The European Commission and the Council of Industry Ministers have been actively addressing this competitiveness issue over the past five years. Europe is taking progressive steps to address this issue, but Europe's achievements in job creation and raising standards of living are not comparable to the USA and Japan. Europe is also lagging behind in terms of productivity. At a European Benchmarking Forum Conference in Paris last December it was stated that the average per capita GDP in the
In an effort to improve the competitiveness of European industry, managers are using benchmarking as a diagnostic, measuring, comparing, monitoring and a learning tool. Some of these managers have also implemented the techniques of World Class Business as described in chapter three in an effort to address the weaknesses identified within their businesses during the Benchmarking exercise.

This methodology and approach is similar to that described in chapter six in the summary of ‘The World Class Rural Cluster Project’. These techniques are regarded by Mr. Richard Keegan (2000) in the ‘Benchmarking in Europe’ illustration as

‘the Medicine for our organisations and businesses’.

Where benchmarking is the diagnosis, the means of identifying where the greatest needs are and in assisting our managers in identifying the most appropriate route to improved competitiveness. The integration of Benchmarking with the World Class Business techniques provides today’s leading manufacturers with a powerful tool set to improve competitiveness. According to Keegan (1998) in ‘Benchmarking facts – A European Perspective’, Rank Xerox is credited with creating the modern benchmarking concept when it found that Japanese competitors were selling copiers at Rank Xerox’s manufacturing cost price. The Americans investigated. They went to Japan and learned
the processes of their competitors. They returned home and began to improve their own processes relative to the Japanese. This investigation and learning process is termed benchmarking and the operational practices that Xerox observed in Japan are known as the techniques of world class business, perhaps more readily known as quality management techniques. Robert C. Camp of Rank Xerox said on his return from Japan that

"benchmarking is the search for industry best practices that leads to superior performance".

As described by Keegan in the text of 'Benchmarking Facts – A European Perspective' (1998) the evolution of benchmarking can be presented as a series of five steps:

1. **Analysis of competing goods: Reverse Engineering** - the benchmarking concept during this phase was concentrated in the comparison of characteristics, functionalities and performances of competing products. Initially, at a technical level and finally enlarged to include competitive evolution of products, in the market perspective.

2. **Competitive benchmarking** – first developed by Rank Xerox when starting to analyse its own manufacturing costs and verifying that they were as high as its competitors’ sale prices. Now the emphasis is on process efficiency and not only product comparison.
3. **Process benchmarking** – during the 1980s, managers started to realise that they also could learn from organisations in other sectors (benchmarking out of the box). The amount of information and knowledge available amongst non-competing companies may be higher than between competitors.

4. **Strategic benchmarking** – This is a systematic process to evaluate alternative scenarios, to implement strategies and improve performance through the understanding and adaptation of successful practices by the partners (competitors or not). It differs from process benchmarking because of its scope.

5. **Global benchmarking** – This is the next generation concept. It is an even more global concept because it includes and analyses cultural differences between companies at a world-wide level. It also takes into account the conditions which affect the localisation of companies.

Decisive factors for the propagation of benchmarking were also the quality award models of the American’s Malcolm Baldrige National Quality Award (1998) and the European Quality Award (1999).

**4.3 BENCHMARKING PROCESS.**

According to Keegan and Lynch (1995) the benchmarking process starts internally: a company needs to understand itself and how it operates before it can hope to gain from comparing with others. This point is augmented by Mr. Tony Kennedy, Department of Trade and Industry, U.K. in his address at the ‘Benchmarking for World Class Performance’ conference in Belfast, 2000. Once a company understands its internal
processes it can benefit from learning how other organisations achieve their benchmarks and which processes they use. Thus benchmarking is a method by which you look "inward" first to understand yourself, and then "outward" (outside your own organisation or company) in order to discover best practices and return "inward" to adapt those best practices to your own specific, tailored requirement.

Figure 4.1 outlines how the potential improvement in companies increases with increased benchmarking effort.

**Figure 4.1  Relationship between the improvement in companies and their benchmarking effort. (Benchmarking Facts, Keegan, 1998)**

The central hypothesis of the benchmarking process proposed by Voss et al (1995), Hanson (1995) and Keegan (1996) is that improvement in company practices leads to improvement in company performances. This point is expanded upon in Section 4.8.3 in the author's description of the Microscope Process.
### 4.4 TYPICAL BENCHMARKS.

Illustrated in Table 4.1 are indicative examples of typical benchmarks supporting specific business goals. (Keegan et al, 2000)

<table>
<thead>
<tr>
<th>Business Goals</th>
<th>Typical Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>To be the lowest priced producer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>• Materials cost per product</td>
</tr>
<tr>
<td></td>
<td>• Labour cost per product</td>
</tr>
<tr>
<td></td>
<td>• Overheads per unit of production</td>
</tr>
<tr>
<td></td>
<td>• Cost of distribution channels</td>
</tr>
<tr>
<td></td>
<td>• Procurement</td>
</tr>
<tr>
<td></td>
<td>• Supplier Relationships</td>
</tr>
<tr>
<td>To maintain or increase market share</td>
<td>Product Differentiation</td>
</tr>
<tr>
<td></td>
<td>• Customer service</td>
</tr>
<tr>
<td></td>
<td>• Product / service functionality</td>
</tr>
<tr>
<td></td>
<td>• Product development lead time</td>
</tr>
<tr>
<td>To maintain a service at a reduced cost</td>
<td>Resource Utilisation</td>
</tr>
<tr>
<td></td>
<td>• Valued added per employee</td>
</tr>
<tr>
<td></td>
<td>• System efficiency</td>
</tr>
<tr>
<td></td>
<td>• Effectiveness of automation</td>
</tr>
<tr>
<td></td>
<td>• Empowerment</td>
</tr>
<tr>
<td></td>
<td>• Training</td>
</tr>
<tr>
<td>To maintain or increase customer loyalty</td>
<td>Customer Service</td>
</tr>
<tr>
<td></td>
<td>• Volumes or repeat business</td>
</tr>
<tr>
<td></td>
<td>• Levels of customer complaint</td>
</tr>
<tr>
<td></td>
<td>• Delivery performance</td>
</tr>
<tr>
<td></td>
<td>• Complaints procedure</td>
</tr>
<tr>
<td></td>
<td>• Product development</td>
</tr>
<tr>
<td>To be the most innovative producer</td>
<td>Innovative Process</td>
</tr>
<tr>
<td></td>
<td>• Time to market</td>
</tr>
<tr>
<td></td>
<td>• Number of new products per year</td>
</tr>
<tr>
<td></td>
<td>• Investment in training</td>
</tr>
<tr>
<td></td>
<td>• Technology management</td>
</tr>
<tr>
<td>To generate cash</td>
<td>Productivity</td>
</tr>
<tr>
<td></td>
<td>• Set-up time</td>
</tr>
<tr>
<td></td>
<td>• Direct to indirect labour cost</td>
</tr>
<tr>
<td></td>
<td>• Efficiencies</td>
</tr>
<tr>
<td></td>
<td>• Stock levels</td>
</tr>
<tr>
<td></td>
<td>• Supplier relationship</td>
</tr>
</tbody>
</table>
4.5 BENCHMARKING TOOLS.

Many of today's benchmarking tools are based around a model of business excellence, such as the European Foundation for Quality Management Business Excellence Model as illustrated in Figure 4.2 or the Malcolm Baldridge awards. The benchmarking tools facilitate an analysis of an operation, identifying areas requiring attention and development. The modern tools have been structured to allow relatively easy identification of areas of operations where competitors and industry in general outperform a company's operation. The identification of these areas of under performance can act as a strong stimulus to management to improve and re-address these problem areas.

![Diagram of the European Foundation for Quality Management model]

Figure 4.2 The European Foundation for Quality management model.

(Benchmarking Facts, Keegan, 1998)
4.6 BENCHMARKING IN IRELAND.

Initially, the author conducted a thorough examination of the benchmarking tools available in Ireland. The benchmarking tools identified included:

1. **Microscope Benchmarking Tool** – This tool was developed by the London Business School, IBM, U. K. and a transnational partnership comprising of partners from seven European Countries including Údarás na Gaeltachta. The tool was developed as a diagnostic tool for SMEs in addition to a tool that assesses the performance of improvement measures within SMEs. ‘Microscope’ is a qualitative benchmarking tool suited to SMEs in manufacturing with 15 – 120 employees. Two thousand, five hundred companies from eleven European Countries have been benchmarked using this tool to date.

2. **Probe Benchmarking Tool (Promoting Business Excellence)** – Similar to ‘Microscope’, this benchmarking tool was developed by the London Business School and IBM, U. K. It is a qualitative benchmarking tool suited to medium to large enterprises in manufacturing. In the region of three thousand, two hundred and fifty companies from all over the World have been benchmarked using this tool.

3. **The Benchmarking Index** - The ‘Benchmarking Index’ was developed by the Department of Trade and Industry, UK. This tool was developed in an effort to improve the competitive performance of UK companies. Since its inception in 1996, it has proved to be a highly successful management tool in its sphere, with almost 2,500 benchmarks having been carried out to date. Having developed an extensive database of comparative small and medium sized enterprises (SMEs) performance information in the UK, the DTI (Department of trade and industry) has been very active in trying to build an international dimension into the databases. They have
recently achieved this goal with the successful conclusion of a pilot project supported by ‘Eurochambre’, which examined the implementation of this benchmarking tool in five European countries.

In addition to this, the author examined the activities of the Irish Benchmarking Forum with the objective of learning from pilot initiatives conducted on benchmarking in Ireland. The following is a description of the Irish Benchmarking Forum and the key activities in benchmarking identified:

4.7 THE IRISH BENCHMARKING FORUM.

The Irish Benchmarking Forum was established in 1997 to act as a forum for all benchmarking events and developments both in the Republic of Ireland and in the North of Ireland. The forum holds memberships from the public and private sectors. It is widely representative of all key actors involved in building competitiveness. Ireland has been interested and active in benchmarking for a number of years now. Key activities that have been undertaken in this field include:

- **Competitive Analysis Model (CAM) Initiative** – A study undertaken between Shannon Development (The Agency focused on the Shannon Free Trade Zone and its hinterland) and CAM benchmarking in Belfast. This study focused primarily on collecting largely quantitative data from companies operating on the island.

- **Microscope benchmarking study** – described in section 4.9

- **Probe (Promoting Business Excellence)** – A benchmarking study of companies employing greater than two hundred employees in Ireland undertaken between the
Irish business and employer’s federation (IBEC) and Enterprise Ireland (National State Development Authority)

The Irish Benchmarking Forum’s private sector benchmarking activities have been focused not only on benchmarking but also on the use of benchmarking as a tool to aid build competitiveness. The Irish benchmarking Forum uses the Medical Analogy:

"Benchmarking is the diagnosis – World Class Business practices are the medicine".

This interaction between benchmarking and World Class Business (WCB) has been demonstrated through two major conferences hosted in Dublin and Belfast, which the author attended.

- Benchmarking for World Class Performance 2 – Belfast 1998.

These conferences were directed towards industry, providing a mechanism for spreading the message for competitiveness building to industry practitioners. Key features of these events were the numerous case studies presented by the local SMEs, highlighting the performance improvements achieved by using the two inter-linked tools of Benchmarking and World Class Business.

The author, having completed an examination of the benchmarking tools available in Ireland rated these tools on the following criteria:

- Responses from the companies which participated in the pilot exercises.
- Interviews with Benchmarking Facilitators.
• Experiences of State Development Agencies in this area.
• Recommendations of the members of the Irish and European Benchmarking Forum.
• Credibility of the Microscope process-data is collected by accredited facilitators only.
• Development support from IBM, U.K.

The author concluded on that basis that the 'Microscope' benchmarking tool is the most appropriate benchmarking tool for small to medium sized enterprises in manufacturing. The Irish Benchmarking Forum and European Benchmarking Forum are in agreement with this view. The author therefore adopted this best practice in the methodology employed in the research phase.

The following is a summary of the microscope benchmarking tool in addition to a study of the results of two hundred and ninety seven Microscope benchmarking exercises conducted by IBM, U.K.

4.8 THE MICROSCOPE BENCHMARKING TOOL.

4.8.1 BACKGROUND.

This benchmarking tool had an integral part to play in the success of two initiatives described in the research element of this thesis. This tool was implemented in the participating companies of these initiatives to identify areas for improvement within these companies, to compare their practices and
performances with a model of best practice and a database of up to 2500 companies in addition to monitoring the performance of improvement initiatives being implemented in the those companies. Microscope was developed in 1997 with the support of the European Social Fund (ESF) Adapt initiative and the European partners listed below. These partners are Regional and State Development Authorities in their respective Countries.

<table>
<thead>
<tr>
<th>Partner Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Údarás na Gaeltachta</td>
<td>Dingle, Ireland.</td>
</tr>
<tr>
<td>Fabrimetal Hassault-Nainur</td>
<td>Charleroi, Belgium.</td>
</tr>
<tr>
<td>Vizo Centrium-Hasselt</td>
<td>Hasselt, Belgium.</td>
</tr>
<tr>
<td>BFZ</td>
<td>Essen, Germany.</td>
</tr>
<tr>
<td>ECIPAR - CAN</td>
<td>Emila Romagna, Italy.</td>
</tr>
<tr>
<td>West London Tec.</td>
<td>London, United Kingdom.</td>
</tr>
<tr>
<td>UPS</td>
<td>Soderborg, Denmark</td>
</tr>
</tbody>
</table>

Microscope is based on the London Business School / IBM “World Class Model” of excellence as illustrated in Figure 4.3. This model links practice in manufacturing and design to operational and business performance.

Figure 4.3 The World Class Manufacturing model. (Made in Europe III, IBM, 1998)
A Company that reaches a certain standard of both practice and performance, equaling or surpassing the very best of international competitors in every area of its business, is referred to as a World Class Business company. George Taninecz (1997) who conducted a survey of 2800 SMEs supports this point and found that World-Class SMEs were those who were implementing best practices in their manufacturing and management functions.

4.8.2 MICROSCOPE CHARACTERISTICS.

The following are the definitions of performance and practice in the context of the 'Microscope' benchmarking tool as proposed by Hanson (1995)

- **Practice** refers to the established processes that a company has implemented to manage its manufacturing business.

- **Performance** refers to the measurable outcome of these practices at both the operational and business level.

The central hypothesis of the model is based on the made in Europe framework (Voss et al, 1998) and states:

"that adopting best practices will lead to the attainment of superior performance."

Microscope is a benchmarking protocol that enables small manufacturers to take the first step in the improvement process, through comparing their levels of
practices and performances with other manufacturers. Microscope consists of two major tools:

- A benchmarking tool used by accredited facilitators on the company site, which is aimed at gathering relevant information about the manufacturing business and providing diagnostic results for the company.

- A central database that includes all the data gathered using the site tool, which is aimed at providing comparative data for company diagnostic and enabling periodic reports highlighting the current status of manufacturing within European small companies – an example of this will be presented by the author shortly.

4.8.3 MICROSCOPE PROCESS.

To assess the level of world class practice and performance within a particular site, accredited facilitators conduct in-depth interviews with a cross-functional team from the participating company, recording the answers in a structured questionnaire. Microscope assesses key areas of manufacturing and design as well as relevant business measures, in the following areas:

- Organisations and culture.
- Manufacturing Cycle times.
- Quality.
- Plant and equipment.
- Innovations.
• Engineering operations and practice.
• Product development process.
• Business measurement.

Responses are ranked from 1 to 5, 1 representing the basic level of practice or performance, and 5 representing world class practice or performance. This methodology is illustrated in the following example, which is sourced from the Microscope questionnaire prepared by Údarás na Gaeltachta.

Question 1. In the areas of Business Measurement

Customer Satisfaction: The following are some guidance notes for facilitators:

“What measurements are in place to track customer satisfaction? Are processes reactive to customer complaints or do they seek to understand customer requirements in more detail? When problems are identified, is there a formal ownership and resolution process? How are causes identified and activities managed to prevent recurrence?”

To score, the company’s cross-functional team with the assistance of the benchmarking facilitator evaluates the most appropriate of the three statements presented to their present day performance.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some customer complaints, often needing escalation to resolve</td>
<td>Few Complaints; handled as priority, customer satisfaction tracked</td>
<td>Delighted customers whose expectations are often exceeded</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This question relates to the performance of the company in respect to customer satisfaction. If the team identified statement number 1 as most appropriate to their present day performance, the company scores 1. If the team decides that they are somewhere between statement 1 and 2 (middle statement) they would score 2 and so on. The full Microscope questionnaire is presented in Appendix III.

This questionnaire is equally divided by practice and performance related questions to support the ‘Made in Europe III’ model proposed by Voss (1998). This model directly links the adoption of best practices to improvements in operational and business performance. The results of a company that completes this exercise is compared to a model of best practice as outlined in figure 4.3 in addition to being compared with the results of two thousand and five hundred other companies that have also completed this exercise.

The results of this exercise are presented in the following formats:

*Overall practice V performance chart.*

This chart categorises the company’s overall practices and performances as against the companies previously benchmarked using Microscope in addition to the model of best practice.

*Quartiles chart.*

This chart divides the scores achieved by the companies on the Microscope database into four quartiles. This chart also rates a company’s practices and performances over a spread of industry functions and highlights imbalances between performance and practice issues in those functions.
Weakest Element charts.

The weakest element charts illustrate a company's weakest practice and performance areas and compares them to the scores achieved by the existing companies on the database.

4.9 A MICROSCOPE STUDY.

As referred to previously, Microscope has a significant role to play in evaluating the current status of manufacturing within European SMEs. IBM Consulting, UK, completed such a study in 1998/1999 when the data from the 297 benchmarking sessions throughout SMEs in Europe were evaluated. The objective of this study was to evaluate the following:

1. Does best practice established in larger enterprises have relevance in SMEs?

2. What changes must small companies undertake to grow successfully?

3. What are the manufacturing strengths and weaknesses of SMEs?

These objectives are addressed in the conclusions of the study (Section 4.9.2) These objectives are also in keeping with the hypothesis of this thesis, which is

"Business success can be achieved in SMEs through the implementation of the techniques of World Class Business and Benchmarking".

The following is a summary of the study completed by IBM Consulting, UK.
The study analysed a total of 297 benchmarking surveys completed with companies located in Ireland, UK, Italy, Germany, Sweden, Denmark and Belgium. Figure 4.4 illustrates the distribution of these surveys by country.

Figure 4.4 Distribution of responses by country. (Made in Europe, IBM, 1998)

The distribution of surveys by industry is illustrated in Figure 4.5

Figure 4.5 Distribution of responses by industry. (Made in Europe III, IBM, 1998)
The companies in the survey operated mainly in industries producing or assembling distinct products such as automotive or mechanical components, with fewer coming from continuous process industries or those producing bulk products.

4.9.1 RESULTS OF MICROSCOPE STUDY.

The initial examinations of the completed survey evaluated the extent to which the companies had achieved World Class standards of practice and performance, which were defined as reaching or exceeding 80% for both practice and performance on the World Class Model.

Drawing on a boxing analogy, the SMEs in this study were classified into six groups based on their practice and performance scores. Figure 4.6 plots the results, underlining the strong relationship between practice and performance.
Figure 4.6 Practice and performance in SMEs. (Made in Europe III, IBM, 1998)

The following is an analysis of each area of the chart presented.

- **World Class**

  The companies in this category are those with excellent practices and performances. Only three SMEs (1%) of the companies reached World Class standards. One came from Italy, one from England and one from Ireland. This is less than half the proportion found among larger companies in a similar study of larger companies conducted by IBM, UK.
• **Contenders**

The companies in this category have better than average practices and performances. Over half of the SMEs had the potential to compete internationally. These companies have the basis for growth and improvement and with perseverance could become World Class.

• **Performance led by practice (won't go the distance)**

The companies in this category have good performances with poor practices. A surprisingly high proportion of companies (27%) fell into this group, perhaps reflecting the informal nature of many smaller companies. The risk for companies in this group is that they do not have the practices in place to support growth.

• **Practice exceeds performance (promising)**

The companies in this category have good practices with poor performances. The number of companies in this group equated to 7%.

• **Vulnerable (makeweights)**

The practices and performances of the companies in this category are below average. 9% of the companies fell into this group. These companies probably lack the necessary practice and performance to be effective in international competition.
• Laggards (punchbags)

The practices and performances of the companies in this category are very poor. These are the bottom of the classification. The number of laggards was low at 3%, but those positioned here require radical change to improve.

A number of patterns are evident from the results of the study:

• SMEs are customer orientated.

SMEs have a strong customer focus.

• SMEs are responsiveness focused.

Practices associated with responsiveness to customer orders such as order response and small batch sizes were emphasised.

• SMEs are focused on creating new products.

The strong focus on generating new product concepts was reflected in product innovations.

• SMEs are systematic.

Many of the areas least emphasised were those that larger enterprises manage systematically, such as equipment layout, performance measurement, manufacturing strategy and product planning horizon.

• SMEs are neglecting training and education.

The SMEs surveyed scored poorly in this area. This may reflect lack of willingness or resource to train, a lack of expertise, or inadequate external support.
4.9.2 CONCLUSIONS OF THE MICROSCOPE STUDY.

SMEs which adopt best practice through the implementation of World Class Business Techniques and Benchmarking can achieve 'World Class' status. It is evident from the study that the adopting of best practices in SMEs through the techniques of WCB will benefit SMEs and are indeed a pre-requisite to sustainable growth. The competitive edge in SMEs is their ability to be responsive and adoptive to changing customer requirements. As the size of the company increases these advantages are inherently diminished unless the growth in size is accompanied by an on-going investment in best practice. The adoption of lean production, total quality and concurrent engineering practices for example, is therefore not an option but a necessity for ambitious growth oriented SMEs. The place of benchmarking in the improvement initiative undertaken by large companies is today without question. On analysing the results of the Microscope Study, there is every reason to believe those time effective approaches to objective self-assessment are just as important for small companies. When used to set priorities and to locate exemplar role models, techniques like 'Microscope' are key enablers for SMEs. The other key ingredient for SMEs in their journey towards 'World-Class' is their adoption of best practices by implementing the techniques of World Class Business. This conclusion concurs with the hypothesis of this thesis.
Other conclusions included:

In order for SMEs to attain ‘World Class’ standards they should adhere to the following:

- Increase employee training and education.
- Introduce systematic and process innovation.

4.10 SUMMARY.

This chapter reviews the literature available on the best practice termed benchmarking paying particular attention to its evolution and its relevance to the SME. The author also reviewed current benchmarking tools and practices available in Ireland and Europe in this chapter. The ‘Microscope’ benchmarking tool is identified by the author as the most applicable to the SME, a view which is shared by the Irish and European Benchmarking Forum. Most noteworthy in this chapter, is the results of a Microscope study which analysed the results of 297 SMEs which were benchmarked using the Microscope benchmarking tool. This study spanned seven European countries. The study illustrated two key points in the context of this research:-

1. It showed that the companies which scored best in the Microscope benchmarking exercise were those who had adopted best practices such as World Class Business and benchmarking techniques.
2. That the practices of world class business and benchmarking were key enablers for SMEs in achieving world –class status.

These results support the hypothesis of this research.
4.11 CONCLUSION OF LITERATURE REVIEW.

The author concludes following the literature review that sufficient evidence exist to support the hypothesis of this research statement. The author will verify this conclusion in chapter eight on presenting the results of case studies from two projects, namely ‘the World Class Rural Cluster project’ promoted by Údarás na Gaeltachta and ‘the Innovative Management Techniques-World Class Business project’ promoted by Enterprise Ireland. These projects examined the implementation of the techniques of World Class Business and Benchmarking in SMEs over a period of two years and then analysed and documented the results. Based on the results of these projects and the literature review completed, the author will conclude that business success can be achieved by SMEs through the application in an appropriate way for the SME of the techniques of World Class Business and Benchmarking.

The next sections presents the research methodology employed by the author during this research.
SECTION THREE
RESEARCH METHODOLOGY
CHAPTER 5 : RESEARCH METHODOLOGY

5.0 INTRODUCTION.

5.1 ACTION RESEARCH METHODOLOGY.

5.2 SELECTION OF SAMPLE.

5.3 CHARACTERISTICS OF THE PARTICIPANTS.

5.4 SCOPE OF THE RESEARCH.

5.5 SUMMARY.
5.0 INTRODUCTION.

This research examined whether or not business success can be achieved in small and medium-sized enterprises through the implementation of the techniques of world class business and benchmarking. Such authors as Schonberger (1986), Suzaki (1987), Hayes and Wheelwright (1988), Hines (1994), Andersen Consulting (1995), Flynn et al (1995), Voss et al (1995) and Keegan et al (1995) formed the basis for the core understanding of the techniques of World Class Business and Benchmarking. The techniques identified in these areas, as implemented in multinational companies were initially simplified and adapted to the requirements of the small and medium sized enterprises. This research is based on the efforts of the ‘World Class Rural Cluster’ and the ‘Innovative Management Techniques-World Class Business’ projects as described in chapters six and seven respectively. These initiatives supported by the European Commission (5th framework) examined the implementation of the techniques of world class business and benchmarking on a cluster of small and medium sized enterprises located in the south-west and eastern regions of Ireland. This research was conducted over a 24 month period where the above mentioned techniques were implemented and the results and conclusions of this approach documented.

The results and impacts of this approach were recorded and documented using two approaches.

The qualitative approach - using the benchmarking exercise named ‘Microscope’ proposed by Voss et al (1998) and modified by IBM, UK and the European Benchmarking Consortium to make it specific to small and medium sized enterprises. This approach examined the impacts of the application of these world class business techniques and concepts contained in the Flynn et al (1995) model on the practices and performances of companies.
The quantitative approach - as put forward by the European Benchmarking Forum in 'The Benchmarking Facts Handbook' (Keegan, 1998) was employed to evaluate the impacts on the core metrics of the business as a result of the world class business programme. Interviews with management were also conducted to evaluate management reaction to this approach. An independent evaluation, as required by the European Commission, was also conducted on the participating companies, to monitor the effectiveness of this approach.

These exercises were completed with the participating companies on two occasions during the World Class Business Programme. The first exercise was conducted at the start of the programme with the latter exercise being completed at its completion. This was done to establish the improvements achieved by the companies as a result of their participation in the World Class Business Programme.

5.1 ACTION RESEARCH METHODOLOGY.

The emphasis of this research requires that the 'action research methodology' be employed. The researcher fulfilled a project management position on the 'World Class Rural Cluster' (WCRC) project and as a result, participated in the interaction with the participating companies in the programme. The researcher acted as a world class business implementator in addition to a benchmarking facilitator during this project. The researcher also coordinated off-site training days, cluster meetings and feedback interviews with the participating companies. With reference to the 'Innovative Management Techniques-World Class Business' (IMT-WCB) project the researcher also participated in off-site training days and cluster meetings. Table 5.1 illustrates the author's input in these projects.
Table 5.1 The author’s input in the WCRC and IMT-WCB Projects.

<table>
<thead>
<tr>
<th></th>
<th>WCRC (Days)</th>
<th>IMT-WCB (Days)</th>
<th>TOTAL (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCB Implementor</td>
<td>12 x 11 Companies</td>
<td>-</td>
<td>132</td>
</tr>
<tr>
<td>Benchmarking Facilitator</td>
<td>2 x 11 Companies</td>
<td>2 x 1 Company</td>
<td>24</td>
</tr>
<tr>
<td>Conferences &amp; Seminars</td>
<td>-</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Off-site Training Days</td>
<td>12</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Preparatory Work</td>
<td>20 x 11 Companies</td>
<td>2 x 1 Company</td>
<td>222</td>
</tr>
<tr>
<td>Cluster Meetings</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>421</strong></td>
</tr>
</tbody>
</table>

Hill (2000) described the situation when they referred to action research as a variant of care research, more ‘the intervention technique is adapted as it is used, and the understanding of its scope and limitations develop with ECU application’. Benlasat (2000) makes the point that the action researcher is a participant, not an independent observer who is effectively studying the process of change, rather than any particular phenomenon.

The use of the action research methodology provided a mechanism for the researcher to implement the techniques of world class business as proposed by Flynn et al (1995) in addition to the benchmarking model proposed by Voss et al (1995). The complicity of full system analysis is accommodated as the action researcher worked within the organisations and was therefore capable of participating in dialogues with staff …
‘working with managers and analysing the reality of a business, its operating function and the management tasks both within the function and across the interface with other parts of the company’, Hill (2000).

This approach resulted in qualitative and accurate data being collected from the participating companies. The regularity of participation between the researcher and the participating companies offered the researcher an in-depth knowledge of the company’s processes and as a result the power to validate the results presented by those companies. The independent evaluation employed by the project team also validated the approach employed in addition to evaluating the results recorded by the participating companies.

Hill et al (2000) identified a number of impediments to the utilisation of action research on a wider basis in current academic research. One of the key problems identified is that the validity of the research conducted is dependent on the experience and knowledge of the researcher when engaging this methodology. This may limit the content and quality of the research according to Hill (2000).

The researcher has outlined practical issues and case studies in an effort to translate real issues and problems faced by SMEs today and assuring the relevance of the research to the majority of business practitioners in the small and medium category. The emphasis of this research is on the practical case studies analysed by the author in chapter eight. In the author’s opinion, the focus of the research should be this work as opposed to the theoretical analysis. This opinion is augmented by Gill and Johnson (1997) in their presentation of the Archaic Platonic – Aristotelian view which states that
"theoretical knowledge was knowledge acquired for its own sake, rather than for some use".

This view highlights that theoretical analysis on occasions can have minimal applicability to the research. This view cannot be shared in the context of the case studies.

5.2 SELECTION OF SAMPLE.

The case studies described in this research consisted of companies which participated in the following European pilot projects.

i. World Class Rural Cluster project, European Commission, Adapt 1997 – 1998, conducted by Údarás na Gaeltachta.


iii. Case studies from English SMEs which participated in a similar programme coordinated by the West London Technical College, UK.

Eleven companies participated in the World Class Rural Cluster project while ten companies participated in the Innovative Management Techniques-World Class Business project.

The majority of the participating companies had these following characteristics.

- small to medium in size
These companies included:

- owner managed
- indigenous manufacturing enterprises
- located in a rural area.

Craft Businesses:- originally started to serve to the local Tourism Market.

Manufacturing Businesses:- originally started to fill local engineering and Primary Processing needs.

Marine Food Businesses:- Originally started to serve the local primary processing needs.

These companies were limited in their ability to expand into national and international markets by a lack of expertise in the various areas of their business operations. These companies needed to adopt best practices across a range of their business operations in order to compete effectively and to develop to their full potential.

The participating companies are client companies of the state Development Agencies – Údarás na Gaeltachta and Enterprise Ireland. These agencies monitor the performances of a wide range of enterprises on a continuous basis in addition to maintaining regular contact with their respective client companies. Executives from the State Agencies, as a result, participated in the selection process in these projects.
Management commitment to the world class business approach was a key measure in selecting the participating companies. Companies which their management failed to express significant interest and commitment at the interview stage, were ruled out immediately.

Other key measures in the selection process included the following:-

- **Appropriate:** The appropriateness of the World Class Business programme to address the requirements of the company.

- **Timing:** The suitability of the programme to the company at that time. Was the company currently committed to other improvement initiatives, development programmes or expansion programmes?

- **Resources:** The availability of sufficient resources to the company to fully participate in the world class business programme and to implement the resulting recommendations?

The selection process was completed during a three month period which indicates how important this stage was to the project teams.
5.3 CHARACTERISTICS OF THE PARTICIPANTS.

The case studies presented in this research are small and medium sized enterprises employing between 18 and 200 employees. These companies are indigenous industries operating in the engineering, electronics, food or craft sectors. The research conducted in this area to date is limited and therefore the author deemed that this particular research topic would be innovative and of potential value. This group of companies was selected for the following reasons:

- **Importance of group** - Small and medium enterprises constitute a vital sector in the development of national and regional economies, such as in Southwest Ireland. SMEs provide over 66% of the European community employment, and 65% of turnover, which emphasises this importance.

- **Competitiveness of this group** - the competitiveness of this group of companies is in question and with the advent of open markets it has never been more important for SMEs to improve their competitiveness.

- **Availability** - SMEs make up the majority of the client bases of Údarás na Gaeltachta and Enterprise Ireland. In the author’s role as a Regional Development Executive he works in the development of these SMEs on a continual basis.
5.4 SCOPE OF THE RESEARCH.

The research conducted may be limited in the following ways:-

- Given the scope of the subject and the methodology chosen i.e. Action research, the research was conducted with a small sample of companies. The companies selected for case study may not be reflective of the SME category.

- The research was conducted during a two year period, between 1996 and 1997 in the case of the World Class Rural cluster project and between 1997 and 1998 in the case of the Innovative management techniques-world class business project. This research was followed by the support services of Údarás na Gaeltachta and Enterprise Ireland which continued with the implementation of the techniques of World Class Business and Benchmarking in these companies at a lower level of intensity. The author was central to this work. The medium time frame of the core of this research is a small fraction of the expected life of a company.

- Since the formal conclusion of the project, Údarás na Gaeltachta client companies are subject to two-monthly reviews in addition to annual reviews of their audited accounts.

- The researcher has recorded the impacts of the programme on the participating companies by recording the differences between the companies’ performances from the start to the finish of the programme. The researcher has made certain assumptions with regard to companies’ initial performances. This was done as core measures were not being recorded by some of the participating companies at the beginning of the programme.
The difficulty as outlined by Meredith et al (1989) of conducting research in operations. The three main shortcomings they outline with this type of research are as follows:

1. Narrow instead of broad scope, largely micro-oriented, concerned with a sub-system rather than a whole system, used only a single criterion quantitative model.

2. Technique instead of knowledge orientation, dominated by the application of techniques, assumed to be simply applied operations research.

3. Abstract instead of reality perspective, used approaches largely confined to the laboratory and based on model formulation and manipulation, emphasised equipment rather than people, rarely involved field studies, the research approaches were characterised by one day visits, interviews and the use of questionnaires.

5.5 SUMMARY.

The objective of this research was to establish whether or not business success can be achieved in SMEs through the implementation of the techniques of world class business and benchmarking. As the author participated in both projects of which the research element of this thesis is formed, fulfilling a project management position in the 'World Class Rural Cluster Project', an action research methodology was employed. The impacts of the World Class Business and Benchmarking techniques proposed by Hayes and Wheelwright (1984), Schonberger (1986), Suzaki (1987), Hines (1994), Anderson Consulting (1994), Flynn et al (1995), Keegan et al (1995) and Voss et al (1995), were recorded and analysed by the author using two approaches:
(a) The qualitative approach which included:-

1. The ‘Microscope’ benchmarking tool,
2. Interviews with management and staff of the participating companies

(b) The quantitative approach which included:-

1. An analysis of the participating companies core metrics as proposed by the European Benchmarking Forum.
2. Independent evaluation conducted by the European Commission.

The companies which were selected in this research participated in the following projects of which the author participated:-


The author with the assistance of West London Technical College also selected two U. K. case studies to give an International perspective to the research.
The author also outlines in this chapter the careful measures that were taken in the selection of the participating companies in addition to the scope and limitations of the research. The next section presents a description of the research projects in addition to the findings of the research.
SECTION 4
RESEARCH FINDINGS
CHAPTER SIX : THE WORLD CLASS RURAL CLUSTER PROJECT

6.0 INTRODUCTION.

6.1 BACKGROUND.

6.2 PROJECT TARGET GROUP AND NEEDS IDENTIFIED.

6.3 HOW THE NEEDS OF THE COMPANIES WERE VERIFIED.

6.4 THE WORLD CLASS BUSINESS PROCESS.

6.4.1 STEP 1 : BUSINESS DIAGNOSTIC.

6.4.2 STEP 2 : WORLD CLASS BUSINESS AWARENESS AND SELF-ASSESSMENT.

6.4.3 STEP 3 : IMPLEMENTATION PLANNING.

6.4.4 STEP 4 : STEP CHANGE.

6.4.5 STEP 5 : CONTINUOUS IMPROVEMENT.

6.5 FRAMEWORK FOR IMPLEMENTING WORLD CLASS BUSINESS IN SMES.

6.6 KEY ELEMENTS OF PROJECT.

6.7 RESULTS.

6.8 CONCLUSION.
6.0 INTRODUCTION.

The research element of this thesis is based on the research conducted by the author during two pilot projects, namely the World Class Rural Cluster project, and the Innovative Management Techniques-World Class Business project.

This chapter describes the first of the two projects which was conducted during the period January 1996 – December 1997. This project examined the transfer of the tools of World Class Business and Benchmarking to SMEs located in the rural Gaeltacht areas of Ireland.

Role of the author.

The author held a project management position on this project and as a result had a significant role to play in its completion. In this role the author's main duties included the following:

- *World Class Business Implementor*: Assisting the participating companies in implementing the tools and techniques of World Class Business by customising these tools to their own specific tailored environments. This work was carried out at the sites of the participating companies where the author worked with the participating companies in developing theses techniques to match the requirements of the companies. The author also assisted the companies in developing teams to work on different areas of the business.

- *Benchmarking Facilitator*: The author benchmarked the participating companies on two occasions during the project. At the beginning of the project the
companies were benchmarked to compare their practices and performances to other companies in their sector and to identify areas for improvement. The results of this benchmarking exercise was used as a 'base point' for comparison purposes during and at the completion of the project. At the end of the project the companies were again benchmarked by the author to compare their practices and performances to other companies in their sector and to identify the improvements made by the companies as a result of their participation in the project. This was achieved by comparing these benchmarking results to the initial results.

- **Training**: The author also co-ordinated and organised off-site training days during this project. In evaluating suitable training areas the author conducted a survey of the training requirements of the participating companies. This was carried out to maximise the relevance of these training areas selected to the participating companies and to realise their input in the selection of these areas.

- **Cluster Events**: The author also organised cluster events for the participating companies during this project. These events included:

  (a) Companies visiting each others' company sites to observe first hand the World Class Business experiences of other companies. The participating companies visited companies within the cluster and outside the cluster to maximise the effectiveness of this exercise.
Conferences and Seminars: Invitations to National Conferences on the areas of World Class Business and Benchmarking were organised by the author for the participating companies. This was done to increase their awareness and appreciation of these techniques. In December 1997, a participating company from the World Class Rural Cluster Project illustrated the significant steps it had taken towards World Class when their Systems Manager, Mr. Peter Walls, presented a paper at the National Benchmarking for World Class Performance Conference, in the Burlington Hotel, Dublin.

Other duties included:

(a) Analysing and documenting the results of the participating companies.
(b) Reporting and making recommendations to the governing agencies.
(c) Developing the World Class Business Process.

The following is a summary of the project, its aims and strategy in addition to an outline of the implementation process, its framework and results.

6.1 BACKGROUND.

This project was a combination of applied research and real-time intervention which facilitated the extension of the accessibility of World Class Business and Benchmarking techniques to any SME operating in disadvantaged areas. The project entailed the extension of these techniques beyond the traditional definition of large multi-national corporations to SMEs and as such is both innovative and of potential
value. It served to remove barriers which inhibit such techniques being developed and used in SMEs, by creating a repository of experience and knowledge within a group of service providers which could be directly applied in future years to other companies.

6.2 PROJECT TARGET GROUP AND NEEDS IDENTIFIED.

Small and medium enterprises employing less than 200 people constitute a vital sector in the development of national and regional economies, such as in Southwest Ireland. Addressing the development needs, which this sector requires, to reach its wealth creation and development potential, is of great importance.

The project focused specifically on these enterprises. It proposed and carried out the development of World Class Business and Benchmarking techniques which were applicable to a diversity of SMEs. This was achieved by implementing these techniques on a variety of SMEs on a pilot basis and then accessing and documenting the results.

The eleven companies which participated in the project were, small, owner managed, indigenous manufacturing enterprises which included:-

- Craft Business originally started to serve the local Tourism Market.
- Manufacturing Business originally started to fill local engineering and primary processing needs.
- Marine Food Business.
These companies were limited in their ability to diversify and expand into national and international markets by a lack of expertise in various areas of their business operation. In order to compete effectively and to develop to their maximum potential, these enterprises had to adopt best practices across the full range of their operations, which included:

- Best Manufacturing Practice.
- Product Quality.
- Innovation.
- Finance.
- Business Planning and Strategy.
- Costing.
- Marketing.

This is the work the project set out to achieve over its two year life span, to help companies located in the disadvantaged areas of Ireland in terms of economy of scale and remoteness from markets, by providing them with the necessary expertise in the various spheres of their business.
6.3 HOW THE NEEDS OF THE COMPANIES WERE VERIFIED.

Údarás na Gaeltachta, the project promoters, are a state development agency operating in the Gaeltacht areas of Ireland. Its principal aims are the economic, social, culture and language development of those areas. As part of their day to day operations, Údarás na Gaeltachta monitors the performance of a wide range of enterprises on a continuous basis as well as maintaining regular contact with companies wishing to expand their business. Therefore, the needs of the participating companies have been identified through the long-term involvement by Údarás na Gaeltachta in the development process. The purpose of this project was to assist the selected companies in identifying their specific constraints and in addressing these deficiencies through suitable interventions.

Benchmarking throughout the project assisted in the diagnosis stage as well as providing measurable performance indicators on the success of the project at all the stages of implementation.
6.4 THE WORLD CLASS BUSINESS PROCESS.

The framework for implementing a World-Class Business improvement drive within a company is presented as a five-step process as illustrated in Figure 6.1.

1) Business Diagnostic
2) WCB Awareness and self-assessment.
3) Implementation Planning.
4) Step Change.
5) Continuous Improvement.

Figure 6.1 The five step World Class Business process (Hanson, 1995).
6.4.1 Step1: Business Diagnostic.

Before moving to a new land it is advisable to know where you are starting from. The business diagnostic step involves a review of the key areas of the business, including:- Finance, Marketing, Sales, Materials, Management, R&D and in particular Operations. The main objective of this phase is to identify problems facing the business. This review of the current business situation by a fresh mind can yield new insights into the nature of the problems. An outside facilitator employed during this phase may have seen similar problems before. Some shortcomings in the manner in which the business is managed may come to light at this stage. Sometimes early actions or 'quick hits' can achieve gains, winning credibility for the facilitator and management commitment for a more intensive drive to come. The Microscope Benchmarking exercise described in section 4.6 was used during this step as a diagnostic tool. This exercise helped companies to identify where the greatest needs in their operations were and assisted their managers in identifying the most appropriate route to improved competitiveness.

An external facilitator working with the management team as a group best carries out the diagnostic analysis. The facilitator will generally come to a company with a fresh, unhindered view of the day to day operations of the business. The output of this phase will typically be an issue list, which forms the basis of an action plan.
6.4.2 Step 2: WCB Awareness and Self-Assessment.

The World Class Business programme is generally driven by the senior managers of a business, which means that the senior managers must have a clear understanding of what World Class Business involves in order to pass on their knowledge to the rest of the workforce. The key individuals involved need to understand the main principles of WCB and, more importantly, appreciate how those principles can be best put to use in their own company. Once the company has come to an understanding of these basic principles it can compare the results of the diagnostic phase against these principles as a form of self-assessment. This assessment will be used as a basis for the implementation plan for the company. This interpretation process of the basics of WCB will lead to the planning and implementation phase.

6.4.3 Step 3: Implementation Planning.

At this stage, the company has learned about WCB and interpreted these principles in relation to real issues within the company. The company diagnostic phase has identified a number of potential areas for improvement. The combination of these two elements allows the company to move to create an implementation plan.

A successful implementation plan needs to be practical and flexible. Practical improvements achieved at an early stage of the implementation programme will have a very positive effect on the morale of all concerned.
A plan should be balanced between detail and flexibility. It is generally better to err on the side of flexibility at the planning stage as this leaves the way open to get the best out of the full team, both at management and at worker level, as the process continues.

6.4.4 Step 4: Step Change.

At this juncture the examination has taken place; the company has learnt about and has come to its own understanding of WCB. The planning has also taken place and it is now time to implement the changes.

One of the features of WCB is that, at this point in the process, relatively minor changes begin to take place within the company. This generally happens as a concerted push as the operation moves into a new gear.

This stage is generally the most exciting and interesting part of the WCB programme as employees are seeing major changes and generally major improvements. This is also the time when the process is more likely to go wrong. Because the company is moving through a process of serious change, the reaction of personnel to change must be carefully managed. Resistance to change is normal. It is at this point that the importance of the previous two steps, WCB awareness and implementation, really come home to the company.

6.4.5 Step 5: Continuous Improvement.

The initial stages of a WCB programme will lead to a number of immediate improvements in the general operation of the company. It is important to
remember however, that the company will need to continue the improvement into the future. It is strongly recommended that the company prepares a plan at the outset of the programme to provide for training and ongoing assessment to ensure that the WCB principles become ingrained in the company.

6.5 FRAMEWORK FOR IMPLEMENTING WORLD CLASS BUSINESS IN SMEs.

The framework outlined above has proved effective in stimulating improvement efforts in all of the companies involved in the pilot WCRC project. The project has brought new insights into how best to implement the WCB improvement process in an SME environment. In the light of experience, a number of suggestions are proposed to adapt the framework more closely to SME needs.

The diagnostic analysis at the start should be brief and should prioritise a small number of improvement projects. Management may tire and lose interest in the process if diagnostic analysis demands too much of their time at this stage. In many cases, data should be obtained to validate theories on the nature and seriousness of problems before rushing towards solutions. The goal of some early projects may be to establish valid data. It is a mistake to run too many projects in parallel. It leads to confusion and demands too much of scarce management time in an SME. The intensive or 'big bang' approach favored by some consultancy houses is not usually appropriate to SMEs. A process flow diagram depicting the WCB implementation cycle used during the World Class Rural cluster project is shown in Figure 6.2
WCB PROCESS FLOW

Management Interview to identify key issues

Identify 2 or 3 improvement projects and prioritise
Projects may involve data collection

Implement quick solutions
Credibility of WCB won
Achieves Management Acceptance and a Belief in WCB

Set up internal improvement teams – outline objectives and plan

Allocate tasks and goals – provide a clear brief for the team members

Final plan created for implementation – Issues fully addressed through WCB

Plan implemented – WCB explained to Staff

Establish targets and monitor performance against targets

IDENTIFY NEW ISSUES

REPEAT – DEMING CYCLE PLAN/DO/CHECK/ACT

Figure 6.2 The World Class Business implementation cycle. (Údarás na Gaeltachta, 1997).
The improvement model for this framework looks like a series of incremental improvement steps and is very similar to the Deming ‘Plan, Do, Check, Act’ cycle, as presented in Figure 6.3. A possible difference between this approach and the ‘big bang’ approach involves ongoing diagnostic analysis and improvement project identification throughout the project. The basic framework is still valid. However, the initial diagnostic analysis is more brief but diagnostic activity continues all through the improvement program.

Figure 6.3  The Deming cycle (Adapted from Deming, 1986).
To complement the framework, a simplified toolkit was prepared. This simplified toolkit, presented in the Handbook for World Class Manufacturing (Foireann WCRC and Keegan, 2000) describes a set of continuous improvement tools taken in the main from classical WCB theory but modified appropriately to make them more easily understood in smaller companies.

6.6 KEY ELEMENTS OF PROJECT.

The following elements were key to the project:-

- The technique and concept of World Class Business and Benchmarking.
- Rural Companies, small to medium in size.
- The use of clustering

The project was innovative in bringing these three elements together. As described in the literature review most business analysts on World Class Business and Benchmarking techniques believe that they are only suitable for companies employing 200+ employees. Very few would suggest that these techniques are applicable in companies employing fifteen staff. This project focused on testing these techniques on companies employing between fifteen and two hundred staff.

As companies develop and grow they tend to reach key stages. When companies exceed thirty staff usually they have designated managers for key areas. They tend to have some level of support and resources to dedicate to project work and new initiatives. In the participating companies for this project the available resources were
extremely limited. This necessitated the identification of a core of World Class Business techniques that could be used effectively by companies with limited resources. These techniques needed to give immediate benefit to the company, to provide quick pay-back for their efforts.

A second key characteristic of the participating companies was their diversity. They all were operating in separate distinct areas of business, at different stages of development. The diversity in their stages of development and business operations led to a wide spread in the needs of the participants. The project team worked with the companies to identify a core of training seminars that had relevance to them. Companies were invited to rate a wide range of potential training subjects. The top five rated topics were chosen and off-site training seminars were presented on them. In this way the companies had a real input to the training provided to them.

6.7 RESULTS.

Some of the more significant results achieved by the participating companies were as follows;

- Reduced product lead time from 2 weeks to 1 week
- Reduced defect level by 75%
- Increased employee training time by 30%
- Increased productivity by 43%
- Increased profitability by 15%
Details are presented on how these results were achieved by the participating companies in the analysis of two case studies conducted by the author in chapter eight.

The most noteworthy result of this project was the positive response from the participating companies at its completion. All of the eleven participating companies expressed satisfaction with the project's approach and the results achieved and asked that the work of the project be continued. This significant result alerted the development agencies Údarás na Gaeltachta and Enterprise Ireland to adopt the techniques developed during the course of the project into their core operations.

6.8 CONCLUSION.

This project proved extremely successful which is clearly evident from the results attained. The project results indeed verify the hypothesis of this thesis that 'Business success can be achieved in SMEs through the implementation of the techniques of world class business and benchmarking'.

The project was innovative in the work it carried out with SMEs. In the context of transferring best practices to SMEs, the project's work contradicted some views expressed in the literature review e.g. Berchtold (2000).

In this thesis the author describes the five step 'World Class Business' process that was successfully developed during this project, of which the author played a key role, in addition to the framework employed.
The following key elements to the success of the project are noted by the author:-

1. Adopting a World Class Business Process which addresses the specific needs of SMEs. Initially, the level of intensity for which this process is implemented in an SME is low. The level of intensity increases as the SME’s understanding and appreciation of the World Class Business process develops.

2. The importance to the participating companies of achieving quick pay-back for their efforts in the project.

3. The importance to involving the participating companies in the development of the World Class Business process and noting this involvement to strengthen the commitment of these companies to the process.

The next chapter in this section will outline the second of the two projects of this research, namely the Innovative Management Techniques-World Class Business project.
CHAPTER 7: THE INNOVATIVE MANAGEMENT TECHNIQUES — WCB PROJECT

7.0 INTRODUCTION.

7.1 OVERVIEW OF THE PROJECT.

7.2 KEY ELEMENTS OF THE PROJECT.

7.3 WORLD CLASS BUSINESS TECHNIQUES.

7.3.1 BENCHMARKING.

7.3.2 JUST IN TIME (JIT).

7.3.3 TOTAL QUALITY MANAGEMENT (TQM).

7.3.4 EMPLOYEE INVOLVEMENT.

7.3.5 BUSINESS PROCESS RE-ENGINEERING.

7.3.6 WORLD CLASS DESIGN.

7.3.7 FINANCIAL MEASURES.

7.3.8 SUPPLIER DEVELOPMENT.

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7.4 COMPANY SELECTION.

7.7 WORLD CLASS BUSINESS IMPLEMENTATION PROCESS.

7.8 RESULTS.

7.7 CONCLUSION.
7.0 INTRODUCTION.

This chapter describes the second of the two projects which forms the basis of the research element of this thesis. This project was conducted in Ireland during the period January 1998 to January 2000. The project promoters were the Business Consultancy Services Division of Enterprise Ireland which were supported by the European Commission under the DGXIII D4 programme.

The Author’s Role.

The author was directly involved in this project and participated in particular in the off-site training sessions in addition to the cluster meetings.

In this role, the author’s main duties included:

- **Benchmarking Facilitator**: The author was involved in the benchmarking of the participating companies. These companies were benchmarked qualitatively using the Microscope benchmarking tool and quantitatively by comparing the companies core metrics with other companies in their sectors.

- **Cluster Events**: The author organised cluster events for the participating companies during this project. These events included:

  (a) Company site visits between companies within the cluster and other companies not participating in the cluster.

  (b) Conferences and seminars on the area of benchmarking and World Class Business in an SME context. These included conferences in Ireland, the North of Ireland
and the U. K. The case studies presented at these events helped to educate the participating companies in the merits of the application of the tools and techniques of World Class Business and Benchmarking. Richard Keenan and Co. Ltd. which is a leading Feeding System Manufacturer located in Boris, Co. Carlow, participated in the IMT-WCB project and showed the gains they had achieved towards world class which their Managing Director, Mr. Liam Lacey, presented at the North-South Benchmarking Conference in Belfast.

- **Training**: The author co-ordinated and organised off-site training days for the participating companies during this project.

- **World Class Business Process**: The author worked closely with the other development agency to monitor the success of the World Class Business Process and made changes when necessary.

- **Results**: The author analysed and documented the results of this project.

The following is an overview of the project.

### 7.1 OVERVIEW OF THE PROJECT.

This IMT-WCB (Innovative Management Techniques – World Class Business) project sought to provide, develop and prove a methodology for implementing World Class Business techniques in small and medium enterprises (SMEs). This methodology was innovative in that it attempted to:
• Use World Class Business improvement techniques to achieve performance levels in SMEs similar to those being achieved through the application of WCB techniques in large multi-nationals.

• Simplify and adapt the World Class Business approach to make it suitable to the SME sector.

• Deliver the World Class Business service at a reduced cost through the clustering approach.

7.2 KEY ELEMENTS OF THE PROJECT.

The key elements of the Project included the following:

1. The clustered approach which provided for the horizontal development of ideas and methods.

2. Management in each of the participating companies embracing the philosophy of World Class Business and leading its overall implementation.

3. Employees of the participating companies taking ownership of their work areas and seeking out projects which continuously improved their processes.

4. The new World Class Business process (as described in Section 7.5) as distinct from the classical or 'big bang' method favoured by large Consultancy groups for the Implementation of World Class Business. The classical approach favoured a major
diagnostic analysis initially with many improvement projects running in parallel. The new methodology operates in the basis of small incremental improvement steps using the Deming approach of Plan, Do, Check, Action, for each step.

5 Significant links have been established between the participating companies through the cluster approach. This has led to the exchange of experiences in problem resolution between the companies and has continued beyond the termination of the project.

6 As a result of the excellent results achieved by the project, Enterprise Ireland and other state development authorities have taken steps to build these concepts into their future development strategies for SMEs.

7.3 WORLD CLASS BUSINESS TECHNIQUES.

An Innovative Management Techniques (IMT) toolkit was developed based on the proven tools used in large companies. This toolkit was specifically designed to suit the needs of the SME and to assist training providers in their application of the proven process improvement techniques of World Class Business in SMEs.

The key techniques included:

- Benchmarking
- Just In Time Manufacturers (JIT)
- Total Quality Management
- Employee Involvement
- Business Process Re-Engineering
7.3.1 BENCHMARKING.

Benchmarking is an integral component of the World Class Business Process and has been defined as

"a continuous systematic process for comparing performances of organisations, functions or processes against the best in the world". (Ó Réagáin, 2000)

Benchmarking allows for the analysis and improvement of key business parameters to eliminate waste, improve performance, profitability and market share.

Similar to the WCRC project described in chapter six the use of benchmarking throughout the project assisted in the diagnosis stage as well as providing measurable performance indicators on the success of the project at all the stages of implementation.

At the beginning of this project, the Microscope Benchmarking exercise was completed by all of the participating companies as part of the diagnosis stage. This exercise helped companies to identify the weakest areas of their businesses in addition to assisting their managers in identifying the most appropriate route to improved competitiveness. This exercise was also completed by the participating companies at the completion of the project to highlight the impact of the project’s
work during its two year life-span and to further highlight areas to address by the participating companies allowing them to further improve in the future.

7.3.2 **JUST IN TIME (JIT).**

Just in Time involves making parts or providing a service as it is needed. The objective of JIT is to remove all unnecessary costs in manufacturing. The main principles for achieving this are:

- A market pull system in production control.

- A levelling of manufacturing through small batch production and through avoiding production peaks.

- Continuous flow in the manufacturing process.

The goals of JIT manufacture are zero faults, zero time to change or adjust tools and equipment, zero inventory, zero material handling, zero stops in production, zero production flow time and a manufacturing batch size of one.

7.3.3 **TOTAL QUALITY MANAGEMENT(TQM).**

This technique involves improving the product and process through the use of quality tools and techniques—*Right first time*.

Total quality management(TQM) assumes that quality is something that is embedded in all activities that take place within an organisation. Total quality management
views an organisation as an open system and the quality must be met every time, be it from suppliers or in the products delivered to customers. Internally, the main focus is on how value is added to the products. The organisation must be geared to handle continuous improvement, and every employee is responsible for improving the overall quality.

7.3.4 EMPLOYEE INVOLVEMENT.

All employees are required to think and act and to become a part of the improvement process. Employees are encouraged to be more proactive and responsive to the needs of the company and that the company values their inputs. The contributions of employees towards the solving of problems is sought and the employees become integrated into the overall problem solving ability of the company.

7.3.5 BUSINESS PROCESS RE-ENGINEERING.

The idea is to gain significant benefits in productivity, service and quality through maximising the potential of individuals and teams. The process is revolutionary in that instead of trying to improve on already existing processes and organisational forms, it suggests that it is better to throw it all away and start from scratch. The starting point of this technique is with the customer and the primary objective is to develop organisations which will provide value, service and quality to all customers whether internal or external.
7.3.6 WORLD CLASS DESIGN.

Fundamental to the success of a large number of companies is the design of their products. Companies must design for excellence and the three most important factors to be considered from the customers standpoint are quality, cost and delivery. Customers expect quality products and the quality of a new product depends heavily on the design of the product. Product cost depends on the materials and the manufacturing process therefore consideration of the materials and manufacturing process in the design of the product is critical to the success of the product. Customers now have very high expectations in terms of the delivery time of the products. The product design will heavily influence the ability to supply product on time.

7.3.7 FINANCIAL MEASURES.

Ratio analysis is about measuring the financial success of the company and the success of the strategies it uses. If a company’s ratios are significantly different to the average in the industry, then the management should be looking for reasons why this is so.

Financial ratios are an effective way of summarising large quantities of financial information in order to compare the company’s performance with other firms. Financial ratio analysis involves examining the financial accounts of a company in a number of different ways, in order to compare them to other companies, industry norm, and to its previous track record.
Ratios can be classified as follows:

- **Profitability** - is the company getting a good return on its investment?
  
  e.g. Gross Margin
  Net Margin
  Return on Capital Employed

- **Liquidity Ratios** - how is the company managing its working capital?
  
  e.g. Current Ratio
  Acid Test

- **Efficiency Ratios** - is the company using its assets in an efficient way?
  
  e.g. Debtors Days.
  Creditors Days.
  Inventory Turns.
  Sales to fixed assets ratios.

- **Capital Structure Ratio** - how is the company financed?
  
  e.g. Debt / Equity Ratio.

### 7.3.8 SUPPLIER DEVELOPMENT.

This involves developing special relationships with the suppliers that can help to develop them internally. The company demands high quality information from the supplier such as statistical process control charts, capability charts, IS9000 accreditation. The company also carries out vendor audits on the supplier and rates the overall performance of the supplier.
In developing the relationship with the supplier the company endeavours to provide the supplier with its in-house expertise. This expertise can prove invaluable insights in the development and growth of the suppliers.

7.3.9 TOTAL PRODUCTIVE MAINTENANCE (TPM).

Total Productive Maintenance is a team-based exercise, which harnesses the creativity and ability of all employees as they endeavour to enhance performance, process improvements and problem solving with the organisation. TPM is a logical step by step process, which involves all employees in the maintenance of the machines and leads to improvements in output, efficiency and profit.

7.4 COMPANY SELECTION.

The following is a list of the criteria, which was considered during the company selection process of this Project:

- Companies employing 40 – 150 personnel.
- Companies engaged in manufacture and design work.
- Companies with a multiplicity of production machinery.
- Companies with a reasonable level of capital equipment.
- Company management committed to the Project.
- Company management prepared to allocate time and effort to identify improvement opportunities.
- Companies prepared to participate in workshops and site visits.
- Companies willing to form centres of excellence for the future dissemination of the World Class Business concepts.
As a result of this selection process the following companies were selected to participate in the project:

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burnside Engineering</td>
<td>Bagenalstown, Co. Carlow</td>
<td>Engineering</td>
</tr>
<tr>
<td>Laserform</td>
<td>Drogheda, Co. Louth</td>
<td>Engineering</td>
</tr>
<tr>
<td>Tanco Engineering</td>
<td>Bagenalstown, Co. Carlow</td>
<td>Engineering</td>
</tr>
<tr>
<td>Richard Keenan &amp; Co. Ltd.</td>
<td>Borris, Co. Carlow</td>
<td>Engineering</td>
</tr>
<tr>
<td>A division of Erin Foods</td>
<td>Thurles, Co. Tipperary</td>
<td>Food</td>
</tr>
<tr>
<td>Int. Meat Ingredients</td>
<td>Naas, Co. Kildare</td>
<td>Food</td>
</tr>
<tr>
<td>Alpha Bookbinding</td>
<td>Dublin</td>
<td>Printing</td>
</tr>
<tr>
<td>Colourbooks</td>
<td>Dublin</td>
<td>Printing</td>
</tr>
<tr>
<td>McNally Joinery</td>
<td>Lusk, Co. Dublin</td>
<td>Timber</td>
</tr>
<tr>
<td>P.B. M/c Tech Ltd.</td>
<td>Dublin</td>
<td>Engineering</td>
</tr>
</tbody>
</table>
BREAKDOWN BY SECTOR.

A breakdown by sector of the companies that participated in the project is presented in Figure 7.1

![Pie chart showing the breakdown by sector of participating companies: Timber 10%, Food 20%, Printing 20%, Engineering 50%]

Figure 7.1 A breakdown by sector of the participating companies.

7.5 WORLD CLASS BUSINESS IMPLEMENTATION PROCESS.

Initially, a comprehensive diagnostic (as described in section 6.4.1) was undertaken in all of the participating companies. The diagnostic examined the following areas:

- operations
- operation systems and performance measures
- financial controls and measures
- marketing
- selling
- materials and stock levels
- Research and development initiatives and methodologies.
As a consequence of the diagnostic exercise, basic problems were identified within the respective companies and an issues list was drawn up with the management team. The success of the project was dependent on the management of the participating companies being proactive in the resolution of the problems which were identified.

The complete approach to company improvement and project induction was through the implementation of the World Class Business techniques.

As part of the WCB implementation process the companies attended training workshops. The subjects of these workshops included:

- World Class Business
- Business Strategy
- Total Productive Maintenance
- Design for World Class
- Finance – Target Cost Management
- Team leader training on problem solving tools

On site training sessions at the participating companies were conducted every two months. A full review of the progress of the improvement projects was conducted during these sessions.
After the initial diagnostic a number of priority projects were identified within each participating company. To reinforce the potential of the WCB process it was important to achieve these targets in a professional manner.

7.6 RESULTS.

The following are some of those noteworthy results attained by the participating companies as a result of their involvement in the project.

- Raw material stocks reduced by 50% (25 days to 12.5 days).
- 60% increase in productivity (from 15 units/day to 24 units/day).
- Work in Progress (WIP) reduced by 25% (from 50% to 25%).
- Lead time down to 1 week from 5 weeks.
- Purchasing savings of up to £525,000/year
- Kit shortage reduced from 14/week to 2/week.
- Better utilisation of people resource.
- Actual performance measures put in place and monitored.
- Realistic targets set.

Details are presented on how these were achieved by the participating companies in the analysis of a case study conducted by the author in chapter eight.
7.7 CONCLUSION.

Similar to the World Class Rural Cluster project this project proved to be extremely successful and the feedback from clients has been very positive. The participating companies have achieved remarkable success, which have resulted in a vital turn around in the profitability of their businesses. Factors in the author's opinion, which contributed to the overall success of the project, include:

- Practical workshops.
- Practical training on the techniques of WCB.
- Horizontal development of ideas between the consultants and the clients.
- Cross fertilisation of ideas at group sessions.
- Inter-company visits. Companies visited each other's sites and learned and saw how problems were resolved.
- Setting realistic targets and measuring the actual results.
- Increased employee involvement within the participating companies.
- Support, advice and follow through from the consultants.

A case study of a company that participated in this project is presented in chapter eight.
CHAPTER 8: CASE STUDIES

8.0 INTRODUCTION.

8.1 LAMPAI AN DAINGAN TEO.
   8.1.1 BACKGROUND.
   8.1.2 DIAGNOSIS.
   8.1.3 WORLD CLASS RURAL CLUSTER TEAM INTERACTION.
   8.1.4 RESULTS.
   8.1.5 COST OF WORLD CLASS RURAL CLUSTER INTERACTION.

8.2 OGENEK TEO.
   8.2.1 BACKGROUND.
   8.2.2 DIAGNOSIS.
   8.2.3 WORLD CLASS RURAL CLUSTER TEAM INTERACTION.
   8.2.4 RESULTS.
   8.2.5 COST OF WORLD CLASS RURAL CLUSTER INTERACTION.
8.3 CASE STUDY FROM INNOVATIVE MANAGEMENT TECHNIQUES – WORLD CLASS BUSINESS PROJECT.

8.3.1 BACKGROUND.

8.3.2 WORLD CLASS BUSINESS PROJECT TARGETS.

8.3.3 RESULTS.

8.3.4 QUALITATIVE RESULTS.

8.3.6 COST OF WORLD CLASS BUSINESS INTERACTION.

8.4 U.K. CASE STUDIES

8.4.1 GAZEBO FINE FOODS.

8.4.2 KLINGER FLUID INSTRUMENTATION LTD.

8.5 CONCLUSION.
8.0 INTRODUCTION.

In selecting these case studies the author endeavoured to select SME companies diverse in sector and employee numbers in order to study the impacts of these variables on the results achieved by implementing the tools and techniques of World Class Business and Benchmarking.

The author will initially describe two case studies recorded during the World Class Rural Cluster Project described in chapter six. This data was recorded over a two year period from January 1997 to December 1998. The author was directly involved in this project. The author fulfilled a project management role during this project and as a result had a significant role to play in its completion. In this role, the main duties of the author were as follows:

- *World Class Business Implementor*: The author spent a total of one hundred and thirty two working days with each of the participating companies applying the tools and techniques of World Class Business to the specific tailored requirements of these companies. In addition, the author spent a further two hundred and twenty two days preparatory work for these on-site sessions. The author also developed teams within the participating companies to implement the techniques of World Class Business in different areas of the business.

- *Benchmarking Facilitator*: The author benchmarked each of the participating companies on two occasions during the project. This exercise was completed using
the 'Microscope' benchmarking tool and a sample of core metrics results. The results of this exercise were used to evaluate the improvements gained by the companies as a result of their participation in the project.

- **Training**: The author organised and hosted twelve off-site training days for the participating companies during this project. The topics of these training days included: Total Quality Management, Tools of Quality, Employee Involvement and World Class Sales.

- The author conducted regular review sessions with the participating companies to monitor their progress and to resolve issues arising from their involvement in the project.

- The author documented and analysed the results of the participating companies.

The case studies selected are as follows:

(i) Lampai an Daingin Teo.

(ii) Ogenek Teo.

The author will also outline a case study recorded during the IMT-WCB project (Innovative Management Techniques - World Class Business) conducted by the Excellence Unit of Enterprise Ireland during the period January 1998 to January 2000. The author refers to this project and case study in an effort to translate a national perspective with regard to the implementation of the tools and techniques of World Class Business and Benchmarking in SMEs. The author was directly involved in the following aspects of this project.
• **Benchmarking Facilitator** : The author was involved in the benchmarking exercises conducted with the participating companies. The duration of each session was one full day including one full day of preparatory work and reporting.

• **Training** : The author was involved in the organisation of twelve off-site training days for the participating companies. These sessions translated the theory of the techniques of World Class Business to the participating companies.

• **Cluster Events** : The author also co-ordinated and hosted cluster events during this project.

• The author conducted regular review sessions with the participating companies to monitor their progress during the project.

• The author as in the case of the World Class Rural Cluster Project documented and analysed the results of the participating companies.

Finally, the author will briefly describe two case studies completed by West London Technical College, UK in an effort to give a European perspective to the efforts of improving the competitiveness of SMEs through the implementation of the tools and techniques of World Class Business and Benchmarking.

The companies selected are as follows:

(i) Gazebo Fine Foods.

(ii) Klinger Fluid Instrumentation Limited.
8.1 LAMPAÍ AN DAINGIN TEO.

8.1.1 Background

Lampai an Daingin was established by Louis and Lisbeth Mulcahy in 1970. The company is located in a rural Gaeltacht area near the village of Ballyferriter on the Dingle Peninsula. The company currently employs 50 staff, which grows to about sixty in the summer season.

The company designs and manufactures by hand pottery products such as plates, cups, vases, teapots and flowerpots. More recently the company has launched a range of furniture products made from timber with a clay finish. The products of the company are particularly renowned for their high quality and their rich lustrous glazes which have been devised during twenty years research and development work conducted by the company.

A sample of products manufactured by the company is illustrated in Figure 8.1
The company grew exponentially since the 1980’s and as a result needed to embrace formal manufacturing and control systems to retain its competitiveness in the market-place. According to the Managing Director of Lampai an Daingin Teo, Mr. Louis Mulcahy

"the company grew at a very fast rate, without the proper structures in place to support this growth. The company needed to adopt formal business and work practices to regain its control on the business."
When the opportunity to join the World Class Rural Cluster project was presented to the company the managing director was quick to embrace it as a possible solution to the company’s immediate issues.

The management and staff of the company are committed to the retention of its ‘handmade’ ethos and therefore the introduction of a ‘Pure Manufacturing’ process or even machinery to assist in the manufacturing process was ruled out immediately. The World Class Rural Cluster team was required to operate within this applied constraint.

8.1.2 Diagnosis.

The initial diagnosis of the company was conducted through:

1. Interview with the company management to identify the problems and causes which they considered to be restricting the growth of the business.

2. The Microscope benchmarking tool which compared the company’s practices and performances to a model of best practice and identified areas for improvement.

The main areas identified during the diagnosis stage included the following:

- **Manufacturing** - The company has developed its business from a pure craft-based type of operation to a medium sized manufacturing operation.
Inefficiencies were apparent in the manufacturing operations which needed to be addressed.

- **Stock management systems** - The existing systems were very poor, with the company running out of a particular raw material on at least two occasions per month. This often signified the loss of half a day’s production owing to the rural location of the company. Finished products were also stored in cardboard boxes, and were often difficult to locate when preparing orders for dispatch.

- **Plant Layout** - Space was at a premium in the workshop owing to the storage of raw materials, finished goods, other debris, and the layout of the machinery.

- **Product breakage** - The question of breakage of product was identified as being very significant. It was estimated that the level of breakage equated to a monetary value of £40,000 per annum (90% of which was lost on labour, with 10% on raw materials). There appeared to be no understanding of where exactly the breakages occurred and thus no efforts made to rectify the problem.

- **Training of staff and management** - Training of staff and management was a significant issue for the company with very little formal training being received by either management or staff. The staff were unmotivated and reluctant to take on responsibility for simple decision-making, no structure of management was in place in the company because according to the managing
director "the company grew so fast, so soon". The addressing and resolving of this issue would be central to the success of the World Class Business programme.

- **Sales and Product Margins** - The company had little or no information relating to the spread or margin of the products being sold. Sales analysis was conducted on an ad-hoc basis with the sales manager asking the production manager to make what he felt was required. This often led to the stripping of the wholesale stores to meet retail requirements, which in turn left wholesale customers with incomplete orders or delayed deliveries. No systems of identifying poor margin products or identifying those products capable of product and margin improvement were in use. No apparent system for pricing products was evident.

- **Working Environment** - The throwing rooms were cluttered and clearly affected by humidity. This led to poor working conditions and low productivity. The risk of accidents occurring in this area was high even though the company was fortunate to experience a low occurrence of accidents.

- **Production Process** – The key stages of the production process are illustrated in Figure 8.2. The high levels of humidity experienced in the throwing rooms was affecting the company’s control over the production process.
• Lead times. The diversity of the products and glazes on offer from the company resulted in long manufacturing cycle lead times which deterred potential customers on occasions.

THE KEY STAGES OF THE PRODUCTION PROCESS AT LAMPAI AN DAINGIN TEO.

MAKE CLAY
THROW
DRYING STAGE 1
TURNING
DRYING STAGE 2
KILN-FIRST FIRING
GLAZE
DECORATION
KILN 2\textsuperscript{nd} FIRING
SANDING
STORES / DISPATCH

Figure 8.2 The Key Stages of the Production Process.
8.1.3 WORLD CLASS RURAL CLUSTER TEAM INTERACTION.

Description

The interaction took place on the following three different levels:

1. On site direct interaction.
2. Off-site training days.
3. Company interaction among cluster companies.

After the diagnosis phase a group of the company’s management was formed and augmented by key workers. A World Class Business training course was devised and conducted with the group.

On completion of this course the group was split into two teams. One team focussed on the production issues and the other examined the administration/sales issues affecting the business. Both teams had a mix of staff and management from the manufacturing and administration areas of the company. An issues list was created by both teams. The teams rejoined and an implementation plan based on their two issues lists was created.

The following World Class Business techniques were used by the company during the implementation phase:
2. Steps analysis.
3. Kanban -- two-bin system.
4. Check sheet.
5. Run charts.
6. Pareto charts.
7. Group solving teams.
8. Improvement teams.

With regard to the interaction, the following are some of the areas which were addressed during the project:

- **Plant layout** - Using the Just in time Manufacture techniques of Process Flow and Physical Flow analysis, the existing flows were initially assessed. This involved superimposing the actual material flow for the product on the plant layout diagram. This technique incorporated with the step analysis gave a valuable insight into the areas of waste within the existing layout. Many improvements were recommended and put in place as a result of this exercise. One significant result of this work was the relocation of an intermediary product store, the bisc store, (bisc is the name given to pottery before it is given the final glaze). Another important result of this work was the freeing up of 20% of the production area. This allowed for the free movement of raw material, product and people, in this area, in addition to the workers in this area benefiting from the extra space afforded to them at their work stations.
• **Stock Control System** - The introduction of the two bin system led to a more improved and visible stock management system. The number of occasions that the company ran out of raw material was significantly reduced by 50% during the first six months of this systems operation.

• **Sales** - A pareto analysis system was introduced to identify which products were top sellers and to facilitate the matching of actual sales requirements to stock levels being held. The administrative department analysed the sales prices and costings of ‘A’ class items and identified areas for development to improve contribution margins.

• **Training** - A tailored training programme for all staff was developed and implemented by the company during the programme. This training programme covered the techniques of World Class Business and Job-system training. 90% of the training was conducted on-site with 10% being conducted externally. The author observed these benefits in the company with staff showing:

1. Increased motivation and enthusiasm about their work.
2. Eagerness to meet and surpass production targets.
3. Increased responsibility for their own work stations.
4. Eagerness to rid the company of its inefficiencies.
5. Increased involvement in improvement teams.
6. Compliance to the internal customer concept.
• **Breakages** - By using check sheets at key control points in the production process, the causes for breakage of products were identified and measures taken to address those causes. Some of the causes are listed below:

1. **Kiln temperatures** - The kiln temperatures at some instances were too high or too low resulting in the cracking of products. The mechanism for controlling the temperature in the kiln was replaced by a more visible and digitally controlled mechanism to address this issue.

2. **Moisture content of raw material** - Measures were taken to store the raw material in an area where the moisture content of the raw material would be controlled and maintained at an optimum level.

3. **Product handling** - Special carrying trays were designed and introduced into the manufacturing and storing areas to minimise the hand handling of products and to reduce the occurrence of breakage of product while being moved between the production and storage areas.

• **Working environment** - The working environment for the staff was greatly improved by:

1. Installing de-humidifiers in the throwing rooms.
2. Conducting a major clean-up operation over two full days.
3. Introducing a cleaning system where every employee was responsible for the cleanliness of his or her own work-station.
This initiative had the following effects on the staff:

1. They were proud of their workplace.
2. They felt more responsible for their workplace and acted accordingly.
3. Productivity improved.

8.1.4 RESULTS.

The results achieved by the company during this project are presented in two formats:

8.1.4 (i) Quantitative Results:

The percentage improvements in the core metrics within the company from the start date to the completion date of the World Class Business programme are presented as follows:

<table>
<thead>
<tr>
<th>Core Metrics</th>
<th>Percentage Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>16%↑</td>
</tr>
<tr>
<td>Defects</td>
<td>15%↓ (from 35% to 20%)</td>
</tr>
<tr>
<td>Breakages</td>
<td>80%↓</td>
</tr>
<tr>
<td>Space Utilisation</td>
<td>20%↑</td>
</tr>
<tr>
<td>Operating profit</td>
<td>5% ↑</td>
</tr>
<tr>
<td>Turnover</td>
<td>10% ↑</td>
</tr>
</tbody>
</table>
The majority of these results were measured from manufacturing data collected using check sheets, which were put in place by the project team. The financial data was recorded from the management accounts of the company.

8.1.4 (ii) Qualitative Results:

The qualitative results attained by the company are recorded through:

(A) Microscope Benchmarking Tool.

(B) Observations of World Class Business facilitator.

(C) Comments of Company Management.

8.1.4 (ii)(A) MICROSCOPE BENCHMARKING RESULTS.

Introduction.
The Microscope benchmarking exercise was conducted on two occasions at Lampai an Daingin Teo. The first exercise was conducted in January 1996, at the start of the project with the second and final exercise being completed at the end of the project.

The overall practice and performance results achieved by Lampai an Daingin Teo., during these exercises are illustrated in Table 8.1. The difference between the results achieved by Lampai an Daingin Teo., from the start of the project to the end of the project is also highlighted in this table. A significant improvement is evident in the company’s performances, where it has increased from a score of
43 to a score of 68 while a moderate improvement is shown in the company’s practices.

<table>
<thead>
<tr>
<th>MICROSCOPE BENCHMARKING RESULTS : LAMPAI AN DAINGIN TEO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESULTS AT START OF PROJECT (Date completed 07.01.1996)</td>
</tr>
<tr>
<td>Practice v Performance</td>
</tr>
<tr>
<td>45 v 43</td>
</tr>
</tbody>
</table>

Table 8.1 Microscope Benchmarking Results.

The results of the first benchmarking exercise conducted at Lampai an Daingin Teo., on the 07.01.1996 are presented in Appendix IV. The following are the reports and results of the second Microscope Benchmarking exercise as described in chapter four that was conducted at Lampai an Daingin Teo. On the 30/09/1997 the exercise was completed by a cross-functional team from the company, comprising of top Management to shop floor representative and an external facilitator. The exercise was completed in 4½ Hours and was deemed very useful by all participants.
Overall Practices V Performance (51 v 68)

This chart categorises the company’s overall practices and performances as against the companies previously benchmarked using this software in addition to the model of best practice. Good practice leads to good performance. In the case of Lampai an Daingin Teo, the overall practice was recorded at 51 and performance at 68, as illustrated in Figure 8.3

This is a good score in terms of performance, but the practice needs to catch up. As referred to in the boxing analogy described in section 4.9.1 the company’s performance is in the ‘contender’ sector and close to ‘World Class’, while the practice is in the ‘vulnerable’ sector. This would make the performance difficult to sustain, without significant improvement in practice.

Figure 8.3 Overall practice vs performance chart. (Microscope benchmarking exercise, IBM, 1997)
• **Quartiles Chart**

This chart divides the scores achieved by the companies on the database into four quartiles. The top quartile (25%) of companies are represented by the light blue area with the red area representing the bottom quartile. With reference to figure 8.4, the top (best) quartile of companies on the Microscope database scores between 70 and 90 in terms of manufacturing practice. Lampai an Daingin Teo., scores 60 in this respect and is in the third quartile.

This chart also outlines the company’s practices and performances over a spread of industry functions and highlights imbalances between performance and practice issues in those functions.

Table 8.2 illustrates the practice and performance scores achieved by Lampai an Daingin Teo. over a spread of industry functions at the start and finish of the World Class Business programme. This table also highlights the improvements achieved by the company across these functions during the period.
Table 8.2  Quartile scores of Lampai an Daingin Teo., (Microscope, IBM, 1997)

The quartile scores achieved by Lampai an Daingin Teo., in the second of the benchmarking exercises is presented in chart form in figure 8.4. From this chart, it is evident that for the majority of the functions analysed, the company scores within the top quartile of the total database and well ahead of its industry sector in relation to its performance.

The weakest areas identified, in terms of the company's practices and performance, was 'quality' which scored in the third quartile. 'Lean production'
shows the greatest variation between practices and performance and this imbalance should be addressed by the company.

Figure 8.4 Manufacturing Quartiles and Boundaries Chart. (Microscope benchmarking exercise, IBM, 1997)
• **Weakest Element Charts**

The weakest element charts illustrate a company’s weakest practice and performance areas and compares them to the existing companies on the database. Areas of the business in which some 50% - 100% of the companies previously benchmarked using this benchmarking tool score higher than this company are rated priority areas and require immediate attention.

• **Weakest Elements in Manufacturing Practice**

The weakest elements in manufacturing practice are illustrated in Figure 8.5

![Figure 8.5 Weakest Elements in manufacturing practice. (Microscope benchmarking exercise, IBM, 1997)](chart)
With reference to 'Performance measuring' and customer orientation' figure 8.5 shows that 82% of the companies on the database scored better than Lampai an Daingin Teo. 'Order release into manufacturing', 'Quality Vision', 'Housekeeping' and 'Batch sizes' are also highlighted as areas of weakness in the company as between 40% and 58% of the companies on the database scored higher than Lampai an Daingin Teo.

- **Weakest elements in Manufacturing Performance**

As illustrated in Figure 8.6 the weakest elements in Manufacturing Performance were:

![Figure 8.6 Weakest Elements in manufacturing performance. (Microscope benchmarking exercise, IBM, 1997)](image-url)
With reference to 'Defects Internal' and 'Customer Delivery Commitments met'
Figure 8.6 shows that between 51% and 75% of the companies on the database
scored better than Lampai an Daingin Teo. This chart showed few weaknesses
overall with only two more recorded – 'Process Capability' at 31% and
Productivity at 41%.

• **BENCHMARKING REPORT – CONCLUSIONS.**

Overall, the company has scored moderately well. Some issues need to be
addressed for the company to achieve a 'World Class' level, particularly in
practice related issues. It is evident that the company has made significant
progress since its previous 'Microscope' benchmarking exercise in January 1996
where the company achieved a score of 45 v 43.

There were some significant weaknesses highlighted in the weakest element
charts and needs to be treated as a matter of priority by the company. These
weaknesses included 'performance measuring', 'Customer orientation' under
practice issues and 'Customer delivery commitments met' under performance
issues.

The quality issue in the quartile graph showed the practice and performance
elements scored lower than the majority of the database. One of the areas where
this was demonstrated in the 'Weakest Element Charts' was the issue of 'Internal
defects'. Finally, 'Lean Production' practice is another area of focus where
'Batch Sizes', 'Kanban' and 'Equipment Layout' were all highlighted.

Further improvement is apparent in these charts in comparison to the previous
benchmarking exercise conducted by the company.
8.1.4 (ii)(B) WCB CLUSTER FACILITATOR OBSERVATIONS.

A key focus of the companies within the World Class Business Programme has been on the development of the middle management and staff to sustain the growth of the business. The efforts started initially with the top tier management and were then cascaded down through the rest of the company. The analysis of company requirements and assets led to the development of a strategic plan for staff development and management team supplementation.

Allied with the strategic thinking, planning and action in terms of staff development, this company has also focused on operational performance development. Process analysis was carried out for each key area identifying key elements of roles within each area.

The developing demands for product further increased the pressure on manufacturing staff to reduce wastes and improve output by improving efficiency and sustaining higher levels of quality. Tools of quality and data capture systems were developed to facilitate this exercise. The systems were extended to the retail and wholesale operations as well as the pure manufacturing area.

As the company’s systems and personnel continued to develop a very significant focus was put into producing a tailored training programme for supervisors. This tailored programme was cascaded down to all staff during the 24 month period of the programme.
The company created a three year Development Plan with the aspiration to address the following three areas of the business.

(i) Consolidate World Class Standards.
(ii) Improve Profits.
(iii) Develop their staff.

In December 1997, the company illustrated the significant steps it had achieved towards World Class during the World Class Rural Cluster project, when their Systems Manager presented a paper at the National Benchmarking for World Class Performance Conference, in the Burlington Hotel, Dublin.

8.1.4 (ii)(C) COMMENTS OF THE MANAGEMENT OF LAMPAI AN DAINGIN TEO.

On completion of the World Class Rural Cluster Project, the project team requested that the participants comment in the form of a letter, on their experiences during the WCRC process, outlining the gains / losses achieved and their desires to continue / not continue with the process. The following are some important extracts from same.

'It was a revelation to me and all the staff. You know the savings we made out of the exercise. These led to expansion and greater employment and security.'

'My aim was to create a structure (when getting involved in WCRC process), and develop and supplement the existing supervisory team by training, and employment of management expertise to ensure that should I depart the scene Lampai an Daingin Teo. would continue.'
'I am writing because of the value the exercise so far has been to us and because I see it as potentially the most practical and effective way of getting at the expertise that vibrant indigenous companies need to stay ahead of the competition, much of it from rich multi-national companies, often from lower cost countries.'

The above extracts illustrate the significant gains achieved by the company through its participation in the World Class Rural Cluster Project. It is evident from the comments presented that indeed the tools of World Class Business and benchmarking in addition to the cluster approach was well received and benefited the company significantly.

8.1.5 COST OF WORLD CLASS RURAL CLUSTER INTERACTION.

Consultancy @ £5,000 per year. £10,000
Time of MD 6 days/year £4,800
1 Manager 12 days/year £4,800
5 Supervisors 10 days/year £10,000
Administrator 12 days/year £1,200
Travel (2,500 miles @ 0.30p/mile) £750

Total £31,550

Total cost of £15,775 per year
8.2 OGENEK TEO.

8.2.1 BACKGROUND.

Ogenek Teo. was established by Oliver and Máire Ui Léime in 1987. The Ogenek plant is located in the rural Gaeltacht village of Ballingeary in the Southwest of Ireland. The company currently employs eighteen full-time staff members. Ogenek is in the business of designing and manufacturing data monitoring, capturing and communication systems.

The base product was designed to capture milk assembly data at the back of a truck. This system is now successfully used by most of the Dairy Companies in Ireland. Other applications of this product include fuel oil distribution and automatic dispensing of fuel oil at filling stations and fleet headquarters.

Another important product manufactured by the company is a range of temperature and humidity monitoring control systems for Thermo King - the Galway based company that manufactures air conditioning units. Many such units are installed in refrigerated trucks and containers.

The Managing Director of Ogenek Teo., is a Software Engineer who continues to drive the company at the leading edge of technology.

The General Manager is the main driver of the principles of World Class Business and Benchmarking within the company.
The opportunity to join the World Class Rural Cluster project was very much welcomed by the proprietors of Ogenek Teo., because of their inefficiencies in manufacturing amongst other key areas. The company essentially is a Research and Development company, which has turned its operations towards manufacture in recent times. This change, the company found both difficult and costly.

8.2.2 DIAGNOSIS.

The initial diagnosis of the company was conducted through:

(i) Consultation with the company management to identify the issues which they considered to be restricting the growth of their business.

(ii) The Microscope Benchmarking Tool which compared the company’s practices and performances to a model of best practices in addition to identifying areas for improvement within the company.

The main areas identified during this stage were the following:

(i) Manufacturing

The company has moved its business from small batch production to medium batch levels. The internal control / production system needed to be developed to accommodate this change in business.
(ii) **Materials Control**

Significant problems had been encountered in ensuring materials are always available for production.

(iii) **Physical Layout**

The manufacturing processes needed to be re-evaluated to eradicate wastes on the production floor.

(iv) **Quality System**

Faults were being recorded but were not being used to improve the base products and processes.

(v) **Production System**

The production system needed to be developed to support the change in business.

(vi) **Test Equipment**

The test equipment needed to be re-assessed to match the test requirements of the company’s customers.

8.2.3 **WORLD CLASS RURAL CLUSTER TEAM INTERACTION.**

The interaction took place on three different levels:

1. On-site direct interaction
2. Off-site training days
3. Company interaction among cluster companies.
With respect to the direct interaction, the following are some of the areas which were addressed:

(i) *Process and Physical Flow.*

Initially, the existing physical and process flow for the company’s principal product—the DRS—was assessed. This involved superimposing the actual material flow for the product on the layout diagram. This method incorporated with the steps analysis, gave an accurate view of the extent of the problems associated with this layout. On investigating and consulting with the production team on our findings, the following improvements were recommended and put in place.

- Improvements to work-stations- Operatives had previously had to leave their work-stations to go to a control cabinet for tools throughout the day. An investment of £1,500 allowed each operative to have his or her own tool kit at their work-bench. Shadow boards were also put in place at each work-station.

- Similarly, operatives crossed the room to a cleaning bath to clean the printed circuit boards as part of the process, they now bring the bath to their work benches.

- Operatives sat between two work-benches, one for assembly work and the other for testing. The introduction of swivel chairs meant that they no longer had to get up out of their seats to move from one location to the other.
• The tolerance criteria for Test 2 was reassessed and amended, the amount of criteria to check during the test was reduced considerably.

• The addition of a new Personal computer for Tests. This eliminated the need to change from Test 1 set-up to Test 2 set-up and vice versa.

Impacts of Improvement

The impacts of the improvements made to the company’s processes and physical flows from the start date to the completion date of the World Class Business programme is as follows:

✓ Improved productivity by 43% (from 140 units/week to 200 units/week).
✓ Reduced defect level by 15% (from 50% to 35%).
✓ Improved product lead time 8 days to 6 days (average).
✓ Reduced direct labour on product.
✓ Reduced test set-up times.

The restructured physical and process flow and steps analysis for the DRS is illustrated in Figure 8.7
Physical process flow

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Figure 8.7   The restructured physical and process flow and steps analysis for the DRS.
(ii) Defect Levels.

Defect levels were one of the most significant issues within the organisation. Defect levels within the company's processes were very high when first visited by the project team. Management was aware that the levels were high, but no systems were put in place to record the actual level or what was causing the high levels. Check sheets were introduced as a means of recording defect levels within the process. The defect level for each process was calculated and recorded on a daily basis, which meant that trends in defects were easily identifiable and the improvements could be made swiftly. The company also realised the merit of analysing the occurring defects as a means of identifying weaknesses within its process.

Example: In one instance, defect levels for a particular process were extremely high (up to 80%), this immediately showed up on the check sheets and on the run charts as being a serious cause for worry. The trends on the check sheets were identified and the weakness in the process as a result were highlighted - the weakness in this case was the introduction of two new employees - the company was in a position to deal with the problem.

At present, the company has trigger defect levels in place i.e. levels of defects which will stop all work on the manufacturing floor until the weakness in the process causing that level of defect is identified and resolved.

In the process, there are two test centres, Test 1 and Test 2; different criteria are associated with each test. The test operator records test criteria failures on check sheets and this information is quantified on a weekly basis. The number of units
tested and the number of units failed are recorded at each weekend and a failure rate for that period is calculated.

Run charts are then drafted to graphically present data over a period of time. Illustrated in Figure 8.8, is a run chart outlining defect levels (test failure rates) for the period 15/11/1996 to 14/02/1997:

**Percentage Failure Rate Per Week**

*Weekending 15th November 1996 to 28th February 1997*

---

Figure 8.8 Run chart recording defect levels (test failure rates) for the period 15/11/1996 to 14/02/1997
The test check sheets are completed by the test operator after each test, if a trend is occurring in the test failures, this can be easily observed by the operator and the associated problem can be resolved quickly.

Fault analysis is carried out on the defect level run charts, to outline the reasons for decreases / increases in defect levels, this is illustrated in Figure 8.9 i.e. defect levels on Test 2 increased from 4% to 22% between the period 21/06/1996 to 28/06/1996.

Figure 8.9  Run chart recording defect levels (test failure rates) for the period 21/06/1996 to 28/06/1996
(iii) **Inventory.**

The levels of inventory within the plant was an ongoing issue among company directors. At the company's origin, a Material Requirement Planning (MRP) system was developed by the company's Managing Director, this system was put in place and has been operating since. This system was not operating effectively because for an MRP system to have a chance of operating effectively, stock accuracy has to be in the 90 percentile, which due to lack of administration resources, is not occurring in Ogenek Teo.

(iv) **Stock Control.**

Poor materials control and control of stock were significant issues identified within the company. The production line was being stopped on a number of occasions because the company had run out of stock, particularly inexpensive components. Company suppliers were not assessed but for the majority were thought to be poor.

To improve material control and stock control, a two-bin system was introduced. The two-bin system is an extremely simple system, which is particularly suited for the control of high volume, low cost stock within the company. Parts are used from the first bin and when it goes empty the bin itself acts as a stimulus to reorder the material. The bin can be a physical bin, a stores location, a bag of parts or even barrels or vats of materials. The introduction of the two-bin system within the company has been very successful and at present all employees have been trained in its operation.
(v) Suppliers.

The company’s suppliers were examined in an effort to reduce their numbers and develop a good working relationship with a select number. To decrease the cost of purchasing and to improve supplier delivery times were the main objectives of this exercise.

The following steps were undertaken in this process:

- Who were the suppliers? – A simple listing.
- Number of suppliers – The number of suppliers was deemed far too high and was reduced considerably.
- ABC classification of the suppliers in terms of the following criteria was completed:
  (i) Quality    (ii) Reliability    (iii) Cost

The following example in table 8.3 demonstrates this concept:

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quality</td>
</tr>
<tr>
<td>Rehab Electric</td>
<td>B</td>
</tr>
<tr>
<td>Electronics Ltd.,</td>
<td>A</td>
</tr>
<tr>
<td>E.B.M. Ltd.,</td>
<td>A</td>
</tr>
<tr>
<td>Unit Design</td>
<td>B</td>
</tr>
<tr>
<td>Radoll Design Inc.</td>
<td>C</td>
</tr>
<tr>
<td>JCL Ltd.,</td>
<td>C</td>
</tr>
</tbody>
</table>

Table 8.3 Classification of suppliers.
Classification:  
A – Good.  
B – Average.  
C – Poor.

It is evident from this classification that Flextronics Ltd., is the preferred supplier of electronic circuit boards.

- Relationships were developed with the selected suppliers. The company helps their suppliers to develop internally by sharing their in-house experience with them. Where this sharing has been achieved by agreement, it has proved to be mutually beneficial.

This exercise has significantly decreased the company’s purchasing costs and has resulted in a vast improvement in supplier delivery times.
(vi) **Rework.**

No systems were in place within the company's processes to calculate the level of rework and to identify the causes of these levels. Check sheets were put in place to record and identify the causes of these levels. These causes were analysed and addressed at regular intervals and recommendations were made to amend the associated problems.

Presented in Table 8.2 is the rework record for the falcon product, for the period 02/12/1996 to 06/12/1997:

<table>
<thead>
<tr>
<th>Weekend</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Total No. of units Reworked</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.11.96</td>
<td>-</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>03.12.96</td>
<td>-</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>10.12.96</td>
<td>-</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>17.12.96</td>
<td>-</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>20.01.97</td>
<td>-</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>02.12.97</td>
<td>7</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>05.12.97</td>
<td>11</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>06.12.97</td>
<td>13</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>31</strong></td>
<td><strong>158</strong></td>
<td><strong>189</strong></td>
</tr>
</tbody>
</table>

Table 8.4  **Rework record for the falcon product, for the period 02/12/1996 to 06/12/1997.**
From this data, it is evident that the number of units reworked is extremely high. This also is a powerful exercise when the cost of these reworks is quantified – both the cost of rework and the cost of lost time in production. This issue was addressed immediately by the manufacturing team.

(vii) Quality.

Ogenek Teo. is a leader in its field in terms of quality. To produce quality products is one of their priority functions. ‘Quality is everybody’s responsibility’ – this simple statement forms the core of the ‘World Class Business’ idea on quality systems. The awareness of quality and how all company employees are part of this quality mindset has been introduced to the staff by a committed and dedicated management who care about the business and its customers. Training of staff members is an essential part of getting this message across.

Even though quality is still highlighted as an area of weakness in the Microscope benchmarking exercise completed by the company, the company has significantly improved its quality systems since the start of the project by the introduction of some of the tools of quality:

- Check sheets
- Faults analysis chart
- Process and physical flows

With the aid of these tools the company was in a position to identify internal and external sources of quality defects and was in a strong position to implement actions to address them.
(viii) **Customer Complaints.**

This was also an area that needed addressing. The worst thing a company wants is to have its customers acting as its quality department. However, in the real world, customers can and do find problems with products. The company emphasises the importance of customer satisfaction and therefore treats every customer complaint as a priority. Each customer complaint is logged and followed through with the required level of service until the customer is satisfied.

While the company reacted well to customer complaints, the World Class Rural Cluster team recommended it should focus on recording customer satisfaction rather than complaints and that a better relationship would be structured with its customers if this exercise was completed regularly.

At present, feedback on the company's products is restricted to a few sources i.e. company sales executives, customer complaints and distributors.

To address this issue, the company successfully structured a comprehensive questionnaire, which assessed customer satisfaction with the company's products.

(ix) **World Class Business Teams.**

The World Class Business structures within the company involves a series of teams:

(i) **Manufacturing Team**

- Production Manager
- Operator(s)
- Facilitator / General Manager

(ii) Design Team
- Managing Director
- Hardware Engineer
- Software Engineer
- Facilitator

(iii) Sales / Marketing Team
- Managing Director
- Sales Executive
- Facilitator

(iv) General Team
- All company employees meet on Monday mornings to discuss matters of common interest, the meetings are facilitated by the General Manager and some of the issues discussed include the following:
  - New products being developed.
  - Internal and external training for employees.
  - Company progress in terms of World Class Business programme.
  - Seminars/Workshops attended by company employees.
8.2.4 Results.

The results attained by the company during the World Class Rural Cluster project are presented in two formats:

(I) QUANTITATIVE RESULTS.

The percentage improvements in the core metrics within the company from the start date to the completion date of the World Class Business programme are presented below. The majority of these results were measured from manufacturing data collected using check sheets, which were put in place by the project team. The financial data was recorded from the management accounts of the company.

<table>
<thead>
<tr>
<th>Core Metrics</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>43% ↑ (from 220 units/day to 315 units/day)</td>
</tr>
<tr>
<td>Defects</td>
<td>15% ↓ (from 50% to 35%)</td>
</tr>
<tr>
<td>Lead Times</td>
<td>2 days ↓ (from 6 days to 8 days)</td>
</tr>
<tr>
<td>Turnover</td>
<td>25% ↑ (measured from the management accounts)</td>
</tr>
<tr>
<td>Operating profit</td>
<td>15% ↑ (measured from the management accounts)</td>
</tr>
</tbody>
</table>

(II) QUALITATIVE RESULTS.

The qualitative results attained by the company are recorded through:

(a) Microscope Benchmarking Tool
(b) Observations of World Class Business facilitator.
(c) Comments of Company Management.
8.2.4 (A) MICROSCOPE BENCHMARKING RESULTS:

INTRODUCTION.

The following are the reports and results of a microscope Benchmarking exercise. The exercise was conducted for the second time on the 20/03/1997 (at the end of the project) by a cross-functional team from the company. This exercise acts as a guide in which the company can compare to its industry sector and helps the company focus its efforts on further developing its strengths as well as addressing its weaknesses.

RESULTS.

- OVERALL PRACTICE V'S PERFORMANCE (52 V 55).

The Microscope Benchmarking exercise was conducted on two occasions at Ogenek Teo. The first exercise was conducted in January 1996, at the start of the project with the second being completed at the end of the project. The overall practice and performance results achieved by Ogenek Teo., during these exercises are illustrated in Table 8.5.
### MICROSCOPE BENCHMARKING RESULTS : OGENEK TEO.

<table>
<thead>
<tr>
<th>RESULTS AT START OF PROJECT (Date completed 11.01.1996)</th>
<th>RESULTS AT END OF PROJECT (Date completed 20.03.1997)</th>
<th>IMPROVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice v Performance</td>
<td>Practice v Performance</td>
<td>Practice v Performance</td>
</tr>
<tr>
<td>34 v 40</td>
<td>52 v 55</td>
<td>18 v 15</td>
</tr>
</tbody>
</table>

**Table 8.5  Microscope Benchmarking results : Ogenek Teo.,**

The results of the first benchmarking exercise conducted at Ogenek Teo., on the 11.01.1996 are presented in Appendix V. The following are the reports and results of the second Microscope benchmarking exercise conducted at Ogenek Teo., on the 20.03.1997. Compared to the overall sample and this industry spread, Ogenek Teo. was performing towards the middle of the sample coupled with average business practice. For means of interpretation, companies placed in this position on the scatter graph would normally consider to manifest the following characteristics.

- Aim for ‘delighted’ customers.
- Market drivers of quality.
- Use the European foundation for quality Management./ Baldridge templates.
- Significant Employee involvement.
- Social and environmental responsibility.

*Overall = Service excellence.*
The overall practice was recorded at 52 and performance at 55, as illustrated in Figure 8.10. This is rated as an average overall score.

Figure 8.10 Overall practice vs performance chart (microscope benchmarking exercise, IBM, 1997)
• QUARTILES CHARTS.

As described in section 8.1.4, this chart divides the scores on the Microscope database into four quartiles. The top quartile of companies is represented by the light blue area with the red area representing the bottom quartile. With reference to figure 8.11 the top (best) quartile of companies on the Microscope database scores between 70 and 90 in terms of manufacturing practice. Ogenek Teo., scores 49 in this respect and is in the fourth (bottom) quartile. This chart also outlines the companies practices and performances over a spread of industry functions and highlights imbalances between performance and practice issues in those functions.

Table 8.6 illustrates the practice and performance scores achieved by Ogenek Teo., over a spread of industry functions at the start and at the finish of the World Class Business programme. This table also highlights the improvements achieved by the company across those functions during the period of the programme.
<table>
<thead>
<tr>
<th>Quartiles Results : Ogenek Teo.,</th>
<th>Results at 11.01.1996</th>
<th>Results at 20.03.1997</th>
<th>Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturing Practice</strong></td>
<td>30</td>
<td>51</td>
<td>21</td>
</tr>
<tr>
<td>Manufacturing Performance</td>
<td>42</td>
<td>54</td>
<td>12</td>
</tr>
<tr>
<td><strong>Quality Practice</strong></td>
<td>34</td>
<td>69</td>
<td>35</td>
</tr>
<tr>
<td>Quality Performance</td>
<td>31</td>
<td>40</td>
<td>11</td>
</tr>
<tr>
<td><strong>Logistics Practice</strong></td>
<td>24</td>
<td>53</td>
<td>29</td>
</tr>
<tr>
<td>Logistics Performance</td>
<td>39</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td><strong>Lean Production Practice</strong></td>
<td>27</td>
<td>42</td>
<td>15</td>
</tr>
<tr>
<td>Lean Production Performance</td>
<td>50</td>
<td>64</td>
<td>14</td>
</tr>
<tr>
<td><strong>Organisation and Culture</strong></td>
<td>31</td>
<td>49</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 8.6 Quartile scores of Ogenek Teo. (Microscope, IBM,1997)

The quartile scores achieved by Ogenek Teo., in the second of the benchmarking exercises is presented in chart form in figure 8.11. From this chart, it is evident that for the majority of the functions analysed, the company scores within the bottom quartile of the total database and significantly lower than its sector. The weakest areas identified in terms of the company’s practices and performance were ‘quality’ and ‘logistics’. Quality performance also scores significantly lower than quality practice and this issue should be examined by the company, this may be the results of new practices being introduced or the wrong practices...
being used for quality. Other imbalances between practice and performance is in the area of lean production, where the performance score is significantly higher than the practice.

![Manufacturing Quartiles and Boundaries](image)

**Figure 8.11** Manufacturing Quartiles and boundaries chart. (Microscope benchmarking exercise, IBM, 1997)
• **WEAKEST ELEMENT CHARTS.**

• **WEAKEST ELEMENTS IN MANUFACTURING PRACTICE.**

As illustrated in Figure 8.12 the key weakest elements in manufacturing practice were:

1. Shared vision
2. Training
3. Equipment Layout
4. Customer orientation
5. Kanban
6. Performance Measuring

![Chart showing weakest elements in manufacturing practice](image)

*Ogenek Teo., Beal Atha'n Ghaorthaigh, Co. Chorcai, Manufacturing Practice vs International Sample*

Figure 8.12 Weakest Elements in Manufacturing Practice. (Microscope benchmarking exercise, IBM, 1997)

In these highlighted areas between 80% - 90% of the companies previously benchmarked using this tool score better than Ogenek Teo. Next were ‘Manufacturing Strategy’,
‘Suppliers’ and ‘Batch sizes’ at 60% - 50%. This chart identified a number of serious weaknesses in the company and needed to be addressed with urgency by the company.

- **WEEKEST ELEMENTS IN MANUFACTURING PERFORMANCE.**

As illustrated in Figure 8.13 the key weakest elements in manufacturing performance were:

1. Product Reliability
2. Inventory Turns
3. Customer Satisfaction
4. Process Capability

![Bar chart showing the weakest elements in manufacturing performance](image)

**Figure 8.13 Weakest Elements in Manufacturing performance.** (Microscope benchmarking exercise, IBM, 1997)
In these highlighted areas between 70% and 81% of the database scored better than Ogenek Teo. Again, there were a number of areas that needed to be addressed immediately by the company in this respect.

- **BENCHMARKING REPORT – CONCLUSIONS.**

Overall, the company achieves an average score. There are a number of key areas within the company that need to be addressed so as to avoid the ‘at risks’ category. The company however has made reasonable progress since its initial benchmarking exercise on the 11/01/1996 where its overall practice V’s performance score was 34 V 40.

The more significant issues identified from the exercise were from the weakest element charts. The company should address these issues as a matter of priority.

The quartile charts again corresponded with the weakest element charts in that it rated the company’s practises and performance in the bottom sector in the majority of the areas of its business. It also identified significant imbalances between Practice and Performance in the following areas of the company:

- Quality
- Lean Production

Ogenek Teo, even though scoring average, has made significant improvements since its first benchmarking exercise on the 11.01.96 and is poised for further process improvement opportunities on many fronts. Process mapping and analysis would be essential to ensure clear management understanding of key
processes, how these contributed to the key business goals, which ones are functioning badly, and what prioritisation is required.

8.2.4 (B) WORLD CLASS BUSINESS CLUSTER FACILITATOR OBSERVATIONS

The company designs and manufactures a range of data logging equipment. Their primary ability and focus is in the area of product research and development. They had significant difficulties in manufacturing.

The company embraced many of the manufacturing related tools and techniques of World-Class manufacturing and effectively doubled production capacity. They used the tools of quality to identify problems in product design, sub-contracted and in-house manufacturing. They managed to remove the sources of many of their problems and to minimise many others.

The company had one main customer; this was a significant issue for the future development of the business. Management addressed this issue successfully attracting business from a further eleven customers. They have worked to develop their staff and have integrated them in the World-Class Rural Cluster project from the outset. They have completed a development plan for the business identifying key objectives for each of the operating units within the business.

8.2.4 (C) COMMENTS OF COMPANY MANAGEMENT.

The following are some significant extracts from a letter written by the Managing Director of Ogenek Teo. on the Company’s reaction to the World Rural Cluster project.
‘The pilot scheme (World Class Rural Cluster project) has been of enormous benefit and without it Ogenek would be wallowing in a quagmire of depression and financial ruins. We have been advised and ably assisted in improving our own lot. We have adopted the philosophy of World Class Business by looking at all aspects of the business and implementing improvements. In particular, over the life of the project we have taken the following specific actions:

- Empowered the workforce.
- Implemented IT improvements throughout the company
- Implemented a Training Programme
- Tracked manufacturing failures
- Detected design flaws
- Implemented a warranty study to improve design by detecting design flaws.
- Purchased new design tools to increase R & D efficiency

These are the sectors that we would not normally have considered had we continued to operate outside the project. Each of these improvements has had a dramatic effect on the viability of the company in both the longer and shorter terms and it would take many pages to list the advantages made available by each one.’
This extract speaks for itself. It is obvious that the company gained significantly as a result of their participation in the programme and that this approach was well received by all in the company.

### 8.2.5 COST OF WORLD CLASS RURAL CLUSTER INTERACTION.

The cost of the interaction to the company is estimated as the following:

<table>
<thead>
<tr>
<th>Service</th>
<th>Hours per Year</th>
<th>Cost per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultancy</td>
<td>@ £5,000</td>
<td>£10,000.00</td>
</tr>
<tr>
<td>Time of MD</td>
<td>10 days</td>
<td>£4,000.00</td>
</tr>
<tr>
<td>1 Mgrs.</td>
<td>10 days</td>
<td>£3,000.00</td>
</tr>
<tr>
<td>5 x Supervisors</td>
<td>2.5 days</td>
<td>£2,500.00</td>
</tr>
<tr>
<td>Administration</td>
<td>10 days</td>
<td>£1,000.00</td>
</tr>
<tr>
<td>Travel 1,500 miles</td>
<td>@ 0.30p/mile</td>
<td>£450.00</td>
</tr>
</tbody>
</table>

Total cost of £20,950.00 per year.
8.3 CASE STUDY FROM INNOVATIVE MANAGEMENT TECHNIQUES-WORLD CLASS BUSINESS PROJECT.

The following is a summary of a case study of one participating company in the project. The work completed by this company during the course of the project was indicative of the work completed by all of the participating companies.

The author participated in the Benchmarking and Training exercises during this project in addition to the cluster events. As Enterprise Ireland was the promoter of the project, the author did not participate in the implementation of the techniques of World Class Business in the participating companies. As a result of this, the author was not privy to the details of this work and to some of the results of the benchmarking exercises.

The author presents a synopsis of this case study based on the data collected during his involvement in the project. This data is included in this research as the same World Class Business programme was implemented in the context of this case study as those presented in sections 8.1 and 8.2. This data therefore tests the methodology and applicability of this programme further by applying it to another case study which is located in a different geographical region. Other significant differences between this case study and those presented earlier include sector, employee number and turnover.
8.3.1 BACKGROUND.

*Company Name:* Richard Keenan & Company Limited.

*Headquarters:* Borris, Co. Carlow, Ireland.

*Turnover:* IR£20m (26mECU)

*Established:* 1979

*Customer:* 10,000 customer’s worldwide (40 countries)

*Employees:* 200 employees of which 70 are graduates.

*Product:* Feeding System.

8.3.2 WORLD CLASS BUSINESS PROJECT TARGETS.

1. Sales to increase 10%.

2. Reduce product customisation by 20%.

3. To improve order taking and processing.

4. Reduce purchasing costs by £250k.

5. Agree business strategy with employees.

6. Improve productivity by 5%.
8.3.3 RESULTS.

(i) Quantitative

Following an intensive World Class Business programme, over a 24 month period, the following quantitative results were attained by the company:

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>13% ✓</td>
<td>10% ✓</td>
</tr>
<tr>
<td>Defects</td>
<td>20% ▼</td>
<td>10% ▼</td>
</tr>
<tr>
<td>Purchase Savings</td>
<td>£ 525k ▼</td>
<td>£ 250k ▼</td>
</tr>
<tr>
<td>Productivity</td>
<td>12% ✓</td>
<td>5% ✓</td>
</tr>
<tr>
<td>Operating Profit</td>
<td>300% ✓</td>
<td></td>
</tr>
</tbody>
</table>

(ii) Qualitative

- Introduced new training programmes for order taking and processing.
- Improved manufacturing process and control. 100% check on equipment in the factory.
- Benchmarking introduced to all areas of operations.
- Reliable key factor forecasting.
- Developed team culture and high degree of involvement.
- Increasingly effective leadership providing direction and a supportive environment.
- Regular performance updates to all levels.
- Operations plan driven rather than event devices.
- Continuous personnel development a priority throughout the organisation.
- 3-year rolling strategic plan developed and agreed with all the staff.
8.3.4 COST OF WORLD CLASS BUSINESS INTERACTION.

Consultancy @ £7000 per year £14,000

Time –

Managing Director 10 days @ £400 /day £4,000
4 Managers 10 days @ £300 / day £12,000
5 supervisors 5 days @ £100 / day £2,500
1 administration 12 days @ £80 / day £960

Total Cost of Programme over 24 months £33,460

Total Cost of Programme per year £16,730

Compared with a cost saving per annum of approximately £525,000 in purchasing alone.
8.4 U.K. CASE STUDIES.

Introduction

Two case studies completed by West London Technical College, UK. are described in brief which illustrate the benefit experienced by two SMEs from the U.K. in their use of benchmarking. The author endeavoured to review two complete case studies from England in this section. While the co-operation of the West London Technical College was apparent in sharing this information, the Management of the companies were unwilling to release the necessary information. As a result, the information presented is in shortened form but still valid as it illustrates the benefits gained by a sample number of SMEs in England through benchmarking, using the Microscope tool. This information was provided by the West London Technical College who conduct Microscope Benchmarking Surveys on a commercial basis in the U.K.

This data is included in this research to highlight the applicability of benchmarking to SMEs transnationally. The case studies presented are applicable as the same benchmarking process was implemented in all cases.

8.4.1 GAZEBO FINE FOODS.

Gazebo Fine Foods, a manufacturer of 'ready to eat' chilled and frozen ethnic meals have been in existence for 11 years and employ 22 full time people. In 1998 Gazebo undertook a Manufacturing Microscope, carried out by Dr. Graham Finney, an experienced food consultant and accredited Microscope facilitator. The Microscope benchmark identified a need for the company to formalise its mission and share this with its employees. A significant investment in training
was seen as one of the top priorities and an improvement in productivity was also highlighted as a key area. According to Mr. Susmita Shah, a partner in Gazebo

"we thought we had a petty good idea of how well we were performing, but we had no formal means of assessing ourselves against others in the industry. Microscope showed us where to concentrate our efforts".

After a year the company undertook Microscope again. This time the performance of the company was higher, although improvements were still highlighted. According to Mr. Susmita Shah

"Our sales and production volume have increased and much of our attention during the year was devoted to ensuring that we met our customer commitments. We established a business plan, carried out some market research analysing our competitors and we have articulated the company's mission to all of the employees. We have also undertaken the 'Investors in People' standard to identify training needs and to motivate staff".

The importance of the benchmarking exercise to the development of Gazebo Fine Foods is further stressed by the partner in his comment that:

"Microscope has certainly concentrated our minds on key issues and we are looking forward to our next benchmark in the year 2000".
8.4.2 KLINGER FLUID INSTRUMENTATION LTD.

Mr. Geoff Eagles, Managing Director of Klinger Fluid Instrumentation Ltd, wanted to use Microscope to learn how efficiently his company was operating relative to his European Competitors. The company, which makes gauges for measuring the level of liquids in tanks and vessels, had recently been restructured and the management team were keen to learn how well the new organisation was performing in practice. According to the Managing Director their objective in participating in the Microscope exercise was:

"We want another view of what we had been developing in our corporate plans. We felt we had good structures and strategic directions but we were unsure on how these were being implemented. We wanted to know across a number of operating parameters how far we were in front of, or behind, the competition".

Microscope revealed that by and large the management was correct in its assessment of their performance. However, in the area of customer satisfaction it revealed that the company was not using the information at its disposal as efficiently as it could have been. Improvements in the speed of response to customer queries and requests for quotations have already led to an improved conversation rate. The Managing Director’s satisfaction with the Microscope tool is illustrated in his following comment:

"It gave us an excellent opportunity to improve our competitive positions but the information is only of value if the management team is prepared to act upon it"
8.5 **CONCLUSION.**

From the case studies presented in this chapter, it is clear that significant gains have been achieved by these companies through the implementation of the tools and techniques of World Class Business and Benchmarking. Both quantitative and qualitative improvements were achieved in all cases.

These results support the hypothesis of this research that business success can indeed be achieved in SMEs through the implementation of the tools and techniques of World Class Business and Benchmarking.

The next section will discuss in detail the results presented in this chapter examining in particular other factors that may have had a bearing on these results. The conclusions to be drawn from this research in addition to its findings will also be presented in the next section.
CHAPTER 9 : ANALYSIS OF FINDINGS

9.0 INTRODUCTION.

9.1 CHARACTERISTICS OF THE PARTICIPANTS.

9.2 THE LEVEL OF INPUT RECEIVED BY THE PARTICIPATING COMPANIES.

9.3 METHODOLOGY EMPLOYED.

9.4 RESULTS.

9.5 SUMMARY.
9.0 INTRODUCTION.

This chapter analyses the results presented in section four. The objective of this chapter is to examine the relationship between these results and other factors that may have influenced them. The other factors the author will examine include:

1. The characteristics of the participating companies.

2. The level of input received by the participating companies during the projects.

3. The methodology employed.

4. The results.

In doing so, the author aims to test the hypothesis of this research statement, which reads as follows:

**H1**: Business success can be achieved in SMEs through the implementation of the tools and techniques of world class business and benchmarking.
9.1 CHARACTERISTICS OF THE PARTICIPANTS.

The case studies presented in this research are small and medium sized enterprises employing between 18 and 200 employees. These companies are indigenous industries operating in the engineering, electronics, food or craft sectors. The research conducted in this area to date is limited and therefore the author deemed that this particular research topic would be innovative and of potential value. This group of companies was selected for the following reasons:

- **Importance of group** - Small and medium enterprises constitute a vital sector in the development of national and regional economies, such as in Southwest Ireland. SMEs provide over 66% of the European community employment, and 65% of turnover, which emphasises this importance.

- **Competitiveness of this group** - the competitiveness of this group of companies is in question and with the advent of open markets it has never been more important for SMEs to improve their competitiveness.

- **Availability** - SMEs make up the majority of the client bases of Údarás na Gaeltachta and Enterprise Ireland. In the author’s role as a Regional Development Executive he works in the development of these SMEs on a continual basis.
The following is a brief synopsis of the Irish case studies represented in Tables 9.1 and 9.2.

**Lampai an Daingin Teo.**

Lampai an Daingin Teo., was established in 1970. The company is located in a rural Gaeltacht area near the village of Ballyferriter on the Dingle Peninsula. The company currently employs fifty staff, which grows to about sixty in the summer season. The company designs and manufactures by hand pottery products such as tea sets, vases and flowerpots. The company’s critical success factors include:

- Product Innovation.
- Product Quality.
- Product Branding.
- Skilled Personnel.
- Vision of Mr. Louis Mulcahy, owner manager.
- World Class Business Programme.

The company is effectively managed by Mr. Louis Mulcahy and a Production Manager. The managerial responsibilities are shared amongst these two with Mr. Louis Mulcahy controlling the Research and Development, Business Development and Accountancy functions of the business while the Production Manager controls the Production and Inventory functions.
Ogenek Teo.

Ogenek Teo., was established in 1987. The company is located in the rural Gaeltacht village of Ballingeary in the Southwest of Ireland. The company currently employs eighteen full-time staff members. Ogenek Teo. designs and manufactures data monitoring, capturing and communication systems. The company essentially is a Research and Development company, which has turned its operations towards manufacture in recent years. The company's critical success factors include:

- Product Innovation.
- Research and Development Capabilities, particularly those of the Managing Director.
- A developing market.
- World Class Business programme-this programme has helped the company to make the difficult transition from research and development to manufacturing.

The company is managed by the General Manager, Mr Oliver Leamy and his wife, Mrs Maire Leamy. Mr Leamy controls the research and development and business development functions of the business while Mrs Leamy controls the production, inventory and accounting functions.
Richard Keenan & Co Ltd.,

Richard Keenan & Co Ltd was established by Richard Keenan and his sons in 1979. The company's headquarters are located in Borris, Co. Carlow. The company currently employs two hundred employees of which seventy are graduates. The company manufactures feeding systems for farm animals. The company exports its products to over forty countries world-wide. The company's critical success factors include:

- Product innovation.
- Product quality.
- Highly skilled personnel. (70 graduates)
- End user experience-Products are developed by a farmer for farmers.
- Product Branding.
- World Class Business programme-the implementation of this programme resulted in significant inefficiencies being extracted from the operations of the company. New systems were also put in place to help the company to continuously improve in the future.

The company is managed by five managers which include Richard Keenan and his sons. Richard Keenan controls the product development and innovation functions in addition to company strategy.
The general and management characteristics of the companies which participated in this research are presented in tabular form in Tables 9.1 and 9.2 respectively.

<table>
<thead>
<tr>
<th>Company</th>
<th>No. of Employees</th>
<th>Turnover</th>
<th>Location</th>
<th>Supplier to Japanese &amp; American Companies</th>
<th>Member of an Employers Group</th>
<th>Taken part in improvement initiatives prior to this research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lampai an Daingin Teo.</td>
<td>50</td>
<td>&gt; £5 Million</td>
<td>Rural</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Ogenek Teo.</td>
<td>18</td>
<td>&gt; £1.5 Million</td>
<td>Rural</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Keenans &amp; Co. Ltd.</td>
<td>200</td>
<td>&gt; £20 Million</td>
<td>Urban</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Gazebo Fine Foods</td>
<td>22</td>
<td>&gt; £2 Million</td>
<td>Urban</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Klinger Fluid Instrumentation Ltd.</td>
<td>44</td>
<td>&gt; £4.5 Million</td>
<td>Urban</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Figure 9.1 General characteristics of participating companies.

<table>
<thead>
<tr>
<th>Company</th>
<th>No. of Managers on Management Team</th>
<th>Management Style</th>
<th>Qualifications of General Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lampai an Daingin Teo.</td>
<td>2</td>
<td>Traditional</td>
<td>Non-graduate</td>
</tr>
<tr>
<td>Ogenek Teo.</td>
<td>2</td>
<td>Traditional</td>
<td>Graduate</td>
</tr>
<tr>
<td>Keenans &amp; Co. Ltd.</td>
<td>5</td>
<td>Traditional</td>
<td>Graduate</td>
</tr>
<tr>
<td>Gazebo Fine Foods</td>
<td>2</td>
<td>Traditional</td>
<td>Graduate</td>
</tr>
<tr>
<td>Klinger Fluid Instrumentation Ltd.</td>
<td>2</td>
<td>Traditional</td>
<td>Graduate</td>
</tr>
</tbody>
</table>

Figure 9.2 Management characteristics of participating companies.
The following are noteworthy considerations from the information presented:

In the context of the number of employees in the companies researched, it is evident that the SME group is well represented. The number of employees varies between 200 employees for the largest and 18 for the smallest.

The broad range evident in the annual turnover of the companies researched augments this argument where the annual turnover is £20 million for the largest company researched and £1.5 million for the smallest. However, it may also be argued that companies employing less than fifteen employees constitute a large percentage of Europe’s SMEs and that this size of company is not represented in the research conducted by the author. It may also be argued that this type of company, because of its small size and lack of resources would have sternly tested the hypothesis of the research statement.

The most interesting characteristics of the participating companies are the details presented on the management of these companies. In this respect, the following points are noteworthy:

- The low number of managers which is typical for the SME group. This assumption is supported by the survey of fifty SMEs conducted by the author (this survey is described in chapter two) These low numbers indicate that the responsibility for the development of these type companies rests on small numbers. This is evident in the case of ‘Keenans’ where five managers are responsible for the work of two hundred employees. This equates to forty employees per manager, which is quite onerous. It
also highlights the lack of time, managers in these type situations have to implement improvement programmes or review the strategy of a company. Therefore, it is not surprising that companies from the SME group predominantly get involved in improvement initiatives when there are serious problems identified in their operations, which require immediate attention. This point is verified in the company characteristics as only one Irish company took part in an improvement initiative prior to this research. The company was ‘Keenans’ and their reason for taking part was to resolve a severe downturn in their business resulting from the BSE crisis, which affected their market.

• Three of the companies researched are owner managed while two are professionally managed. In the author’s opinion, based on his experience of working as a Regional Development Executive with over five hundred SMEs, companies that are professionally managed tend to be more open to new ideas and initiatives to improve their operations than owner managed companies. This point is verified as the two professionally managed companies have each sought assistance by their participation in improvement initiatives prior to this research.

• The author’s interpretation of a traditional styled manager is a manager whose primary objective is to maximise product output and reduce costs. Product quality and service are secondary to this type of manager. All the companies researched are managed by traditionally styled managers, which in the author’s opinion is surprising, as these type managers are generally slow to change and adopt new ideas and techniques to improve. However, the author recognises that other reasons may be
apparent to justify these companies' involvement in improvement initiatives. Other reasons may include:

1. Necessity as previously discussed.
2. Recommendations from supporting body.

The management of these companies had to develop their understanding of employee involvement before they were ready to start the World Class Business process.

- All but one of the companies researched employed a General Manager with qualifications to graduate level. It is noteworthy that four of the General Managers had a technical or science degree and not a business or management degree. General Managers in these type companies usually focus on the aspects of the business, which corresponds to their qualifications or interests and tend to neglect the other areas.

This is particularly evident in the author’s research conducted at Ogenek Teo., where the General Manager, an Electronic Engineer, focused the majority of his time on product development to the detriment of other areas of the business.

Location and a company’s participation in employer organisation is critical to an SME’s exposure to new ideas on product development and improvement initiatives. All but one of the companies researched showed a certain involvement in an employer group, with one company located in a rural area showing no involvement. Companies in this situation tend to feel very isolated and are generally uninformed on new opportunities to
company development. This is not a significant factor in terms of this research as it only refers to the possible difficulties experienced by companies in seeking help and not to the success of the process.

9.2 THE LEVEL OF INPUT RECEIVED BY THE PARTICIPATING COMPANIES (IRISH ONLY).

The inputs received by the companies researched were in the following formats:

**On-site visits**: Twelve on-site sessions were conducted with each of the companies researched. The sessions were facilitated by a World Class Business and Benchmarking consultant. Each session lasted approximately one full day. These sessions addressed specific company matters, working with the management and staff of the companies to develop their understanding of the tools and techniques of World Class Business and Benchmarking within their own specific, tailored environments. This tailored approach addressed the high level of diversity of the companies by providing focused, relevant training in individual operations. This approach helped to remove any translation requirements from management. The management of these companies did not have to work from first principles to find their specific solution, they could work through the theory with a trainer on site. This tailored approach to the specific needs of the
companies was perceived positively by the companies researched, for its flexibility to deal with a variety of issues and its ability to simplify the most complex of issues.

**Off-site training days**: Twelve training days on the tools and techniques of World Class Business and Benchmarking were also received by the companies researched. The training days were conducted off-site and were attended by a number of representatives from each company.

The companies were invited to rate a number of possible training areas at the start of the project and the training areas were selected on this basis. Therefore, the companies had a real input to the training provided to them. The training provided was also practical and examined real case studies to maximise the benefit to the participants. The training was well received by the participants.

**Cluster meetings**: Clustering of companies was another format of input provided to the companies researched. Companies visited each other’s sites to observe at first hand the improvements that had been implemented. This approach resulted in a number of positive results:

By having a cluster of companies in a greater geographical area, off-site training days could be arranged in a cost and time effective way. Trainers in specific topics could present to a number of companies at a single session, greatly improving the efficiency of their input. As the companies researched had a real input in the training provided, these sessions were designed for maximum benefit at minimum cost.
The staff and management of the cluster of companies began to develop links during the course of the project. As they identified areas of mutual interest, they began to discuss solutions that they had developed. A key point to this type of clustering would have been the consensus reached by the companies researched in terms of keeping the project on-going, to further develop links into the future.

Most noteworthy in this analysis of the inputs received by the companies researched is that it varied little between all the companies researched. The techniques implemented in some of the companies may have differed at certain intervals but in effect the same techniques were used in all of the companies over the same period of time.

The required inputs from the companies researched were also examined and the author's findings are presented in Table 9.3

<table>
<thead>
<tr>
<th>Company</th>
<th>Time of MD (Days)</th>
<th>Time of Managers (Days)</th>
<th>Time of Supervisors (Days)</th>
<th>Administrators Time (Days)</th>
<th>Travel (Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lampai an Daingin Teo.</td>
<td>12</td>
<td>12</td>
<td>100</td>
<td>12</td>
<td>2,500</td>
</tr>
<tr>
<td>Ogenek Teo.</td>
<td>10</td>
<td>10</td>
<td>25</td>
<td>10</td>
<td>1,500</td>
</tr>
<tr>
<td>Keenans &amp; Co. Ltd.</td>
<td>10</td>
<td>40</td>
<td>25</td>
<td>12</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 9.3 The inputs from the companies researched.
From this chart, it is evident that the duration of time spent by each managing director on the project is the same. This is an interesting observation as the companies vary considerably in size.

The time spent by the other members of the management team equates to 10 - 12 days per manager, as four managers make up the management team at Keenans while the management team in Lampai an Daingin Teo., and Ogenek Teo., consist of two (including the Managing Director).

Supervisor's time at Lampai an Daingin Teo., varies considerably in comparison with two other companies. One hundred supervisor days are recorded in the case of Lampai an Daingin Teo., which equates to twenty days per supervisor. The high number of days in this case highlights the lack of training previously received by the supervisors in this company prior to their involvement in the World Class Rural Cluster project, in addition to the Managing Director's commitment to the process.

Again, the consistency of input from the companies researched is highlighted in this analysis.

9.3 METHODOLOGY EMPLOYED.

The participation of the author in the research projects necessitated that the 'action research methodology' be employed. The researcher fulfilled a project management position on the 'World Class Rural Cluster' project and as a result participated in the interaction with the participating companies in the programme. The researcher acted as a
World Class Business implementator in addition to a benchmarking facilitator during this project. The researcher also co-ordinated off-site training days, cluster meetings, Microscope Benchmarking Sessions and feedback interviews with the participating companies. With reference to the ‘IMT - World Class Business’ project the researcher also participated in off-site training days and cluster meetings.

The methodology employed aided the research in the following ways:

- The author was in a strong position to verify the accuracy of the data collected from the companies researched.

- The regularity of participation between the researcher and the participating companies offered the researcher an in-depth knowledge of the companies’ processes.

- The author, as a result of working so close to the participating companies was able to quickly identify weaknesses within the World Class Business process and take action to rectify them immediately. Equally, the author was able to identify areas of the process that were making a good impact on the companies and was able to develop these areas during the project.

The methodology employed may have hindered the quality of the research in the following way:
The validity of the research conducted is dependent on the experience and knowledge of the researcher. In the author’s opinion this is not a significant issue in the context of this research as the research was conducted by an experienced team of professionals, including the author. In addition to this, the results attained during this research have been verified by an independent evaluator appointed by the European Commission, as in the case of all projects supported by the Commission.

9.4 RESULTS.

The results of this research were recorded by the author using two approaches:

The **qualitative approach** - using the benchmarking exercise named ‘Microscope’ proposed by Voss et al (1998) and modified by IBM, UK and the European Benchmarking Consortium to make specific to small and medium sized enterprises. This approach allowed the researcher to compare the results of the companies in this research, to the results of two thousand, five hundred companies, from eleven European countries that have been previously benchmarked using this tool. This tool enabled the researcher to make comparison by sector, size of company and by country. The validity of the data recorded using the ‘Microscope’ benchmarking exercise is assured as only data collected by trained and accredited facilitators is allowed on the ‘Microscope’ database. The validity of this data is further assured by the existence of the ‘Microscope Benchmarking Consortium’ which continually monitors the operations of the ‘Microscope’ benchmarking tool.
The quantitative approach - as put forward by the European Benchmarking Forum in ‘The Benchmarking Facts Handbook’ (Keegan, 1998), was employed to evaluate the impacts on the core metrics of the business as a result of the world class business programme.

This approach again allowed the researcher to compare the results achieved by the companies in this research with the results achieved by companies in similar improvement initiatives. This approach was appropriate to the companies in this research as it compared data that was readily available from each company. The majority of the data required was recorded on the annual account statements of each company.

The noteworthy results achieved by the companies, in the context of their core metrics and benchmarking results, are illustrated in Tables 9.4 and 9.5 respectively.

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>PRODUCTIVITY</th>
<th>DEFECTS</th>
<th>OPERATING PROFIT</th>
<th>TURNOVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lampai an Daingin Teo.</td>
<td>16%↑</td>
<td>15%↓</td>
<td>5%↑</td>
<td>10%↑</td>
</tr>
<tr>
<td>Ogenek Teo.</td>
<td>43%↑</td>
<td>15%↓</td>
<td>15%↑</td>
<td>25%↑</td>
</tr>
<tr>
<td>Keenans</td>
<td>12%↑</td>
<td>20%↓</td>
<td>300%↑</td>
<td>13%↑</td>
</tr>
</tbody>
</table>

Table 9.4 Core metric results.
### RESULTS

#### BENCHMARKING RESULTS

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>RESULTS AT START OF PROJECT</th>
<th>RESULTS AT END OF PROJECT</th>
<th>IMPROVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practice v Performance</td>
<td>Practice v Performance</td>
<td>Practice v Performance</td>
</tr>
<tr>
<td>Lampai an Daingin Teo.</td>
<td>45 v 43</td>
<td>51 v 68</td>
<td>6 v 25</td>
</tr>
<tr>
<td>Ogenek Teo.</td>
<td>34 v 40</td>
<td>52 v 55</td>
<td>18 v 15</td>
</tr>
<tr>
<td>Keenans</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 9.5 Benchmarking results.

**Discussion of Results:**

**Lampai an Daingin Teo. – Core metric results.**

*Improved Productivity by 16%* - This result is attributed to the significant improvements made by the company during the World Class Business programme in the following areas:

- Breakages of product reduced by 80%
- Plant layout significantly improved
- Working environment for the staff greatly improved

*Defects reduced by 15%* - This result is attributed to the improvements made in product breakages by the company during the World Class Business programme.
Improved profit by 5% - This result is directly related to the improvements achieved in productivity, turnover and defects. This result would have been greater only for the large capital investment undertaken by the company during the final year of the WCB programme.

Improved turnover by 10% - This result is directly related to the improvements in productivity. This result is also attributed to the pareto analysis system introduced during the WCB programme which matched actual sales requirements to stock levels being held.

Lampai an Daingin Teo., - Benchmarking Results.

The increase in the company’s overall practice score (6) from the start to the finish of the WCB programme is attributed to the improvements made by the company in the following areas:

- Manufacturing practice.
- Logistics practice.
- Lean production practice.

The increase in the company’s overall performance score (25) between the start and the finish of the WCB programme is attributed to the improvements made by the company in the following areas:

- Manufacturing performance.
- Quality performance.
- Logistics performance.
- Lean production performance.
Ogenek Teo. – Core metrics Results.

*Improved productivity by 43%* - This result is attributed to the improvements made by the company in the following areas:

- Physical and process flows.
- Work stations.
- Investment in new toolkits for each operative.
- The amending of the tolerance criteria for Test 2 of the production process.

*Reduced defects by 15%* - This result is attributed to the following improvements made by the company:

- Check sheets, which were introduced as a means of recording defects within the manufacturing process. The defect level for each process was calculated and recorded on a daily basis, which meant that trends were easily identifiable and improvements made accordingly.
- The test criteria was reassessed to the requirements of the customer and amended accordingly.
- Staff training on the tools of quality.

*Improved operating profit by 15%* - This result is directly related to the improvements achieved in productivity, turnover and defects. Similar to Lampai an Daingin Teo., this result would have been greater only for the large capital investment undertook by the company during the WCB programme.
Improved turnover by 10% - This result is directly attributed to the improvements in productivity achieved by the company.

Ogenek Teo., - Benchmarking Results.

The increase in the company's overall practice score (18) between the start and finish of the WCB programme is attributed to the improvements made by the company in the following areas:

- Manufacturing practice.
- Quality practice.
- Logistics practice.

The increase in the company's overall performance score (15) is attributed to the improvements made by the company in the following areas:

- Manufacturing performance.
- Logistics performance.
- Organisation and culture.

Richard Keenan & Co Ltd., - Core metric Results.

Improved productivity by 12% - This result is attributed to the improvements made by the company during the WCB programme in the following areas:

- Physical and process flows.
- Cellular manufacturing.
- Inventory management system.
Reduced defects by 13% - This result is attributed to the improvements made by the company in the following areas:

- The introduction of the internal customer concept.
- Check sheets, which recorded on a daily basis the defect levels of each manufacturing process.
- Training of staff on the tools of quality.

Improved operating profit by 300% - This result is attributed to the improvements made by the company in the following areas:

- Productivity.
- Defects.
- Purchasing savings of £525,000/year, which was achieved through supplier developments.

Improved turnover by 13% - This result is attributed to the improvements made by the company in the following areas:

- Sales team training methods.
- Supporting documentation available to sales team.
- Reduction of product customisation.
From the results presented in tables 9.4 and 9.5 the following points are significant:

- Improvement is evident in all measures recorded.

- A significant variance is apparent between the improvement in operating profit of the three companies in this research. The significant improvement of 300% in the case of ‘Keenans’ is partly attributed to a reduction of £525,000 that was made to the purchasing bill of the company.

  This reduction in the purchasing bill was achieved as a result of the supplier development technique implemented during the World Class Business programme. The relatively moderate increases in operating profit achieved by Lampai an Daingin Teo. and Ogenek Teo. is due to the large capital investments in equipment that these companies undertook during the final year of the World Class Business programme. These investments were made as a result of the companies participation in the World Class Business Programme.

- With reference to the benchmarking results presented in table 9.5, the improvement in performance achieved by Lampai an Daingin Teo. is considerably higher than the improvement achieved by Ogenek Teo. This results seems to contradict the higher gains achieved by Ogenek Teo. in the core metrics results. In the author’s opinion, the reasoning for this apparent contradiction is that only a small number of results have been taken into account in forming this opinion. Ogenek Teo. have made
significant gains in some areas of their business, but in other areas they have not and this is verified in the scores recorded.

9.5 SUMMARY.

This chapter examined the results of the research element of this thesis in an effort to highlight other factors that may have had a bearing on these results. In this context, the author analysed the following areas:

1. The characteristics of the participating companies.

2. The level of input received by the participating companies during the projects.

3. The methodology employed.

4. The results.

The most noteworthy of the issues raised in this analysis was that companies employing fifteen or less were not represented in this research and that these type of companies, because of their size, would have sternly tested the hypothesis of the research statement. The results show that all the companies in this research achieve improvements. Some companies achieved greater improvements than others and the author successfully addresses this issue in this chapter. The fact that all the companies show improved profitability and competitiveness verifies the hypothesis of this research.

The conclusions to be drawn from this research are presented in the next chapter.
CHAPTER 10 : CONCLUSION

10.0 INTRODUCTION.

10.1 SUMMARY OF MAIN FINDINGS OF RESEARCH.

10.1.1 FINDINGS OF PROCESS.

10.1.2 KEY INSIGHTS GAINED DURING THE DEVELOPMENT AND IMPLEMENTATION OF THIS PROCESS.

10.1.3 OVERALL FINDING.

10.2 LIMITATIONS OF THIS RESEARCH.

10.3 RECOMMENDATIONS FOR FURTHER RESEARCH.
10.0 INTRODUCTION.

This research studied the extension of the accessibility of the tools and techniques of world class business and benchmarking from large multinational companies, where these techniques have been applied successfully, to small and medium sized enterprises. The objectives of this thesis were to establish whether or not an improvement process could be developed appropriate to SMEs, based on the tools and techniques of World Class Business and Benchmarking and that indeed business success could be achieved through the implementation of this process. The main objective of this research was to test the following hypothesis:

H1: Business success can be achieved in SMEs through the implementation of the tools and techniques of World Class Business and Benchmarking.

10.1 SUMMARY OF MAIN FINDINGS OF RESEARCH.

The author initially examined the tools and techniques of World Class Business and Benchmarking and successfully developed an improvement process appropriate to small and medium sized enterprises based on these techniques. This process identified the following five key steps:

1. Business Diagnostic
2. WCB Awareness and Self-assessment.
3. Implementation Planning.
4. Step Change.

5. Continuous Improvement.

The following is a summary of the process developed in addition to the main insights gained during its development and implementation.

10.1.1 FINDINGS OF PROCESS.

The initial step of the process examined the key issues facing the company. This step was completed using benchmarking and interviews with company staff and management. This step ensured that the improvement projects identified, addressed the immediate needs of the company. An external facilitator working with the management team as a group best carries out this step. The output of this phase will typically be an issue list, which forms the basis of an action plan.

Step two of the process requires that the appropriate training is received by the company staff and management in order to develop their understanding and appreciation of the World Class Business and Benchmarking techniques prior to committing themselves to an implementation programme.

The implementation process begins at this stage. Usually, the first World Class Business techniques introduced to the companies were the following ‘Just in Time’ techniques:
• Process flow analysis
• Physical flow analysis

Close examinations of the process flows of the companies led to the formation of problem solving teams to address the weaknesses identified. Other techniques including tools of quality, benchmarking and employee involvement were subsequently introduced as required. As company issues were identified and resolved using this process the company developed its level of competence of the tools and techniques of World Class Business and Benchmarking and was in a position to address more complex issues affecting the business.

One of the key factors, which led to the success of this process was that it provided immediate results to the company, which ensured the commitment of both management and staff to the process.

10.1.2 KEY INSIGHTS GAINED DURING THE DEVELOPMENT AND IMPLEMENTATION OF THIS PROCESS:

• The capability of the process to address different issues in different companies at different times was a significant factor in the success of the process.
• Management commitment to the process is critical to its success. This is stressed in the description of the research projects and in the literature review.

• The process is most successful with companies with management that is open to new ideas.

• Companies in which a world class champion is appointed to drive the process forward and to deal with the day to day administration of the process, achieve significant benefits from the process.

• The facilitators of this process adopt an interventionists role to aid the participating companies to apply the theory of the World Class Business and Benchmarking techniques to the companies’ tailored environments.

• Teams and effective team management are key elements of the process.

• Quantitative benchmarking is difficult in SMEs. Financial benchmarks can be obtained by analysing the audited accounts of a company but key operational measures are not available. This issue should be addressed at the initial stage of the process by implementing systems to record the appropriate measures.

• Hotels are not the ideal venues to hold the off-site training sessions. These sessions are more effective when held at other company sites where the
opportunity is afforded to the participants of these sessions to observe first hand practical examples of the techniques being taught.

- The concept of clustering was central to the success of the process. Clustering was achieved in two ways in this process.

1. Project clustering, which allowed off-site training sessions to be attended by a number of companies increasing the effectiveness in terms of time and cost of these sessions.

2. Inter-personal clustering, which occurred when the staff and management from the participating companies developed links.

10.1.3 OVERALL FINDING

The most significant finding of this thesis was that business success could be achieved in SMEs through the implementation of the tools and techniques of World Class Business and Benchmarking. As illustrated in section four of this thesis, significant improvements were achieved by the SMEs in this research through the implementation of the tools and techniques of World Class Business and Benchmarking. It is evident from the results of this research that all the companies that participated achieved improvements both in their practices and performances. Improvements also have been identified in these companies both
quantitatively and qualitatively using the measurement models analysed in chapter ten.

The following are some of the noteworthy results achieved by the companies, which participated in this research:

- Breakages 80% ↓ - Lampai an Daingin Teo.,
- Productivity 43% ↑ - Ogenek Teo.,
- Lead Times 2 days ↓ - Ogenek Teo.,
- Turnover 25% ↑ - Ogenek Teo.,
- Purchase Savings £525k ↓ - Richard Keenan & Co Ltd.
- Operating Profit 300% ↑ - Richard Keenan & Co Ltd

These are significant results when compared to the relatively small investment made in time and money by the participants in order to achieve them.

In chapter nine the author analysed other factors that may have had a bearing on the results presented. This analysis verified that no other factor influencing the company's operations could be attributed to the significant results achieved by the companies over the two-year duration of the research. On this basis the author concludes that the hypothesis of this research is proven.
10.2 LIMITATIONS OF THIS RESEARCH.

The main limitations of this research as highlighted in the methodology (chapter five) include the following:

- Given the scope of the subject and the methodology chosen i.e. Action Research, it was only possible to work with a small number of companies. The author chose to conduct in-depth research in a few case studies rather than little research in many case studies. Many researchers favour this approach as it may be argued that the validity and quality of the data collected is superior.

- The companies that took part in this research were invited to do so and as a result this disposition may be a differentiating factor precluding this sample from being truly representative of the total regulation to the related category.

- Companies employing fifteen or less were not represented in this research and that companies of this type, because of their size, may have sternly tested the hypothesis of the research statement.

- The duration of the research is short in comparison to the expected life of a company. The author’s conclusions are based on the research conducted over a two year period which is relatively short in comparison to twenty years, which is the average life expectancy of a company.
10.3 RECOMMENDATIONS FOR FURTHER RESEARCH.

As the areas of world class business and benchmarking are relatively new to industry in Ireland and Europe, in an SME context, the research conducted in these areas to date is minimal. However, the author notes that the literature becoming available on these areas is increasing at a steady pace as these areas evolve and develop. In the context of the World Class Business process developed during the research, the research has been innovative. The research has also been of potential value as evident from the results it achieved.

During this research, some aspects related to the research were highlighted as suitable topics for further research. In this section, the author identifies and recommends these areas for future research:

- To conduct a follow up study using this research study’s findings so that changes and patterns over time could be highlighted.

- The role of Government in fostering the development of industry, in particular the SME group, by the adoption of best practices.

- In this research, the author has examined the implementation of the techniques of World Class Business and Benchmarking on SMEs in manufacturing.
Could some of these techniques be of potential value to the service industry? The author proposes a comparable study to the one completed, researching the impacts of these techniques on SMEs in service industries. With the development of our service industry this may be an important topic for study in the future.

- A comprehensive study on the benchmarking techniques used in the private and public sectors in Europe. With the growing importance of benchmarking in society today, this is an important area for future research.

- The importance of the concept of clustering to the success of this research is noted by the author. In the author's opinion, an in-depth study examining the area of SME clustering would be of potential value.

- In the 'Made in Europe III' report (Hanson, 1998), referred to by the author in chapter five, the importance of investing in the training and education of staff and management is highlighted. The author recommends that research should be conducted in this area in the context of Irish SMEs and a comparison made between these results and the results of their European counterparts.

- With the advent of new information technologies in recent times, a study of the relationship between business success in SMEs and the adoption of new information technologies would be of potential value.
In conclusion, the area of world class business and benchmarking are relatively new to industry, in an SME context. These areas are evolving and growing in importance to the competitiveness and profitability of SMEs and as a result further research in these areas is recommended.


Integrated Quality Dynamics, 1999,”The Benchmarking Review”, Benchmarking Publishing Ltd.,


Majima, Ichiro, December 1992, “The Shift to JIT : How people make the difference”.


Taninecz, George, 1997, “World Class Manufacturers : these plants believed to be World-Class exhibit best practices and best results”, Penton Publishing Inc.


APPENDICES I-V
APPENDIX I

A TYPICAL SET-UP TIME REDUCTION SHEET
## SET-UP TIME REDUCTION

**Machine name/number:** Labeler

**Date:** 11.04.2011

**Person:** Dónal Ó Liatháin

<table>
<thead>
<tr>
<th>ACTION</th>
<th>Internal</th>
<th>External</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare roll of labels for next run.</td>
<td>x</td>
<td></td>
<td>5 min</td>
</tr>
<tr>
<td>Prepare new print template</td>
<td>x</td>
<td></td>
<td>5 min</td>
</tr>
<tr>
<td>Service machine with oil and lubricants</td>
<td>x</td>
<td></td>
<td>5 min</td>
</tr>
<tr>
<td>Affix machine with pre-set settings for frequent runs</td>
<td>x</td>
<td></td>
<td>22 min</td>
</tr>
<tr>
<td>Fit quick release mechanisms to change settings with speed.</td>
<td>x</td>
<td></td>
<td>5 min</td>
</tr>
<tr>
<td>Place product to be labeled next to machine</td>
<td>x</td>
<td></td>
<td>5 min</td>
</tr>
<tr>
<td>Reduce number of test runs from 5 to 2</td>
<td>x</td>
<td></td>
<td>10 min</td>
</tr>
</tbody>
</table>

**Key points noted for improvement:**

1. Pre-settings on machine to be easily read and accurate.
2. Source quick release fittings
3. Reduce test runs to one.
4. Use video recorder to show difference in set-up times before and after changes
APPENDIX II

A TYPICAL EXAMPLE OF A CHECK SHEET
<table>
<thead>
<tr>
<th>Key faults</th>
<th>Number of occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miss Print</td>
<td>IIII</td>
</tr>
<tr>
<td>Electric Fault</td>
<td>IIIIIIII</td>
</tr>
<tr>
<td>Paper Jam</td>
<td>III</td>
</tr>
<tr>
<td>Labels not sticking to product.</td>
<td>IIIIIIIIII</td>
</tr>
</tbody>
</table>
APPENDIX III

THE MICROSCOPE QUESTIONNAIRE
Microscope
World Class Manufacturing

QUESTIONNAIRE WITH NOTES
Welcome to Microscope

This is a confidential survey which studies the factors that bring success in manufacturing companies of 50 employees or less.

With a couple of exceptions, the questions seek to assess today's position; a snap-shot of your current business state. They cover both the practices you employ and the performance you achieve, across a broad range of manufacturing and engineering business processes. By addressing these key processes, you will be able to establish a comparative position against World Class standards of manufacturing.

The notes which accompany each question, have been included to help you prepare for answering the questionnaire. They should help you to gather all appropriate information and to ask the right questions of your organization.

You will be offered a report on the findings of this questionnaire. The report will help you to judge where your company stands in relation to European industry.

The information you give us will be kept under strict confidentiality and only used in suitably sized comparison groups. Individual company data will not be used other than on behalf, and at the request of, that company.

Thank you for joining this initiative. By doing so you have started on the road to benchmarking your business - one of the essential features of any aspiring World Class organisations.
**Industry segment(s) of principal products**

- automotive
- aerospace
- chemical
- electrical/electronic
- food
- mechanical
- pharmaceutical
- utility
- other (please state below)

Tick the box(es) that represent the industry segment in which the business is said to operate. This is not necessarily the same as the segment to which its customers belong. If in doubt consider the types of process or operations undertaken.

For example a pump manufacturer would be classed as being in the mechanical sector, and maybe electrical/electronic depending upon the amount of control apparatus manufactured. The fact that the pumps may be used in chemical processing is not important.

**principal products**

This text is used to assign a Standard Industry Code.

**number of employees at this site**

- less than 5
- 5 - 20
- 20 - 50
- more than 50

How many full-time (or equivalent) people are employed in the business, as defined in the company details above, ie site, business unit or division.

**to which areas do you ship your products**

- domestic market
- rest of Western Europe
- Eastern Europe
- USA
- Asia Pacific
- other (please state below)

Identify those countries or geographies to which the business directly supplies product(s).
# Business Profile

**what is the nature and ownership of your site**

<table>
<thead>
<tr>
<th>nature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>owner managed</td>
<td></td>
</tr>
<tr>
<td>professional management</td>
<td></td>
</tr>
<tr>
<td>operating unit of a larger company</td>
<td></td>
</tr>
</tbody>
</table>

**ownership**

<table>
<thead>
<tr>
<th>country</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
</tr>
<tr>
<td>other (please state below)</td>
<td></td>
</tr>
</tbody>
</table>

Identify the legal status of the business. If a subsidiary, please identify the parent organisation as either a holding company or a larger operating company.

Identify the country from which the business, or its parent organisation if appropriate, originates.

---

**Are you a supplier to any of the following**

<table>
<thead>
<tr>
<th>category</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese companies</td>
<td></td>
</tr>
<tr>
<td>major retail chains</td>
<td></td>
</tr>
<tr>
<td>IT industry</td>
<td></td>
</tr>
<tr>
<td>UK government departments</td>
<td></td>
</tr>
</tbody>
</table>

Identify any of the large purchasing organisations listed to which the business directly supplies products, ie is considered a first tier supplier of.

---

**who does your design?**

<table>
<thead>
<tr>
<th>location</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>at this site</td>
<td></td>
</tr>
<tr>
<td>at an other company site</td>
<td></td>
</tr>
<tr>
<td>outsourced</td>
<td></td>
</tr>
<tr>
<td>primarily suppliers</td>
<td></td>
</tr>
<tr>
<td>customers</td>
<td></td>
</tr>
</tbody>
</table>

Identify with approximate percentages and trends, who performs product design. A design house or consultancy are examples of outsourced design. Do not include suppliers or customers unless they are actually involved in the physical design of product, rather than just consulted.

---

**where is your design done?**

<table>
<thead>
<tr>
<th>location</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>this country</td>
<td></td>
</tr>
<tr>
<td>rest of western Europe</td>
<td></td>
</tr>
<tr>
<td>Eastern Europe</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td></td>
</tr>
<tr>
<td>Asia Pacific</td>
<td></td>
</tr>
<tr>
<td>other (please state below)</td>
<td></td>
</tr>
</tbody>
</table>

With approximate percentages, identify the countries or geographies where parties involved in product design are located.
Microscope Questionnaire

How to fill in the questionnaire

The Microscope questionnaire starts on the following pages. Each right-hand page asks you about a particular area of your company, for example Quality. Within each of these areas there are a number of questions about aspects of that particular area, for example, one of the aspects within Quality is Quality Vision. Within each of these questions are statements - you have to choose the statement that is most appropriate to your company site. Each statement gives you a score that you write in the box provided.

On the facing left-hand page there are notes which give you a more detailed explanation about what each question is asking. These notes are numbered in the same sequence as the questions. There are a few lines under each note for you to write your own responses or thoughts.

How to score

You choose the statement most appropriate to your company site and this gives a score - the number in the grey band above. Sometimes you may feel that your company is between two statements. In this case you choose the number in the shaded band between the two statements. In this example below, the company questioned felt that statement two was most appropriate to them and so they scored three. If they felt they were between statement one and two, they would have scored two.

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<tbody>
<tr>
<td>statement 1</td>
<td>statement 2</td>
<td>statement 3</td>
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If you see differences across the organisation, where some areas are more advanced than others, it is best to assess an average position. For example, a pilot implementation does not warrant the maximum score of five.

We seek to assess the position of your company today, not where it will be when current plans and projects deliver the results you expect. Benchmarking will only ever be of value to you if assessments are true reflections of the practices and performance of the organisation as it is now.
Glossary

ABC
Activity-based costing

Baldrige
USA national quality award

Benchmark
Systematic comparison against other Organizations

BOM
Bill of material

CAE
Computer-aided engineering (analysis + design + manufacture)

CALS
Computer-aided acquisition and logistical support

CNC/NC
Computer numerical control/numerical control

Configuration management
The management of the definition of the product (BOM, specs, geometry etc) throughout each stage of its life from concept to in-life support

DFA
Design for assembly/automation

DFM
Design for manufacturing

DTI
Department of Trade and Industry

EC/ECO
Engineering change/Engineering change order

EDI
Electronic data interchange

EHS
Environment, health and safety

EFQM
European Foundation for Quality Management

Group technology
Breaking up processes and recombining them into cells

Inventory turns
Annual cost of sales divided by inventory value at year end

IT
Information technology

JIT
Just-in-time

Kanban
A mechanism to trigger the need for more parts in JIT

KBS
Knowledge-based systems

MRP
Materials requirements planning

MRPII
Manufacturing resource planning

NPBT
Net profit before tax

NPD
New product development

OEE
Overall effectiveness and efficiency of plant and manufacturing lines

OFI's
Opportunities for improvements

Order processing time
Time taken to process an incoming order and commence manufacture (excluding design)

PPM
Parts per million

Process variance
Process variability measured in standard deviations

Pull production
Manufacture only what has been ordered

QCD
Quality, cost and delivery

QFD
Quality function deployment

Raw process time
Time spent in adding value to the manufactured product

Return on net assets
NPBT divided by assets minus liabilities

SLA
Service level agreement

SPC
Statistical process control

TOM
Total quality management

Value engineering VE
An approach to improve or enhance functionality at lower product cost

WIP
Work in process

Workflow
Automatic tracking, direction and control of a linked set of activities
Organisation and culture notes

1. Vision
Where does the organisation seek to be in the foreseeable future? Outline the key driving forces behind this vision, e.g. quality, costs, customer service, etc. What are today's focus measurements for managing the business? What future measurements and targets have been set? The types of measurements selected will determine the achievable score. Is there a clear link between today's measurements and those of the future?

2. Shared vision, mission & goals
Many organizations have stated their vision, mission and operational goals. How were they developed and who was involved in the process? In order to be effective, they need to be communicated and understood at all levels in the organization. Any documentation supporting this communication and the methods employed should be outlined. How have these business-wide statements been translated into operational goals for departments and individuals?

3. Employee involvement
What education plans exist? To score 2 or more requires a documented plan and allocated budgets. The score will depend upon the type, amount and distribution of education across the organization.

4. Employee involvement
How do employees contribute to the operation of the business and decision-making process? Prepare a list of existing business systems that have been designed to involve employees: quality programmes, suggestion schemes, quality circles, etc. What measurements exist to assess the success of these schemes? In what ways, if any, do employees exhibit empowerment?

5. Manufacturing Strategy
In today's harsh economic environment, it is easy to become focused upon short-term achievement of outputs and costs. A manufacturing strategy will contain details of future requirements in areas such as skills profile, product portfolio changes, capital investment plans, legislative and environmental issues and capacity and productivity projections. What elements are contained in the business' manufacturing strategy and how far will this carry the company? It does not have to be carved in stone, but should be presented in a documented form and exhibit links to the overall business strategy.

6. Customer orientation
Customer partnerships are more than just routine meetings. Who is involved in communication with external customers? How are their needs disseminated within the organization? Has the concept of internal customer-supplier relationships been adapted? In all cases, what measurements are used to drive customer satisfaction? Is the process proactive or just reacting to complaints?
<table>
<thead>
<tr>
<th>1</th>
<th>Vision</th>
<th>Maximise product output, managers dictate direction, cost reduction key goal</th>
<th>Customer service, emphasis on employee involvement, quality and cycle times are key drivers</th>
<th>Leadership in quality &amp; service, production balanced with customer needs, production cycle time less than order lead time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Shared vision, mission &amp; goals</td>
<td>Insufficient direction, no shared plan or vision state meet, employees do no</td>
<td>Management commitment to shared vision, written mission statement, some</td>
<td>Total employee involvement, published improvement plan, individuals and departments have vision matching company's</td>
</tr>
<tr>
<td>3</td>
<td>Manufacturing strategy</td>
<td>Framed in output and cost targets, less than 1 year</td>
<td>Functional strategy for manufacturing, 1 - 3 year</td>
<td>Business-led manufacturing strategy with strong links to corporate plan, 3 - 5 year</td>
</tr>
<tr>
<td>4</td>
<td>Employee involvement</td>
<td>Little or none</td>
<td>Quality teams, suggestion programme, corrective action teams, 25 - 50% employees involved in teams</td>
<td>More than 50% involved in teams, open access to management, empowered individuals throughout the business</td>
</tr>
<tr>
<td>5</td>
<td>Training and education</td>
<td>Ad hoc, no plan</td>
<td>Some skills and development plans for all employees</td>
<td>More than 5% of each employee's time devoted to training with strong emphasis on quality</td>
</tr>
<tr>
<td>6</td>
<td>Customer orientation</td>
<td>Little emphasis on customer service, employees do not understand needs, no customer satisfaction measures</td>
<td>Customer requirements tracked and disseminated throughout the business; internal customer concept, some customer involvement</td>
<td>Customer satisfaction measures, all employees understand needs, customers involved in user groups and partnerships</td>
</tr>
</tbody>
</table>

TOTAL ORDER TO DELIVERY CYCLE TIME

Notes:
The business process cycle time described may not be sequential or additive as illustrated. The total potential effect will vary with the nature of the process and the demand. The business cycle time shown is for illustration purposes only and does not represent actual process times.
Manufacturing cycle times notes (see figure 1)

1. Production cycle time

Actual production cycle time is the average time required from when all raw materials are available and the order is 'launched' into production, to when it is finally dispatched from the end of line, whether to the customer or store. If there is an accurate measure of work in progress (WIP), then the cycle time (in hours) can be calculated from WIP (#units)/output per hour. The WIP count should include all units or kits issued to the line, even if no actual work has taken place on them. Raw processing time is simply the sum of the value-added activities required to make the product, i.e. no waiting, no queuing, no rework, etc. Often businesses have rush or priority orders that are 'hand carried' through the process. What is the quickest possible journey through the process? This may serve as a useful approximation to raw process time.

2. New product introduction lead time

Speed to market is only one element of startup production. The ease with which volume production and shipment can be achieved, without encountering product and process design problems, is more important. Clear evidence of thinking through and solving problems, before volume production and shipment, is necessary to score more than 1. How are design and manufacturing linked to ensure a rapid learning curve? How is the speed of innovation in competitors measured and how does it compare?

3. Equipment change-over time

This time should be from the end of full-speed production of product A, to the production of product B at standard volumes and quality levels. This will include setting and adjustment times, as well as physical equipment changes and cleaning activities. Because of equipment variety, an average may have to be taken across production. How are change-overs planned into production schedules? What activities take place outside of equipment down-time? Have any programmes been used to reduce change-over times, e.g. single minute exchange of die (SMED) concepts?
Manufacturing cycle times questionnaire

<table>
<thead>
<tr>
<th>Manufacturing cycle times</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production cycle time</td>
<td>More than 10 x Raw Process Time (time devoted to performing value added work on material)</td>
<td>5 - 7 x Raw Process Time</td>
<td>2 - 4 Raw Process Time</td>
<td></td>
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<tr>
<td>New product introduction lead time</td>
<td>Often lag competition - for example through slow manufacturing startups, 'bugs' still in production after delivery. Slow learning curve</td>
<td>Equal to competition - for example, through products and processes designed for manufacturability, startup costs and learning curve</td>
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<tr>
<td>Consistently beat competition to the market, for example, through concurrent design, engineering and manufacturing right first time</td>
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<tr>
<td>Equipment change-over time</td>
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</tbody>
</table>

Figure 1. Definitions for manufacturing cycle times

TOTAL ORDER TO DELIVERY CYCLE TIME

- order processing time
- production cycle time
- delivery time

works order, schedule, warehouse pick list

raw materials

finished goods inventory

Notes
The business process cycle times depicted may not be sequential or additive as illustrated here. The exact pattern of events and/or time to achieve each stage will depend on the raw material and the finished goods stocking policy. The diagram is used to ensure consistent start and end points for each business process.

Do not include material acquisition times, design activity for "engineered to order" products, delayed schedules or finished inventory holding times in your calculations.
Quality notes (see figure 2)

1 Quality vision
This is the second question looking into the future and as before it is important to assess realism by examining the plans that are in place to address quality topics. What steps have been taken to reduce inspection activities? Elimination of the Quality Control department does not equate to a total quality mind-set. How does business intend to reduce in process defects? What training is planned to equip employees with required tools and skills? Does the business quality vision compare with industry achievements and trends?

2 Process capability
See figure 2 for a qualitative description of process capability. How is process variation measured and recorded? What considerations of the manufacturing process are taken into account when design tolerances are set? Is statistical process control (SPC) widely employed? What parameters are regulated using SPC methods? Score = 1 if Cpk < 1, 3 if Cpk > 1 and 5 if Cpk > 2

3 Product reliability in service
This question is concerned with failure in-use or rejects from customers' processes and asks about numbers of units, not the cost. In chemical or process industries, off-spec product can impact the capability of customers to process material and should be assumed as equivalent to 'failure in-use'. What systems and measurements are used to manage these failures?

4 Defects (internal)
How is in process quality measured and recorded? Defects can occur anywhere in the process, they are not restricted to end-of-line quality checks. How much material is true 'first time' product, traveling from raw material to finished product? What percentage of product has to undergo some form of corrective processing?

5 Customer delivery commitments met
Is delivery performance actually measured and used to manage the day to day business? On time means the time originally agreed with the customer, not one that has been revised to account for manufacturing delays. Also, distinguish between order delivery performance and line item delivery performance. An order is only on time when every component line item is delivered at the required time. Is this distinction recognised by the business?

6 Suppliers
Most businesses will buy some items just on price, but is there a recognition of other factors affecting commercial success? What procedures are used to review supplier bids and contract placement? Is there a formal assessment and certification system for key suppliers only, or all suppliers? What criteria are considered during assessment? Does the business have 'open book' supplier partnerships, based on trust and working in the best interest of all parties? Are suppliers actively encouraged to contribute to product and process development and improvements?

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**Figure 2 Process Capability**

**Definitions:**

\[ C_p = \frac{USL - LSL}{6 \times \text{Std Dev}} \]

\[ C_{pl} = \frac{\text{mean} - LSL}{3 \times \text{Std Dev}} \]

\[ C_{pu} = \frac{USL - \text{mean}}{3 \times \text{Std Dev}} \]

\[ C_{pk} = \min \{C_{pl}, C_{pu}\} \]

USL = Upper specification limit

LSL = Lower specification limit
<table>
<thead>
<tr>
<th>Quality questionnaire</th>
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<tbody>
<tr>
<td><strong>Quality vision</strong></td>
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<tr>
<td>Defects will happen, inspect them out, accept cost of scrap and rework, ship product and deal with customer complaints.</td>
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<tr>
<td>Inspection and control, some data collection to regulate variance, some employee involvement, some rework.</td>
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<tr>
<td>Zero defect, &quot;total&quot; quality mind-set, quality controlled in process, quality designed into manufacturability, quality is everyone's job.</td>
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<tr>
<td><strong>Process capability</strong></td>
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<tr>
<td>The manufacturing process has a variance often worse than the design tolerance of the product.</td>
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<tr>
<td>Process variance is better than the design tolerance of the product.</td>
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<tr>
<td>Process variance less than half the product design tolerance.</td>
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<td><strong>Product reliability in service</strong></td>
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<tr>
<td>Unit failure rate more than 2%, frequent recalls, make.</td>
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<td>Unit failure rates between.</td>
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<td>Unit failure rate less than.</td>
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<tr>
<td><strong>Defects (internal)</strong></td>
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<tr>
<td>More than 10,000 parts per million (more than 1% defect).</td>
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<tr>
<td>Less than 1,000 parts per million (less than 0.1% defect).</td>
</tr>
<tr>
<td>Less than 100 parts per million (less than 0.01% defect).</td>
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<tr>
<td><strong>Customer delivery commitments met</strong></td>
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<tr>
<td>Less than 80% per month.</td>
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<tr>
<td>More than 95% per week, every week.</td>
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<tr>
<td>More than 95% per day, everyday week.</td>
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<td><strong>Suppliers</strong></td>
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<td>Many vendors, seek low bid, no certification programme.</td>
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<td>A few certified suppliers, JIT for hardware and consumables.</td>
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<tr>
<td>Partnerships with certified suppliers, JIT deliveries, involved in products and process design improvements.</td>
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**Score**

1 | 2 | 3 | 4 | 5

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| 1 | Quality vision | | | | |
| 2 | Process capability | | | | |
| 3 | Product reliability in service | | | | |
| 4 | Defects (internal) | | | | |
| 5 | Customer delivery commitments met | | | | |
| 6 | Suppliers | | | | |

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11
1 Equipment layout
How is equipment physically laid out? Where cellular layout is not possible, is there any attempt to use logical group technology, i.e. using dedicated routings between process stages, to minimise the proliferation of paths between operations? Challenge the real flexibility of the installed plant and layouts. Does the layout inhibit the capability of the business to respond to customer demands or market fluctuations? Can multiple products or families be produced on the same equipment? In a process industry, focus on the back end or finishing area of production.

2 Kanban
Pull production is a system for controlling material flow by responding to demands at the end of the process, i.e. nearest the customer. Is the concept of kanban (the use of signals to trigger up-stream operations established to control flow and WIP levels)? Where are kanbans in use and what form do they take? How are bottlenecks managed? What activities are in place to optimise kanban size and develop their wider use? Again, for process industries focus on back end operations and processes discontinuities.

3 Batch sizes
To what extent are batch sizes between operations balanced? Is there a logical link between operation, transport and final packaging batch sizes? How is WIP used to manage bottlenecks, defects and breakdowns? A 'conceptual' batch size of one, i.e. being able to manufacture the minimum order or packaging quantity, will avoid unnecessary production and surplus stocks. How have batch sizes been calculated and their impact on cycle times, problem identification and obsolescence been assessed?

4 Order release into manufacturing
For some businesses a better concept than order release may be 'issue of a production schedule'. Is the plant primarily producing product in response to a forecast demand, customer orders or some form of true 'pull scheduling', i.e. end of line replenishment? Remember that continuous daily priority changes and adjustment of schedules is not the same as 'pull scheduling'.

5 Maintenance
Emphasis should be on actual events, not intentions and written procedures. Total absence of break-downs is not expected, but maintenance should be a planned activity to minimise disruptions. Is the cause of equipment down-time recorded and a structure in place to reduce lost time due to maintenance activity? How often are problems not solved at the first attempt? What practical steps have been taken to enable operators to perform routine maintenance tasks, without recourse to specialist personnel?

6 Priority orders in manufacturing
What are the main reasons for priorities on the shop-floor? How many levels of priority exist and how are priority jobs identified? Is there a measure for the quantity of "rush" jobs in the process at any one time? How many people are employed to expedite or chase the progress of this work?

7 Housekeeping
The overall appearance and cleanliness of the working environment can give a good indication of the culture that exists within the business. Operators can be directly affected by their surroundings and convey their attitude to quality through their approach to housekeeping. Does the shop floor adequately convey the company's commitment to quality and control? What activities are instigated prior to a customer or external visit? How often does the site receive external visits?
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<tr>
<td>1</td>
<td>Equipment layout</td>
<td>Functional layout Traditional equipment grouped in like types</td>
<td>Some cellular layout incorporating CNC or specialised equipment</td>
<td>Multi-purpose layout with inprocess control, mostly CNC or specialised equipment</td>
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<td>2</td>
<td>Kanban</td>
<td>High work in progress, no Pull production with some</td>
<td>Demonstrated reduction in kanban sizes, continuous improvement</td>
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<td>3</td>
<td>Batch sizes</td>
<td>Moving towards smaller, Batch size of one (or</td>
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<td>4</td>
<td>Order release into manufacturing</td>
<td>Once a month based on plan</td>
<td>Weekly, based on orders</td>
<td>Daily, pull scheduling</td>
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<td>5</td>
<td>Maintenance</td>
<td>Crisis maintenance</td>
<td>Preventive maintenance, corrective action teams</td>
<td>Total preventive maintenance, maintenance scheduling synchronised with production, performed by</td>
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<td>6</td>
<td>Priority orders in manufacturing</td>
<td>Typically more than 20% orders</td>
<td>Less than 10% of orders</td>
<td>Rare</td>
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<td>7</td>
<td>Housekeeping</td>
<td>Cluttered and disruptive</td>
<td>Organised</td>
<td>Clean, orderly, minimum WIP, self-maintained, always 'tour ready'</td>
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<tr>
<td><strong>Innovation notes</strong></td>
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<tr>
<td><strong>1 Exploitation of innovation and creativity</strong></td>
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<tr>
<td>This question seeks to understand the culture for creativity within the company. You are looking for evidence that individual and group-wide innovation is encouraged and rewarded, together with a culture focusing on the value and importance placed on it, both in the development of new products and a so in systems and infrastructure to support the business.</td>
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</table>

| **2 Generation of innovative product concepts** |
| Are products customer or internally driven? What structured planning is used? Do new products just happen/merge; are they driven by customers or clients or by the company? Are there dedicated teams (i.e. 'think tanks') who use structured methodologies to bring new products/services to market? |

| **3 Product life-cycle planning** |
| Are products developed as part of a family or as one offs? Looking at application of the technology and overlap between products. Looking for evidence that a product will have a defined life-cycle with planning for variants or mid-life updates where applicable. Also looking for phasing of new products overlapping obsolete lines. |

| **4 Product technology strategy** |
| This question focuses on the technology used within products, e.g. suspension and engine management for automotive products. It is not intended to assess the love of technology used in the supporting infrastructure of the company i.e. CAD/CAM, MPP etc. |

| **5 New product(s) introduction (last 2 years)** |
| Cost reduction activities which have not changed functionally cannot score more than 1. Need to be careful of the industry sector and/or product type i.e. introduction of 486 vs. 386 PC; introduction of a new body to a car vs completely new engine, gearbox, suspension etc. |
### Innovation questionnaire

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<th>score</th>
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<tbody>
<tr>
<td>1</td>
<td>Exploitation of innovation and creativity</td>
<td>The measurement systems do not encourage individual and organisational creativity</td>
<td>New ideas are encouraged, provided that they are not too risky. Champions for new ideas usually sought and supported</td>
<td>Innovative and entrepreneurial behaviour amongst employees encouraged and rewarded, mechanisms to fund unplanned initiatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Generation of innovative product concepts</td>
<td>Ad hoc development of new product concepts</td>
<td>Market research, involvement of marketing and technical functions in developing and screening new product concepts</td>
<td>Customer involvement in concept development. Explicit processes to capture, act on and track customer needs. Early involvement by all relevant functions and suppliers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Product life-cycle planning</td>
<td>Forward planning of future products not systematic</td>
<td>Product planning for up to 2 families/generations (and/or major variants of products). Product and process development strategies linked e.g. 3 year horizon</td>
<td>Product planning for 3 or more families/generations of products. Market-driven planning e.g. 5 year horizon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Product technology strategy</td>
<td>Weak processes for the acquisition of new technology. Projects driven by short-term functional needs</td>
<td>Technology needs to be seen on a project-by-project basis. Understanding of technology needs and capabilities in each function</td>
<td>Company understands core competencies in technology. Explicit policies for sourcing technologies including in-house R&amp;D and/or licensing-in, partnerships and external linkages. Monitoring of key technologies of competitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>New product(s) introduction (last 2 years)</td>
<td>Variations to existing products have been introduced</td>
<td>New product range/family introduced/launched</td>
<td>Significant/radical changes introduced into product line</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1 Engineering process overlap

Is the process for developing products parallel or sequential? To achieve a high score, they need to be able to demonstrate concurrency across all functions within the company and not just say between design and manufacture, i.e. marketing, design, and production manufacture, test, project office etc.

Looks at the design and reuse tools and the ease of communicating information between the groups involved in design/development. Do they have (and use!) CAD/CAM/CAE analysis tools, project management, project control, etc.

2 Design extent - beyond the enterprise

Are external groups involved (i.e. suppliers and customers) in a formal way? Are there systems to track and provide applicable external resource (such as suppliers, customers, consultants, academic institutions etc), at the appropriate time during the development cycles. Is the value/worth of external resource recognised and understood?

3 Engineering change and release process

This question looks at the EC/R process on y and does not include BOM etc. Is the process effective and timely? Is the process mapped, understood and controlled? Is the data requirement at each stage known/understood? Is the process rigid or does it reflect the demand for different requirements along the development process?
**Engineering operations and practice questionnaire**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engineering process overlap</strong></td>
<td>Most activities are sequential, measurement by department rather than project</td>
<td>Concurrency of activities with in engineering</td>
<td>Full collaboration inherent across the product if e-cycle, project management system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Design extent - beyond the enterprise</strong></td>
<td>One company culture, limited interaction with suppliers and customers</td>
<td>Some planning with suppliers and/or customers but limited</td>
<td>Suppliers, partners and customers involved throughout. Supported by a suitable communications infrastructure. Working as though one company</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Engineering change and release process</strong></td>
<td>Approve/release is slow and poorly related to previous engineering change orders. Traditional manual process</td>
<td>Effective change process with systematic links between functions for release of data</td>
<td>Central point for product and configuration data, integrated with change and release process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Engineering application tools</strong></td>
<td>Focus on function or individual productivity Limited/no use of CAE and project control tools</td>
<td>Applications selected to enable multi skilled design team approach. Interfacing not integrating. Control via work group managers</td>
<td>Integrated project specific tools enabling design, production, marketing etc to a fully co-operate Product model common across tools</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Product development process notes

1 Monitoring of design
How is previous field/customer experience incorporated (if at all in new designs? Do they just design to a specification; with little or no understanding of fit for purpose; no scope for improving/amending spec - just design to it. Versus, a clear and communicated focus/understanding on what the eventual customer wants or needs from the design.

4 Cycle time - concept to production release (design freeze)
Note difference between Discrete and Process (particularly Pharmaceutical). In both cases, the end point is when the product is released from a PRIMARILY development activity to a PRIMARILY manufacturing activity.

5 Cycle time - production relative to general availability
How long does it take for the PRIMARILY manufacturing activity to turn a prototype product to one which is available to the market?

2 Product development process
Is there an established process? Ask to see a documented process to quality. Is there a clear understanding of the core strengths/weaknesses in their process; do they understand the characteristics relevant to their segment/product for developing products? (i.e. is focus on time to market or quality or design for manufacturing/ assembly/in service maintainability etc)

3 Design for production and product use
Tools and techniques for integrating manufacturability, assembly and maintainability in the product development process. Could also be an interest in the emerging areas of design for disassembly/disposal after use.
<table>
<thead>
<tr>
<th></th>
<th>Monitoring of design</th>
<th>Product development process</th>
<th>Design for production and product use</th>
<th>Cycle time - concept to production release (design freeze)</th>
<th>Cycle time - production relative to general availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design to specification only, Little/no analysis of in service problems and feedback to design</td>
<td>Process not defined, No clear development strategy, New products just 'emerge'</td>
<td>Design focus on meeting the functional specification</td>
<td>Static or increasing for equivalence in decreased design iterations</td>
<td>Static or increasing</td>
</tr>
<tr>
<td>2</td>
<td>Some in-service monitoring and customer feedback</td>
<td>Strategy in place</td>
<td>Product and process develop Dent strategies inked, DFM/DFA initiatives but limited</td>
<td>Year on year and consistent reduction in design cycle times</td>
<td>Consistent reduction in product delivery cycle time i.e. &gt;10% pa</td>
</tr>
<tr>
<td>3</td>
<td>Customer seen as part of the development team, Continuous monitoring of in-service performance, Feedback used by design teams</td>
<td>We defined, reproducible product development process. Continuous improvement. Ability to adapt, where appropriate, to different project types and technologies</td>
<td>Early investment in design effort to reduce manufacturing/assembly costs. Design for use/maintainability in service and end of life disposal</td>
<td>Design time falling at &gt;20% pa for equivalence in increased design iterations</td>
<td>Time to market decreasing by &gt; 25% pa</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1 Customer satisfaction
What measurements are in place to track customer satisfaction? Are processes reactive to customer complaints or do they seek to understand customer requirements in more detail? When problems are identified is there a formal ownership and resolution process? How are causes identified and activities managed to prevent reoccurrence? What is considered to be a good level of customer satisfaction and how is it defined?

4 Inventory turns (WIP, purchased and finished goods)
Use the equation: Cost of Sales divided by inventory value at year end. Inventory should include all raw material, WIP and finished goods, but not too or replacement equipment stocks. Cost of Sales is used to make the calculation independent of profit margins, to enable cross-industry comparisons to be made.

7 Productivity
Use a year on year assessment of productivity gains. How is productivity measured: output per head, return on capital employed? What has been the key contributor to gains? How is progress going to be maintained in the future?

2 Market share
Is market share used as an active measure of business performance or just a result of business decisions? Has any independent confirmation been sought of market position over time and likely trends, new competitors or changes in consumer profiles? What is the current trend in market share?

5 Cash flow
Use today's position, but assess the general direction of cash flow over the last few months to determine whether it is moderately or strongly flowing in any one particular direction.

8 Product costs
What steps are taken to establish competitive position? How sensitive to price variations is the market? Where are the lowest cost producers of this product located?

3 Employee morale
Are employee surveys used on a regular basis to assess morale within the organization? What indicators are used to assess employee satisfaction and morale?

6 Return on net assets
NPBT divided by assets minus liabilities. If the business does not know how the industry performs then a score of 3 is probably all that can be justified.

9 Performance measurement and reporting
What are the key business performance measurements used to manage the business? How is the contribution of individual employees measured? What measures are used to determine senior management performance? What bonus or variable pay plans exist within the organisation? To what extent does the business recognise processes rather than departments?
### Business measurement questionnaire

<table>
<thead>
<tr>
<th>Question</th>
<th>Score Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Customer satisfaction</td>
<td>Some customer complaints, often needing escalation to resolve</td>
</tr>
<tr>
<td></td>
<td>Few complaints; handled as a priority, customer satisfaction tracked</td>
</tr>
<tr>
<td></td>
<td>Delighted customers whose expectations are often exceeded</td>
</tr>
<tr>
<td>2. Market share</td>
<td>Declining</td>
</tr>
<tr>
<td></td>
<td>Static</td>
</tr>
<tr>
<td></td>
<td>Increasing</td>
</tr>
<tr>
<td>3. Employee morale</td>
<td>Pressure and stress, anxiety about future, cynicism</td>
</tr>
<tr>
<td></td>
<td>Stability, status quo or moderate progress, occasional stress situations</td>
</tr>
<tr>
<td></td>
<td>Controlled environment, growth opportunities, consensus on direction</td>
</tr>
<tr>
<td>4. Inventory turns (WIP, purchased and finished goods)</td>
<td>Large order sizes, yearly to monthly, turnover less than 5</td>
</tr>
<tr>
<td></td>
<td>Smaller volumes, monthly to weekly, some JIT, turnover between 10 and 15</td>
</tr>
<tr>
<td></td>
<td>Weekly, daily or hourly, extensive JIT, turnover more than 20</td>
</tr>
<tr>
<td>5. Cash flow</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>6. Return on net assets</td>
<td>Lower than competition</td>
</tr>
<tr>
<td></td>
<td>Better than competition</td>
</tr>
<tr>
<td>7. Productivity</td>
<td>Decreasing</td>
</tr>
<tr>
<td></td>
<td>Consistently improving, significant gains</td>
</tr>
<tr>
<td>8. Product costs</td>
<td>Greater than competition</td>
</tr>
<tr>
<td></td>
<td>Lowest in world</td>
</tr>
<tr>
<td>9. Performance measurement and reporting</td>
<td>By costs and outputs vs allocated targets</td>
</tr>
<tr>
<td></td>
<td>By costs and outputs of processes rather than functions (e.g. Using ABC)</td>
</tr>
<tr>
<td></td>
<td>Using a score-card of measurements including, for example, customer satisfaction, market share and employee morale</td>
</tr>
</tbody>
</table>
Company size and characteristics

To answer these questions, refer to company statistics for this year to date and the last two financial years. If you do not have a formal measure for any of these, poll those people in your organisation who have responsibility for the relevant aspect of operations (e.g. the Design Manager for product range).

Where the figures have fluctuated significantly, look at the trend over the period.

The markets in which you operate
Which companies do you think are the most important in winning and retaining customers in your market? It may help to rank them in order of importance first, before reflecting this in the extent to which you agree with the statements in the question.

The competition and how you compare with them
Having decided the relative importance of the competitive factors - how does your company perform against each of them? How in tune with the market is your organisation? For example, are you highly competitive on price in a market that places more value on product quality? Rank the factors from strongest to weakest performance and then reflect your relative performance for each by the extent to which you agree with the statements in the question.

Impact of change
Change in the company
Examples of significant change might be: the removal of a layer of management; the introduction of a radically different range of product (perhaps for new target markets); the implementation of a business process re-engineering exercise that spanned the organization.

Change in the business environment
Has there been any major entrants into the market? Have major competitors merged? Have there been any changes in import controls on your goods or services? Have any changes in legislation had a direct and major impact on your business?

Company size and characteristics

Circle the number which most accurately represents any trend in the company's size and characteristics (in the last two years up to today).

<table>
<thead>
<tr>
<th></th>
<th>Declining rapidly</th>
<th>Declining steadily</th>
<th>Little change</th>
<th>Growing steadily</th>
<th>Growing rapidly</th>
</tr>
</thead>
<tbody>
<tr>
<td>sales turnover</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>number of employees</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>profitability</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>product range</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>number of customers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>number of suppliers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
## The markets in which you operate

Please indicate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>our principles markets are characterised by intense competition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in our principle markets the following are major competitive factors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>price</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>product quality</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>short lead times</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>reliable on time delivery</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>product customisation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

## The competition - and how you compare with them

Please indicate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>we have a significant advantage over our competition in terms of:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>price</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>product quality</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>product customisation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
**Impact of change**

Please indicate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

as a company, we have significantly changed the way we operate during the last few years

the business environment in which the company operates has changed significantly in the last few years

the business environment in which the company operates is likely to change significantly during the next few years

as a company, change is something we are good at - we see it as an opportunity for improvement rather than as a necessary evil to cope with

---

**Company size and characteristics**

<table>
<thead>
<tr>
<th><strong>Number of employees</strong></th>
<th><strong>Annual turnover</strong></th>
<th><strong>Product range</strong></th>
<th><strong>Number of customers</strong></th>
<th><strong>Number of suppliers</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>
APPENDIX IV

THE MICRSCOPE BENCHMARKING RESULTS – LAMPAÍ AN DAINGIN TEO.,
Overall Practice vs Overall Performance
(Relative to International Sample):
Practice vs Performance: 45 v 43

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IBM Consulting Group and Client Confidential

Date: 23, 01, 1997
APPENDIX V

THE MICRSCOPE BENCHMARKING RESULTS – OGENEK TEO.
Ogenek Teo., Beal Atha'n Ghaorthaigh, Ireland, 11 January 1996
Overall Practice vs Overall Performance
(Relative to International Sample):
Practice vs Performance: 34 v 40
Industry Sector: Electronic and electrical machinery and equipment
Ogenek Teo., Beal Atha’n Ghaorthoigh, Ireland, 11 January 1996
Manufacturing Quartiles and Boundaries
(Relative to International Sample):
Industry Sector: Electronic and electrical machinery and equipment

[Bar chart showing manufacturing quartiles for different practices such as manufacturing practice, manufacturing performance, quality practice, quality performance, logistics practice, logistics performance, lean production practice, lean production performance, organisation and culture practice.]

Microscope IBM Consulting Group and Client Confidential Consultant: Donal O'Liaithain Date: 06, 06, 1999
Ogenek Teo., Beal Atha’n Ghaorthaigh, Ireland, 11 January 1996
Manufacturing Practice vs International Sample
Relative to: Electronic and electrical machinery and equipment

% of Sample with Higher Scores


IBM Consulting Group and Client Confidential  Consultant: Donal O'Liaithain  Date: 06, 06, 1999
Microscope
IBM Consulting Group and Client Confidential
Consultant: Donal O’Lathlain
Date: 06, 06, 1999

Ogenek Teo, Beal Athaín Ghaorlaigh, Ireland, 11 January 1996
Manufacturing Performance vs International Sample
Relative to: Electronic and electrical machinery and equipment