DEPARTMENT OF TRADE AND INDUSTRY
POLICY SUPPORT PROGRAMME

Sector Strategy Development

GUIDEBOOK FOR ASSESSING COMPETITIVE PERFORMANCE AND PRACTICE

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Compiled by

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FOREWORD

This manual was produced as a component of the Department of Trade and Industry Policy Support Programme Training Project (Year 3). It was compiled by three principal researchers - Prof. Raphie Kaplinsky from the Institute for Development Studies (IDS) at the University of Sussex, Prof. John Bessant from the Centre for Research in Innovation Management (CENTRIM) at University of Brighton, and Prof. Mike Morris at the Industrial Restructuring Project (IRP) at the University of Natal, Durban.

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This manual exists on CD-ROM, and is designed to be utilised in conjunction with the training workshops and mentorship provided under the Training Project for DTI Officials (Year 3). Queries in regard to this resource may be addressed to Wolfe Braude at the Policy Support Programme Management Unit on wolfedra@iafrica.com or Pearl Thandrayan at the Directorate of International Development Cooperation on pearl@dti.pwv.gov.za
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Looking for world class practice

1. ASSESSING COMPETITIVE PERFORMANCE AND PRACTICE

Competitiveness matters. In world markets where there are many players and new ones coming on stream every day, firms have to be able to create and preserve a strong position if they are to survive. Whether this is in competing for the export market or fending off import competition, the challenge is the same. Unless firms are prepared to think about their operations, develop a strategic framework for the future and implement change, there may be no tomorrow for the business.

The challenge is clear - but the response is more difficult to make. Most firms are busy fighting today’s fires and find it difficult to focus on strategic issues - and even experienced businesses can benefit from some help, even if it is only a different perspective on their problems. For this reason many public policies around the world are moving towards providing various kinds of assistance in restructuring for competitiveness. But making these policies effective depends on civil servants and others having a good understanding themselves of the issues facing firms and the potential ways of dealing with the challenge.

This work-book is designed to help think through these issues and to present a framework for looking at firms and value chains to assess where they are performing well and where they might be able to learn and improve. Ideally, it is most effectively used in conjunction with visits to enterprises, but if this is not possible, the work-book can also function as a stand-alone training manual.
1.1 Content of the workbook

The workbook is structured in seven sections:

<table>
<thead>
<tr>
<th>Section</th>
<th>Content</th>
</tr>
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</table>
| 1. How does Globalisation affect the need for South African enterprises to achieve world class capabilities? | What is Globalisation?  
Globalisation pressures on South African enterprises  
Positioning in the global economy  
The benefits offered by Globalisation |
| 2. What is 'world class manufacturing' - and why does it matter? | Introduction  
Factors affecting competitiveness  
A model for world class manufacturing |
| 3. Understanding markets – the key external driver for change | Does the firm hear and understand its markets?  
Why this matters  
How to measure and assess this  
Case examples |
| 4. Core competence - what distinctive competitive edge can the firm create or use? | Does the firm understand its sources of competitive advantage?  
Why this matters  
How to measure and assess this  
Case examples |
| 5. Strategy - the need for focused change | Does the firm have a framework for changing its products/services and/or its processes?  
Why this matters  
How to measure and assess this  
Case examples |
After the Introduction (which explains the factors forcing world class manufacturing in South Africa), each subsequent section contains information on why the issue is important, on how to measure and assess how well a company deals with the issue and on case examples of how others have tackled this.

The resource also contains two other elements:

- The WCM index - a quick assessment tool which helps you generate a profile to describe how far along the road to WCM a firm has got. 
  (available to print out on the CD version)

- A glossary explaining some of the main tools and techniques associated with WCM. 
  (Only available on the CD version).

If you are using the CD version simply click on a highlighted link.
1.2 Globalisation and the pressures forcing World Class Manufacturing on South African Enterprise

This section looks at the phenomenon of globalisation and what it means for the South African economy and for firms within South Africa. It deals with the following questions:

What is globalisation?
What impact has Globalisation had on the South African economy?
Is export success enough to guarantee sustained economic growth?
The benefits offered by Globalisation

1.2.1 What is globalisation?

Globalisation is often reduced to a single issue – usually the growth of international trade, or of foreign direct investment. But in fact it is multifaceted, and covers a wide range of phenomena, which in addition to trade and investment, includes the flow of ideas, values, culture, people, technology and so on. For this reason globalisation can best be defined as:

A reduction in the barriers to the cross-border flow of factors (capital, labour and technology), products, ideas and values

The character of globalisation

- Globalisation is uneven. Some barriers are coming down faster than others. For example, the barriers to the flow of manufactures are falling faster than those for agricultural products; skilled labour is increasingly mobile, but barriers against the migration of unskilled labour are growing.

- Some elements are globalising much more rapidly than others – financial flows are accelerating rapidly (currently something like $1,600bn changes hands every day of the year, with less than 5% being used to finance international trade); on the other hand, technology remains largely concentrated in the richer countries.

- The degree of globalisation ebbs and flows over time. During the nineteenth century, the major economies globalised in a similar manner to the late twentieth century, but the inequalities which resulted led to the world turning inwards during the inter-war period, with growing barriers to the flow of both people and trade.

- Globalisation is volatile. Flows of finance are generally speculative and are particularly volatile, with investors behaving in a herd-like fashion, forcing currencies to behave in unexpected and often irrational ways. For example, in the early 1990s, vast sums of
finance flowed into East Asia, but after the Thai financial crisis in August 1997, these financial inflows reversed, dramatically. This was a great shock for economic management. But it is not just finance which is volatile. So, too, is direct foreign investment, as are the prices of many commodities in which developing economies such as South Africa specialise.

1.2.2 What impact has Globalisation had on the South African economy?

There are three major ways in which globalisation has affected the South African economy over the past two decades. In each case, the pace of change has quickened over the years, particularly after the Transition in 1994.

- In the realm of ideas, there has been a general move away from an often xenophobic inward-mentality towards an appreciation of foreign things and ideas. This has not only affected our political system and our values, but also our attitude towards foreign products, foreign technology and foreign investment. In general, many people now believe that these externally-sourced factors and products have the potential to improve the quality of our lives and to help us in achieving sustainable income growth.

- Particularly in recent years, the falling barriers to mobility have led to a significant outflow of skilled people from South Africa. Often this mobility is temporary, with many intending to return in the future (as has occurred for countries as diverse as Korea, Taiwan and India, as well as in South Africa’s own past when many émigrés returned to assist in the Transition). But in other cases, these skills are lost for ever, and this has placed growing pressures on the productive sector. In very recent months steps have been taken to allow South Africa to gain more effectively form the immigration of skills, but this is still a nascent development.

- But, by far the most significant aspect of Globalisation for South Africa has been the change in the trade regime. Beginning during the 1920s, and speeding up significantly after the Second World War, the South African economy developed an elaborate system of trade protection with domestic industry being protected by a combination of quotas and import tariffs. But, since the 1980s, and especially after the transition in 1994, the South African economy has begun to emerge from this inwardly-focused developmental path. Both imports and exports have increased over the past decade, and the share of trade in GDP has grown from 34% in 1993 to 41% in 1999 (Fig 1).
The fall in import protection

The manufacturing sector has been especially significantly affected by these changes in the trade regime. In the past, South Africa’s industry was heavily protected. Not only were tariff levels high, but they were often complemented by quotas which limited the physical quantity which could be imported. Moreover, our tariff structure was unusually complicated, and we had one of the most intricate and varied tariff systems in the world. But from the mid-1980s, this protective structure began to change. Quantitative restrictions were removed, tariffs became much less complex and varied, and tariff rates were reduced. After the transition in 1994, the Government committed itself to a determined policy of import liberalisation, and agreed to import tariffs which were even lower than required by GATT (the predecessor to the World Trade Organisation) (Table 1). This was done in order to force industry to upgrade to meet global standards and to improve the availability of goods to the public.

Table 1. Projected Average Tariffs and GATT Binding Tariffs

<table>
<thead>
<tr>
<th></th>
<th>1994</th>
<th>2002</th>
<th>GATT Binding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption goods</td>
<td>34</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>Intermediate goods</td>
<td>8</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Capital goods</td>
<td>11</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>All manufactures</td>
<td>15</td>
<td>7</td>
<td>16</td>
</tr>
</tbody>
</table>

A move into external markets

As import protection was being reduced in the post-Transition era, so the GEIS export subsidies were removed. (These subsidies had been targeted on the degree of value added, but they were costly, were subject to major fraud and were illegal in terms of international trade agreements). But despite this, manufactured exports have grown rapidly, aided by the falling value of the Rand.

Thus:

despite the hope that globalisation would lead to the inflow of significant new foreign investments and technology, these development have not transpired (with the possible exception of the automobile sector). Instead, the major impact of Globalisation on South Africa’s manufacturing sector has been on the trade front.

This has meant that:

- Manufacturers serving the domestic economy have increasingly had to confront import competition. These imports have not just led to price pressures, but also provided consumers with new levels of quality and variety. It is nor surprising, therefore, that not only have competitive pressures increased in most sectors, but domestic consumers have become increasingly discriminating and demanding.

- Manufacturers selling into foreign markets have had to compete with global competitors. Here, too, the pressure has not just been on prices, but also on quality, design, customer support, flexibility, reliability and a host of other Critical Success Factors which foreign customers have come to expect.

1.2.3 Is this export success enough to guarantee sustained economic growth?

The problem with South Africa’s growing export success is that it is not unique. We are not the only country which is targeting external markets. In fact global competition is growing rapidly. This has meant that in many sectors, world prices are falling. This means that producers can only survive by:

- increasing their productivity, or improving their products
- if the currency continues to devalue.

The problem with currency devaluation is that it reduces the foreign goods that can be bought with the Rand value of our earnings. A firm making a profit of R100m in 2001 will find that it can buy only a fraction of what could have been purchased with the same currency in 1995. So, if growth can only be sustained with continual devaluation, there will be little chance of sustainable income growth for our population.

These dangers are not remote from South Africa as can be seen from the recent experience of our wooden furniture industry. Here, although exports have grown dramatically in Rand terms, the unit price of our furniture exports has fallen from more than $16/tonne to less than
$7/tonne.
Falling global prices in the wooden furniture sector are extremely dangerous when producers are unable to upgrade

Growing competition in the wooden furniture sector is having a major impact on the wooden furniture industry. At an aggregate level, global prices are falling, as can be seen in the case of EU imports during the 1990s.

![Graph: Unit price of EU imports of wooden dining room furniture](image)

Source: Kaplinsky and Readman (2000)

For some developing country producers who are locked into the commodity segments of this market (pine dining room furniture), the fall in prices can be very significant. For example, the Sterling prices of bunk beds and kitchen furniture received by two South African exporters fell between 1996 and 2000 by up to one-third:

**Prices received by South African Exporters of Bunk Beds (£)**

<table>
<thead>
<tr>
<th>Exporter</th>
<th>1996</th>
<th>1999</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporter 1</td>
<td>£74</td>
<td>£48</td>
<td></td>
</tr>
<tr>
<td>Exporter 2</td>
<td>£69</td>
<td>£52</td>
<td></td>
</tr>
</tbody>
</table>

These falling prices were not limited to bunk beds, but were also experienced by an exporter of kitchen doors. As can be seen, the only factor saving this manufacturer of doors was the falling exchange rate, which devalued by more than the rate of inflation in this sector. Although this may have saved the wooden furniture manufacturer, the upshot of devaluation for the economy as a whole is a fall in the international purchasing power of domestic value added.
1.2.4 The benefits offered by Globalisation

If Globalisation holds these dangers – a race to the bottom – why should South Africa bother to participate, allowing in more imports and targeting our production on foreign consumers, many of whom are much richer than us anyway?

There are three major reasons why we might wish to do so.

1. We may have no option. The world community is demanding that we open up our markets to imports, making this a condition of our participation in the global economy. Only a very few economies such as Burma and North Korea have tried to resist these pressures.

2. Our consumers will benefit from globalisation. In the days of inward orientation they were frequently forced to buy high-priced goods of low quality. This not only affected final consumers, but also many of our producers who did not have access to up-to-date technology.

3. But, most importantly, making a success of Globalisation will make it possible for us to meet two pressing economic needs:

   - Our problems of unemployment are so pressing, that there is no way that our domestic market can provide enough demand to create the number of jobs which we require

   - In the past our economic growth has been held back by persistent balance of payments deficits. A successful Globalisation strategy is the one way in which this can be solved

Making a success of Globalisation requires a range of suitable policies, including the macroeconomic stabilisation which we have struggled so hard to achieve since the Transition. But macroeconomic stabilisation and participation in the global economy are not enough. They may help us to participate in the global economy but not to do so in a way which provides for sustainable income growth.

For this to be achieved the only alternative is for South African industry to develop the capabilities of World Class Manufacturing and in so doing, to upgrade our industrial capabilities.
2. WHAT IS WORLD CLASS MANUFACTURING - AND WHY DOES IT MATTER?

This section looks at five main elements:

- **Explanations – what is world class manufacturing - and why it matters**
- **Developing WCM**
- **A model for looking at WCM**
- **WCM in South Africa**
- **Why is this important for the DTI?**

(If you are using the CD-version, just click on the highlighted words to go to that section)
2.1 What is World Class Manufacturing?

Until the 1970s, there was a widely accepted view of best practice in manufacturing. Firms which had grown on the back of post-war reconstruction, sold into stable and relatively undemanding markets. Supply-shortages meant that as long as firms could provide the volume at a reasonable price and quality, they would continue to thrive. Given these stable and favourable market conditions, the "model" which firms generally tried to achieve was based on the following main characteristics:

- Logistics were organised around the principle of mass production. Low cost was to be achieved through high volume. Machinery was thus designed to produce specialised products, and machine changeovers were to be minimised. This led firms to hold large inventories of incoming materials, work-in-progress and finished products just-in-case anything would go wrong and interrupt the flow of production.

- Quality procedures were designed so as not to get in the way of production-flow. So quality inspection was placed at the end of the production line, and faulty products were reworked before delivery.

- Work organisation was designed to support this system. Highly-skilled workers concentrated on management, design, quality, marketing and supervision, and unskilled workers followed the instructions they were given, often being paid on a piece-work basis in order to maximise production.

These principles of mass production were appropriate as long as markets were stable and undemanding. But once final markets became more heterogeneous and changeable, new principles of production had to be established. In Europe, North America and Japan, these market conditions began to change in the 1970s – customers wanted increasing variety and quality, and were unwilling to trade-off quality against price. This led producers in these countries to adopt new principles to organise their production processes.

Producers in South Africa and other developing countries were until recently insulated from these more demanding markets and could continue with these outdated forms of manufacturing organisation. But now, with trade liberalisation, this head-in-the-sands attitude is no longer viable.

The new principles of production – World Class Manufacturing - are in sharp contrast to the inherited pattern of "best practice" namely:

- logistics are designed so that flexibility can be ensured. This means producing in small batches to satisfy varied and volatile markets. Inventories are organised on a "just-in-time" basis, and production flows through the plant as single units rather than in large batches. Attention is paid to rapid machine changeover and simpler and more flexible machinery is often used.

- instead of checking quality at the end of the line, quality is assured at each stage of the production process, so that no defects are allowed to pass through the plant.
• work organisation becomes much more flexible, and the boundaries between "skilled" and unskilled workers are narrowed. A key task is to develop an organisation which focuses on learning and continuous improvement, involving all of the labour force rather than just the "skilled" engineers and managers.

These differences are summarised below:

**Figure 1. Contrast between Mass Production and World Class Manufacturing**

<table>
<thead>
<tr>
<th>Critical Points</th>
<th>Control</th>
<th>Mass Production</th>
<th>World Class Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Logistics</strong></td>
<td></td>
<td>• Large batch production</td>
<td>• Single unit flow production</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Just-in-case inventories</td>
<td>• Just-in-time inventories</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Specialised machinery</td>
<td>• Flexible machinery and rapid machine changeover</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td></td>
<td>• End of line inspection</td>
<td>• Quality-at-source at each part of production process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reworking of defects</td>
<td></td>
</tr>
<tr>
<td><strong>Work organisation</strong></td>
<td></td>
<td>• Division of labour between skilled and unskilled workers</td>
<td>• Multi-tasking and multi-skilling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Specialised R&amp;D and product development staff</td>
<td>• Continuous improvement in Green Areas as well as</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>specialised staff</td>
</tr>
</tbody>
</table>

**How to go about developing world class manufacturing**

There are a large number of "tools" which can be used to realise these objectives with regard to production control, inventory and work-organisation. Some of these are to do with factory layout, others affect production scheduling, machine changeover, quality assurance and work-organisation. There is no universal toolkit which all firms need to adopt in all circumstances.

In making the transition to World Class Manufacturing, the firm needs to address three primary challenges:

1. develop the awareness of the need to make the transition to World Class Manufacturing
2. to develop the ability to search for relevant tools and to apply them effectively
3. monitor progress so that an improvement-programme can be systematically utilised.
2.1.1 A model for WCM

The model below sets out a framework for developing world class manufacturing and we will use this in the remainder of the workbook. The seven key policy challenges required to promote restructuring are:

1. **Understanding the market.** Many firms are often particularly poorly placed to understand the nature and complexity of the markets which they serve. They fail to recognise that these markets are both segmented and dynamic, and that different market segments are characterised by different critical success factors. This is a particular problem when the markets in question are distant and serve consumers with different tastes. In terms of priorities, therefore, providing support for their capacity to “hear their markets” is a first-order policy imperative.

2. **Identifying core competences.** It is not uncommon for firms to lack a grasp of their distinctive core competences, that is those capabilities which meet all of the following three conditions – they are of value to final customers; they are relatively unique; and they are difficult to copy. Without core competences, it will be difficult for them to gainfully participate effectively in global product markets. If the required core competences do not exist, does the enterprise have the capacity to develop them? Do enterprises have the will and strategy to jettison those historic competences which have become outdated?

3. **Defining an appropriate business strategy.** An effective business strategy comes from an alignment of market opportunities and core competences. If the two do not match, there is little scope for sustained penetration of external markets. In many cases firms either have no explicit strategy, or it is one in which the existing and potential portfolio of competences does not support.

4. **Defining a product strategy.** The dynamic mature of most final markets requires a capability to upgrade product offerings. In some cases the modifications may be so minor that they are well within the existing grasp of most firms, but more often they require new skills. New product development will thus be an important agenda.

5. **Defining a manufacturing strategy.** But even if a firm is aware of what it needs to produce, does it have the capability to manufacture this with appropriate flexibility and quality, and at the required price? This may involve a change in internal quality and logistics procedures, new forms of layout, and/or the acquisition of new equipment.

6. **Improving value chain links.** However efficient an individual firm may be, if it operates in an inefficient value chain its effectiveness will be limited. Given their inherently small size, there will be a limit to the extent to which firms can influence their customers and suppliers, but it nevertheless remains an arena of action for them.
7. **Implementing change.** The business world is awash with intelligent strategies – whether these be business, product or manufacturing strategies. But implementation is a different story, and this is a challenge which requires heavy investments in people, in the development of trust relations, processes of continuous improvement and changes in organisational structures.

Essentially firms need to understand what drives their markets and what they are capable of offering those markets - their core competencies. Thinking about this leads to developing a strategic framework which aims to develop the firms products and processes to meet the strategic goals - and requires continuous improvements both within and between firms.

**2.1.2 World Class Manufacturing in South Africa**

It is only in recent years that South African firms have begun to adopt World Class Manufacturing Techniques systematically. Progress is most advanced where lead-firms are forcing change on their supply chains and on their customers, and particularly when they are selling into demanding foreign markets. These conditions are met most closely in the automobile sector, although other sectors (often involving local firms, as in brewing) are also showing signs of progress. This progress can be measured both in improvements over time,
and by comparison with foreign competitors who have adopted World-Class Manufacturing programmes.

Tables 2, 3, 4 provide evidence from an ongoing benchmarking programme which provides closely-matched comparisons between South African and European automobile component manufacturers producing the same components. Three major conclusions can be drawn from this benchmarking exercise:

- On average, the South African firms are some distance from their European competitors
- On individual performance indicators, the best of South African firms are close to the best of the European firms. However, in general, where this occurs, South African firms tend to excel on a single performance indicator, rather than on a group of indicators
- The "tail" of firms – measured as the difference between the average performance and the best performer – is larger in South Africa than in Europe

<table>
<thead>
<tr>
<th>Measure</th>
<th>SA firms</th>
<th>International firms</th>
<th>SA vs. internat. firms (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material stock holding (days)</td>
<td>28.0</td>
<td>20.8</td>
<td>-25.7</td>
</tr>
<tr>
<td>Work in Progress stock holding (days)</td>
<td>10.2</td>
<td>7.2</td>
<td>-29.4</td>
</tr>
<tr>
<td>Finished goods stock holding (days)</td>
<td>23.1</td>
<td>9.1</td>
<td>-60.6</td>
</tr>
<tr>
<td>Customer return rate (ppm)</td>
<td>3,585</td>
<td>260</td>
<td>-92.7</td>
</tr>
<tr>
<td>Labour turnover rate (%)</td>
<td>3.7</td>
<td>7.7</td>
<td>+108.1</td>
</tr>
<tr>
<td>Absenteeism rate (%)</td>
<td>4.0</td>
<td>4.6</td>
<td>+15</td>
</tr>
</tbody>
</table>

Source: IRP research (1999) and KwaZulu-Natal Benchmarking Club database
Table 3: Summary of best and worst inventory control performers (1998)

<table>
<thead>
<tr>
<th></th>
<th>South African firms</th>
<th>International firms</th>
</tr>
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<tr>
<td></td>
<td>Best</td>
<td>Worst</td>
</tr>
<tr>
<td>Total inventory (days)</td>
<td>9.93</td>
<td>94.0</td>
</tr>
<tr>
<td>Raw materials (days)</td>
<td>3.86</td>
<td>33.6</td>
</tr>
<tr>
<td>Work in progress (days)</td>
<td>1.89</td>
<td>11.0</td>
</tr>
<tr>
<td>Finished goods (days)</td>
<td>2.0</td>
<td>48.0</td>
</tr>
</tbody>
</table>

Table 4: Outlying quality indicators at the South African and international firms (1998)

<table>
<thead>
<tr>
<th></th>
<th>South African firms</th>
<th>International firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Best</td>
<td>Worst</td>
</tr>
<tr>
<td>Customer return rate</td>
<td>70 ppm</td>
<td>2,000 ppm</td>
</tr>
<tr>
<td>Internal reject rate</td>
<td>0.7%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Internal scrap rate</td>
<td>0.7%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Internal rework rate</td>
<td>0%</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

Why is this important for DTI?

Achieving World Class Manufacturing standards is an essential step in enterprise restructuring. But it is only one of a number of challenges facing the firm. The prime step is to develop a realistic business strategy in which the firm matches its core competencies with the opportunities in the market. This business strategy will have identified the key Critical Success Factors in the final markets. And it is from these Critical Success Factors that the priorities in adopting World Class Manufacturing will be identified. If, for example, it is quality, then emphasis will have to be given to the use of those organisational tools which will best deliver high quality at a low cost. Similarly, if lead-time to satisfying customer orders is critical, then the emphasis will be placed on altering production-flow, and reducing batch sizes and inventories.

Many of these changes will diffuse naturally as a consequence of the operation of the market. Firms will be forced to innovate or to die. Diffusion may also happen as a consequence of the demands of the lead-firms who are forcing change on their suppliers. But experience in South Africa as well as that in other countries suggests that it would be unwise to rely on these two mechanisms alone. The natural operation of market forces may have forced some firms into bankruptcy which might have survived had they been able to make the necessary changes first. And lead-firms may make demands of their suppliers, but the suppliers may not know how to achieve these demands. They will thus be delisted and be unable to thrive.
The South African Government has introduced a number of supply-sided measures which help to promote the diffusion of World Class Manufacturing. These are the:

- Sector Partnership Fund
- The Competitiveness Fund
- The Workplace Challenge

Each of these policies is designed on the basis of world best practice. But their take-up is slow, and they are often introduced in a partial manner – more “joined-up policy” is required. Moreover, there are only limited consulting capabilities in South Africa which firms can draw on in their restructuring processes.

These are the primary challenges now confronting Government in its attempts to help South African industry meet the challenge of World Class Manufacturing
This section looks at three main elements:

- What we mean by understanding markets - and why it matters
- How might we assess whether a firm does this well?
- Case illustrations

(If you are using the CD-version, just click on the highlighted words to go to that section)
3.1 What we mean by understanding markets - and why this matters

- **Introduction**
- **Global markets have changed**
- **Critical success factors**
- **Order-qualifying and order-winning markets**
- **Critical success factors in external markets often differ from those in South Africa**
- **Shaping the market: What happens when the market is not there?**
- **Different types of consumers**
- **Feeding into more than one chain**

For a firm to be an effective and profitable producer, probably the most crucial capability it needs to master is that of “hearing its market”. It must understand what its market looks like – who the customers are, what customers want and how customer demands may change.

Companies brought up in a protected environment are usually rather poor at hearing their markets. They tend to be used to customers approaching them for products. They have operated in markets which have not been very competitive, so that in the past their customers may not have been very demanding. And as a consequence of these undemanding markets, customer demands have been stable.

This was a warm predictable environment, but it is one which increasingly is vanishing in South Africa, where protective barriers are coming down. Competition from imports is increasing, and firms selling into external markets find themselves operating in even more demanding markets.

In this new globally competitive environment it is important that the firm invests in understanding its market thoroughly. Once this market is understood, then it can be matched to the firm’s core competencies, and from this matching, the firm can develop its unique business strategy.

In understanding its markets, the firms needs to recognise:
- the different segments of the market
- the characteristics of each of these segments
- the characteristics of different types of customers
- how to shape its markets

The key recognition required is *that market knowledge does not come by accident or for free.* It requires that the firm devote specific expertise to identifying these features. This may be the
single most important investment which the firm needs to make initially, particularly when it is emerging from a previously undemanding and protectionist environment.

**Global markets have changed**

The economic devastation after the second world war meant that the industrialised countries had to recover much lost ground, and it was only in the early 1950s that rationing was ended. But for the next two decades, until the early 1970s, industry throughout the world was struggling to catch-up with demand. From the manufacturer’s perspective this was an attractive situation. As long as the firm could get the goods out of the door, these could be sold (except in conditions when the overall economy was in recession and when customers did not have much money). Quality and product innovation were not major in the competitive arena.

By the early 1970s, the economic recovery had not only been completed, but the world’s major economies had broken new ground. In most cases basic needs had been met, there was full employment and customers were becoming more discerning. They no longer wanted undifferentiated goods – in Henry Ford’s words, “a Model T Ford in any colour as long as it was black”. They no longer wanted poor quality goods, with low product lives and high recall rates. But, perhaps most importantly, they no longer wanted the same goods – consumers increasingly began to see themselves as individuals or as members of distinct, and increasingly of small consuming groups.

From the manufacturer’s point of view, this was an unpleasant development – operating in a world where customers queued at the door and where variety was limited was a much more comfortable existence. Instead, they have increasingly had to recognise that modern markets are characterised by two major characteristics:

- They are increasingly segmented – there is no such thing as “the customer”, since customers increasingly vary in their tastes
- They are increasingly volatile - what was in fashion last year, is no longer in fashion now, and next year’s fashions will be different

**Critical success factors**

Each of these market segments is distinct – they reflect different priorities which customers have in their consumption habits. For example:

- Both poor and rich people may prioritise the “positional” aspects of what they buy, that is, the status which the consumption gives them. In buying Nike products the customer is also paying for a specific image. But rich consumers will not give much priority to the prices which they pay, and poor consumers may be extremely price conscious

- Corporate customers of a firm’s output may have introduced just-in-time production and may thus put a premium on reliability of delivery and quality, since they do not have buffer stocks to carry them through late or unreliable deliveries

- Corporate customers in volatile markets may require of their suppliers that they have the ability to meet order orders with a short lead time
Firms operating in volatile markets will find that their customers require of them the capacity to change and to introduce new products frequently.

Firms selling into demanding consumer markets may be required to place great emphasis on the quality of their packaging.

These different elements in market demand are called Critical Success Factors (CSFs). Most markets will have a number of Critical Success Factors which the firm will have to meet. Inevitably, not all of these factors will be of the same importance. In some markets, price may be critical, in others it may be quality, or design.

But, increasingly, markets are becoming more demanding. That is, to succeed, a firm will need to meet a number of critical success factors, and without trading them off against each other. For example, in the days of protection, a South African firm could offer either price or quality; now customers want both, that is high quality and at the same (or lower) price.

Order-qualifying and order-winning markets

In any market, firms will be required to achieve minimum standards in order to participate effectively. Even in the most undemanding markets of the protectionist era, South African firms were required to reach certain levels of price and product-availability. In the defence industry, price was less important than technical specifications, and in electronics, quality was key. These are known as “order-qualifying characteristics”, that is the minimum standards which firms need in order to participate in a given market segment.

But what happens when more than one firm achieves the “order-qualifying” standard? The answer is that it needs some additional features which makes it stand out from other basic participants in the market. For example, when price and availability are order qualifying, then product quality may be order winning. And then as competition increases, when product quality becomes order qualifying, then rapid innovation becomes order winning.

One of the characteristics of modern markets is their volatility. That is, markets are in a continual state of flux, and what was order qualifying in the past soon becomes order winning as new competitors enter the market and emulate the market winners. The competitive chase then is to find and impose new “winning” characteristics on the market.

Roughly speaking, over the past two decades the story of order-qualifying and order-winning Critical Success Factors in major global markets is shown below. In each stage, what was order winning rapidly becomes order qualifying. Also, as time proceeds, features which were previously order-winning are attacked as new objectives and may become order-winning once more, as price became in many sectors in the late 1990s.
<table>
<thead>
<tr>
<th>Time period</th>
<th>Order-qualifying factors</th>
<th>critical success factors</th>
<th>Order-qualifying critical success factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre 1970</td>
<td>Availability</td>
<td></td>
<td>Price</td>
</tr>
<tr>
<td>1970s</td>
<td>Availability, price</td>
<td>Quality</td>
<td></td>
</tr>
<tr>
<td>1980s</td>
<td>Availability, price, quality</td>
<td>Differentiation</td>
<td></td>
</tr>
<tr>
<td>1990s</td>
<td>Availability, price, quality, differentiation</td>
<td>Time to market with new products</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>Availability, price, quality, differentiation, time to market with new products</td>
<td>Price</td>
<td></td>
</tr>
</tbody>
</table>

*Critical success factors in external markets often differ from those in South Africa*

The nature of critical success factors will vary by market segments. These segments may be narrowly defined – for example, different types of organic food consumers. Or they may also be seen in much broader terms – for example, foreign markets compared to domestic markets.

South African firms entering the foreign market, usually find that this market segment is especially demanding. It is also a market segment which is difficult to “hear” easily. The markets are a long way from South Africa, and the antennae which the firm has in the past used to pick up its market signals may not work very effectively when pointed towards new, foreign markets.

There are many examples of the differences between the Critical Success Factors in different markets. For example, one of South Africa’s most rapidly growing furniture exporters has found that external markets are much more demanding than local markets. This is true of almost all factors except location (for obvious reasons) and credit facilities.
Shaping the market: What happens when the market is not there?

What happens in new markets when no one knows what the critical success factors are, partly because no one is sure who the future consumers will be? Here there is an interesting paradox which may be particularly relevant for South African firms who are newcomers to global markets.

What international markets have shown is that when new “disruptive” technologies are involved, the firms who were the best and most effective producers with the old technology and who understood their markets best, are least able to capitalise on the new market opportunity. This is because they have become really good at listening to the needs of their existing customer base. However, the markets of the future are made up of new and different customers. Typically, in the early stages of development, these new “disruptive technologies” offer products which are cheaper and perform less well than the existing technologies, and the existing customers (and producers) thus spurn them.

If this is the case, then new producers face a great advantage. And in some cases these new producers may come from emerging countries like South Africa. But even in these cases, this does not take away the challenge to producers that they develop the capability to influence their markets. In this case, it is not so much a matter of “hearing” the market, but rather of “shaping” the market, and this may require the firm to develop the capability to educate its
users. Conventional media-based advertising is one way of educating customers, but there are a range of marketing tools which can be deployed to achieve these ends, including through the use of the world wide web (e-commerce).

**Different types of consumers**

Markets are segmented and have different critical success factors, which will change over time. But the nature of these markets will also be affected by what sector the firm operates in, and who the final consumer is. For example, a value chain may have a number of intermediary steps:

![The Furniture Value Chain](image)

Each of these links in the chain faces a “customer” with different critical success factors. The key categories of “customers” are:

- The final consumer
- The retailer
- The wholesaler and/or the exporting agent
- The final manufacturer in the chain buying a firm’s output (for example, a furniture manufacturer buying wood)
- An intermediate manufacturer buying another intermediate product (for example, a sawmill buying equipment)
- The provider of the basic raw material (for example, the timber grower purchasing machinery)

The longer this value chain is, the greater the distance the final consumer is from the different links in the chain, and the more difficulty the chain as a whole – and each link in the chain – will have in hearing its market and responding with effective business strategies.
Feeding into more than one chain

In some cases, firms may be dedicated to a single chain or to a single customer. This is especially true for SMEs. But, more often, firms feed into a variety of chains. In these cases the critical success factors may vary not just in relation to the requirements of individual customers within a given chain (for example, whether it is foreign-owned or domestically-owned), but also on which chain the firm is feeding into. For example, the forestry sector may feed into the pulp and paper, sawmilling and mining sectors; in turn, the sawmilling sector may feed into direct wood exports, domestic furniture manufacturers, the construction industry and into the do-it-yourself sector.
3.2 How to measure and assess how well a firm understands its markets

All of the above explanation points to one thing - in order to succeed, firms need to hear their markets. How well do they actually do so? To assess this aspect we can pose some simple questions:

<table>
<thead>
<tr>
<th>Question</th>
<th>How to interpret the response</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. What factors affect whether or not people buy from you?</strong></td>
<td>If they don't know they are in a very weak position. If they do, go on to question 2.</td>
<td>Stop at this point and discuss the problems of not hearing the market</td>
</tr>
</tbody>
</table>
| **2. Get them to list the factors which affect whether or not people buy from them** | If the list has only one factor - price - this is often a high risk case  
If the list has more than one factor and they seem to understand the differing range, go on to question 3. | Begin a discussion of the difficulties of sustaining competitive advantage in a world where price competition is increasing                                                                                                                                                  |
| **3. Get them to classify these into order winning and order qualifying factors** | If they do not understand the distinction they may need help with strategic positioning. If they do, go on to question 4.                                                                                                           | Explain the concept and discuss how they can differentiate themselves in an increasingly competitive and open market.                                                                                                                                                        |
| **4. Get them to do this classification for each of their main product/market families** | If they do not understand the need for such separation they risk having an unfocused change strategy. If they do go on to question 5 (following page)                                                                                   | Explain the need for focus and concentration on particular target markets.                                                                                                                                                                                                 |
**Question:** How to interpret the response

**5. Get them to complete a competitiveness profile - see below.**

This should generate a 'spider' chart or profile from which they can see their relative competitive strengths and weaknesses - and identify where they have strategic development needs.

**Implications:** This chart provides the focus for discussion and for identifying where more detailed data collection is needed. For example, if it appears that delivery performance is a critical issue then it might be valuable to carry out some benchmarking to clarify the nature of the gap between the firm and its main competitors.

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**3.2.1 Competitiveness profiling - a tool to help market-driven change**

A powerful tool for picking up signals for innovation involves creating a simple profile of how your products and processes match up to what the market wants and what your best competitors can offer. The step-by-step process is well suited to discussion in groups and provides a powerful way of building a shared awareness of the strategic challenges facing the firm.

**Step 1** involves reviewing and focusing the business. This recognises that for all but the smallest firm, there may be a number of different product/market combinations with widely differing strategic characteristics. Where one business might involve a relatively standard product and compete in a market based on price, another may involve producing to customer specifications, where competition is based on fast delivery, high quality and the ability to meet customer needs as closely as possible. Trying to configure a single factory to meet these different requirements is unlikely to be a successful approach, and an alternative model is to focus on particular families with common characteristics and concentrate development of parallel strategies for each of these.

For example, a firm making furniture might have three distinct product/market groups. The first is high volume furniture for general use which sells mainly on low price. The second is high quality, advanced design fashion furniture which sells at a higher price and can be customised to meet particular needs. And the third is for sale to a major retail store for resale under its own brand. Let us concentrate on the third of these.

**Step 2** involves identifying the market requirements for performance within these groupings; the concepts of 'order qualifiers' and 'order-winning' criteria are helpful here. This involves defining those factors which have to be present simply to be able to enter the particular competition (such as, for example, minimum levels of price or standards of quality performance), and those factors which win orders (such as faster delivery, better levels of customisation, or high quality of service).
Then try and answer the question 'what level of performance does the market expect on each of these?' Use a scoring scale from 1 to 10 where 1 is 'not important' and 10 is 'very important'.

Essentially this stage involves building up a map of what the market requires and what competitors are achieving, as a means of setting clear targets towards which capability improvement must be directed.

For example, in the furniture case the retail store demands high quality, increasing variety, fast and reliable delivery and good prices. By contrast the mass market furniture sells mainly on price rather than design, and people will accept a trade-off on quality.

<table>
<thead>
<tr>
<th>'Not important'</th>
<th>'Very important'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
</tr>
<tr>
<td>Fast delivery</td>
<td></td>
</tr>
<tr>
<td>Reliable delivery</td>
<td></td>
</tr>
<tr>
<td>Small lots/ customisation</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
</tr>
<tr>
<td>Frequent product change</td>
<td></td>
</tr>
</tbody>
</table>

= what the market wants
The next step involves answering (honestly) the question 'How well do we meet these demands?', again using the scale 1 'not important' and 10 'very important'. In our example it is clear that there is a big gap which must be closed.

'Not important' ----------------------------------------' Very important'

Price
Quality
Fast delivery
Reliable delivery
Small lots/ customisation
Design
Frequent product change

= how we actually perform
= what the market wants
The problem becomes even more acute if we add a third question ' How well does our best competitor perform? ', using the scale 1 'not important ' and 10 'very important'. In our diagram it is clear they are better able to meet the needs of this particular customer than we are.

<table>
<thead>
<tr>
<th>'Not important'</th>
<th>'Very important'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
</tr>
<tr>
<td>Fast delivery</td>
<td></td>
</tr>
<tr>
<td>Reliable delivery</td>
<td></td>
</tr>
<tr>
<td>Small lots/ customisation</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
</tr>
<tr>
<td>Frequent product change</td>
<td></td>
</tr>
</tbody>
</table>

= how we actually perform
= how well our best competitor performs
= what the market wants

The challenge is simple - either the gap is closed or the firm might as well exit from this market. This helps to define the strategic target for the firm, as being the areas where the gaps are greatest, and the areas in which individual critical success factors are most important. Of course the level of detail involved in constructing a simple sketch like this is low, but the process can be used to focus on a more detailed analysis using better information - for example, coming from a survey of customers or a benchmarking study of competitors. The purpose is the same - to help focus the analysis of the market on key strategic drivers and to identify where and what has to change.

The next steps involve reviewing the internal capability to meet these performance targets (which will be discussed in greater detail in following chapters in this Manual). This can be a review of strengths and weaknesses of individual elements or functions in the product or process, or a wider look at the appropriateness of the process itself, in the light of prevailing technological and market conditions (business process re-design). It is concerned with
answering the question 'how far does our product or process help or hinder the achievement of the external performance targets?'

In the above case it may well be that the firm needs to look at new design technology to help close that gap. Or it could look at new production techniques to reduce its lot size and enable it to work with higher variety, smaller volumes - which would also speed up its deliveries. New equipment might be another option. But in each case these possible changes are now being considered in the context of a strategic framework, not as random inputs.

The figure following shows an example of such profiling done within the South African auto components sector and in two segments of the domestic clothing industry (A/B being the higher income segment and C/D being the lower income segment).

Critical Success Factors in the higher and lower segments of the domestic retail clothing industry

Source: Harrison (1996)
3.3 Case Examples

3.3.1 The impact of customer selection – the case of Ikea

The choice of customers can have a significant impact on firm performance. Firms that choose customers that offer high volumes at low prices might find themselves on a downward trajectory with constant pressure to reduce costs. On the other hand, linking to a buyer that focuses on upgrading manufacturing performance can help firms to add value to their products and improve performance over time.

Ikea is a large Swedish retail chain that has a very negative reputation as a customer in South Africa. Ikea has a global distribution network, and sources in a number of countries in both the industrialised and developing world. A number of firm closures within the South African industry over the past few years have been directly linked to reliance on Ikea. Ikea offers high volumes, which is particularly attractive to a firm that is trying to get into the export market, or is going through a period of low orders. However, Ikea demands a high level of adherence to technical specifications, offers relatively low prices, and requires these prices to fall over time.

While Ikea are reportedly reliable when it comes to payment arrangements, a firm that becomes too dependent on Ikea will reportedly often find itself under pressure to lower prices to an unsustainable level. Ikea’s quality requirements also pose a problem for many South African manufacturers whose internal quality standards fall well below the customer’s requirements. If this is the case, quality requirements can only be met with a high reject and rework rate, which adds considerably to costs. This can prove highly problematic when operating on what are already very low margins.

A different picture emerged when speaking to a firm that had supplied Ikea for several years. While Ikea is still judged to be an extremely demanding customer offering very low margins, Ikea has brought in technical experts to assist the manufacturer in improving quality and efficiency and minimising waste. Ikea has also facilitated visits to their Swedish factories to explore ways of improving the performance of the South African firm. This assistance has been invaluable in upgrading the performance of the South African manufacturer, and is expected to stand them in good stead as they reduce their dependence on Ikea as a customer. Ikea’s sourcing philosophy is also felt to be evolving, with growing emphasis on developing a competent, reliable and efficient supply chain.

Despite the dominantly negative picture it is clear was that Ikea does offer certain potential advantages for South African manufacturers. There appears to be a tendency in the South African industry to regard Ikea’s quality demands as excessive, and to some extent unreachable. Clearly this is not the case, and using Ikea’s standards as a benchmark for international demands might be a useful vehicle for improving local quality and other performance standards. Firms need to learn to use the customer to maximum advantage, thus benefiting from upgrading possibilities while not becoming too dependent on the customer.
3.3.2 Exporting success has attracted foreign investment…

FHE Automotive Technologies (Pty) Ltd, based in New Germany, just outside of Durban, recently changed ownership and is now part of Behr, a multinational company that specialises in heat transfer products for the automotive industry. FHE manufactures engine cooling radiators, condensors, evaporators and heater cores for both domestic assemblers and the international automotive aftermarket. Well over 50% of FHE’s output is exported, with its principle export markets being Europe, North America and the Far East.

The company has focused on its operational capabilities over the last couple of years and has consequently made significant improvements to its competitiveness. Not only has the company secured new international export contracts as a result, but it has also recently secured a QS9000 rating to add to its ISO9002 listing, and has obtained the highest occupational safety standard available in South Africa (NOSA 5-star). (Both the QS and ISO ratings are quality standards). As highlighted by FHE’s general manager Malcolm White: "The company’s focus on operational excellence, localisation of raw materials and new aftermarket export business has been one of the key reasons for our success."

With its dedicated management team and strong commitment to building its human resource base, FHE believes it is capable of succeeding in the extremely demanding domestic and international automotive markets. Now that it is part of a focused multinational grouping with extensive marketing and design expertise, FHE believes it can increase its value-adding services to customers, whilst at the same time continuously improving its operational capabilities to ensure that quality and delivery reliability standards are met.

3.3.3 Exporting success through a quality focus…

Shurlok Automotive Systems, a division of Electromatic (Pty) Ltd., designs and manufactures integrated electronic modules for OEMs. Its product range comprises highly sophisticated automotive electronics in the convenience, body electronics and security fields. The company, which is both ISO9001 and QS9000 rated, has over the years proved itself an extremely reliable supplier into both the domestic and international automotive markets. The result: exports have increased from 20% of total turnover in 1995 to over 50% by the end of 1999.

In order to meet the key requirements of the demanding international markets into which it supplies Shurlok has developed its manufacturing and quality systems to international standards, with its customer return rates for export sales sitting at just over one hundred parts per million. In line with its commitment to continued progress and international competitiveness Shurlok made breaking the one hundred parts per million threshold and attaining ISO14000 accreditation (concerning environmental practices) two of its key objectives.

Given its commitment to attaining world class manufacturing standards and long-standing relations with its principal OEM customers, which include BMW, Toyota, Daimler Chrysler, Honda & Samcor (Ford/Mazda) Shurlok sees a bright future for its export program. By using advanced technology and by investing in its human resource base through team-based manufacturing processes Shurlok consequently sees the liberalization of the South African automotive industry as more of an opportunity than a threat. As highlighted by Managing Director, Mick Fish, "As we discovered very quickly there are really only two overriding factors to international business, the first is – if you want to play in their league you must play..."
by their rules. Secondly, always approach a problem as an opportunity, ask how can this be achieved and improved upon, not, as is often the case, this cannot be done because… Work hard at all levels in the business on the following principal – We are all faced with a series of great opportunities brilliantly disguised as unsolvable problems".
4. CORE COMPETENCE - WHAT DISTINCTIVE COMPETITIVE EDGE CAN THE FIRM CREATE OR USE?

This section looks at three main elements:

- What we mean by core competence - and why it matters
- How might we assess whether a firm does this well?
- Case illustrations

(If you are using the CD-version, just click on the highlighted words to go to that section)
4.1 What do we mean by understanding core competencies - and why this matters

Think of a company like Sony - and what comes to mind is not just that they are good at electronics, but also that they have a design flair (from the earliest Walkman designs through to today's stylish and much complimented Vaio models of portable computer), that they are very good at miniaturisation (they built the first transistor radios and have maintained this miniaturising approach right through to today's DVD players and mini-discs), and that they are not afraid to lead the market rather than wait for consumer panels to tell them what to do (cf. the Walkman - a product which marketing didn't think would sell!). These are examples of what is distinctive about Sony - and they also represent things which are not easy to copy or reproduce without a long learning process. They constitute what we can see is almost an aspect of the 'personality' of the firm and which is called its distinctive technological competence.

Even large and long-established firms are not immune from the forces of disruptive change. It's worth reflecting on the fact that most firms don't live all that long - for example, of the firms comprising the Dow Jones index of the largest businesses in the USA in 1900 only 1 firm (out of 250) made it through to the year 2000! But equally there are survivors and firms which have managed to stay around and to thrive and prosper. What makes the difference?

First, these firms do not survive because of their scale or their physical assets. The thing which enables them to survive is a deep knowledge base - a core competence which defines what they are distinctively good at and which others find hard to match. This could take many forms. It might be a specific technology - for example, the Pilkington Company in the UK has the patents on the process by which most of the world's flat glass is made - so it has some measure of defence against shocks by virtue of this knowledge base. In most cases the core competence of a firm is much more than just a set of patents or a specific knowledge set - for example, Sony's skills lie in being able to link electronics, miniaturisation, design and good customer understanding to make them the respected player which they are in consumer electronics. Canon does the same in imaging because of competence built up from mixing electronics and optics. 3M have deep skills in coating technology down to sub-molecular level - but they are also extremely capable in the field of regular product innovation so their competence lies in being able to build a business out of technological knowledge.

Other examples of competence include, Rolls Royce in aircraft engines, Samsung in semiconductor manufacturing and American Express in financial information systems. Competence is not necessarily something which only large firms can aspire to - many smaller firms have developed very useful niche strategies based on specific technological expertise - for example, the Sheffield firm of Richarbons have built up a world class position in the manufacture of knives, whilst another UK firm, J&J Cash have developed a strong position in narrow fabric weaving of labels and badges.

In summary, there are three critical factors which make up core competence:

- The competence must be able to deliver something which will be of some value to customers
The competences have to be distinctive. Even paying millions of Rand for the latest generation of machine tool may be worthless if it doesn't give a competitive edge because other firms also have access to such machines.

The competences must be difficult to copy. If they are easily reproduced, their value to the firm will be limited.

**The need to manage competence**

What separates the survivors from the rest is not just that they have core competence but that they actively manage this side of their business. And a key feature in such management is knowing when you have to build it (for example, by making strategic investments in R&D or in acquiring knowledge which you need to add) - but also when you have to let it go. The other side of “core competences” are “core rigidities”, capabilities which hold the firm back from achieving profitability in a dynamic world. Letting go of knowledge you no longer need is simple in concept but very hard to achieve in practice.

We can see this in the case of a firm like Nokia - a large company which began as a forestry business in the 19th century. It diversified and acquired many different areas of knowledge - some would say too many, since its product range at one time ran from pulp and paper right through to gum boots! But in the late 20th century it focused on electronics and particularly on mobile communications - and let the other competencies go. By the year 2000 it was entirely a mobile telecommunications business.

What we have learned from studies of technological competence is that it doesn't appear overnight - it has to be learned and absorbed. Even when firms buy other firms in order to acquire new competencies there is a lengthy period before the new competence is sufficiently absorbed. So building and deploying technological competence for competitive advantage is a long-term strategic concern; it's the managing - as a farmer does - of ‘knowledge crops’, developing and building up over time. Table 1, on the page following lists some of the ways in which firms can build competitive advantage.
Table 1: Ways in which strategic advantage can come from technological innovation

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Strategic advantage</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Novelty in product or service</strong></td>
<td>Offering something no-one else can</td>
<td>Introducing the first … Walkman, fountain pen, camera, dishwasher…. to the world, Thawte Consulting’s encryption technology</td>
</tr>
<tr>
<td><strong>Novelty in process</strong></td>
<td>Offering it in ways others can’t match - faster, lower cost, more customised, etc.</td>
<td>Pilkington's float glass process, Bessemer's steel process, Internet banking, on-line bookselling, etc.</td>
</tr>
<tr>
<td><strong>Complexity</strong></td>
<td>Offering something which others find it difficult to master</td>
<td>Rolls-Royce and aircraft engines - only a handful of competitors can master the complex machining and metallurgy involved</td>
</tr>
<tr>
<td><strong>Legal protection of intellectual property</strong></td>
<td>Offering something which others cannot do unless they pay you a licence or other fee</td>
<td>Blockbuster drugs like Zantac, Viagra, etc.</td>
</tr>
<tr>
<td><strong>Add /extend competitive factors</strong></td>
<td>Move basis of competition - e.g. from price of product to price and quality, or price, quality, choice, etc.</td>
<td>Japanese car manufacturing, which systematically moved the competitive agenda from price to quality, to flexibility and choice, to shorter times between launch of new models, and so on - each time not trading these off against each other but offering them all.</td>
</tr>
</tbody>
</table>
Table 1 (continued): Ways in which strategic advantage can come from technological innovation

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Strategic advantage</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timing</strong></td>
<td>First-mover advantage - being first can be worth significant market share in new product fields</td>
<td>Amazon.com and Yahoo - others can follow but the advantage 'sticks' to the early movers</td>
</tr>
<tr>
<td></td>
<td>Fast follower advantage - sometimes being first means you encounter many unexpected teething problems, and it makes better sense to watch someone else make the early mistakes and move fast into a follow-up product</td>
<td>Palm Pilot and other personal digital assistants (PDAs) which have captured a huge and growing share of the market. In fact the concept and design was articulated in Apple's ill-fated Newton product some five years earlier - but problems with software and especially handwriting recognition meant it flopped.</td>
</tr>
<tr>
<td><strong>Robust design</strong></td>
<td>Offering something which provides the platform on which other variations and generations can be built</td>
<td>Boeing 737 - over thirty years old the design is still being adapted and configured to suit different users - this is the most successful aircraft in the world in terms of sales</td>
</tr>
<tr>
<td><strong>Rewriting the rules</strong></td>
<td>Offering something which represents a completely new product or process concept - a different way of doing things - and makes the old ones redundant</td>
<td>Typewriters vs. computer word processing, Ice vs. refrigerators Electric vs. gas or oil lamps</td>
</tr>
</tbody>
</table>
Table 1 (continued): Ways in which strategic advantage can come from technological innovation

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Strategic advantage</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconfiguring the parts</td>
<td>Rethinking the way in which bits of the system work together - e.g. building more effective networks, outsourcing and co-ordination a virtual company, etc.</td>
<td>Benneton in clothing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dell in computers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toyota in its supply chain management</td>
</tr>
<tr>
<td>Others?</td>
<td>Innovation is all about finding new ways to do things and to obtain strategic advantage - so there will be room for new ways of gaining and retaining advantage</td>
<td>Napster? This firm began by writing software which would enable music fans to swap their favourite pieces via the Internet - the Napster program essentially connects person to person (P2P) by providing a fast link. Its potential to change the architecture and mode of operation of the Internet is much greater and this may be responsible for a whole new generation of programs and services.</td>
</tr>
</tbody>
</table>

4.2 How can we measure and assess understanding of core competence?

All of the above explanation points to one thing - in order to succeed firms need to know what they are distinctively good at - and to seek to develop and protect such competitive advantages. How well do they actually do so? To assess this aspect we can pose some simple questions. Such questions are listed in the following page:
<table>
<thead>
<tr>
<th>Question</th>
<th>How to interpret the response</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your particular and distinctive competitive edge?</td>
<td>If they don't know they are in a very weak position. If they do, go on to question 2.</td>
<td>Stop at this point and discuss the problems of developing distinctive competitive edge in open markets.</td>
</tr>
<tr>
<td>2. Get them to list the factors which affect whether or not people buy from them</td>
<td>If the list has only one factor - price - this is often a high risk case.</td>
<td>Begin a discussion of the difficulties of sustaining competitive advantage in a world where price competition is increasing</td>
</tr>
<tr>
<td></td>
<td>If the list has more than one factor and they seem to understand the need to develop a competitive edge which can be protected, go on to question 3.</td>
<td></td>
</tr>
<tr>
<td>3. What are you doing to sustain and protect this advantage?</td>
<td>If they are not actively aiming to protect their advantage, they risk someone else moving in and eroding it. Ways of protection include legal protection (patents, copyright, etc.) but also keeping the process of creating specialist knowledge (e.g. through R&amp;D) going so as to stay one jump ahead of potential competitors.</td>
<td>Explain the concept and discuss how they can differentiate and protect themselves in an increasingly competitive and open market.</td>
</tr>
<tr>
<td>4. What are you doing to create future advantage?</td>
<td>If they are not actively seeking new sources of advantage they risk others catching up with them, or the emergence of substitute products and processes which eliminate their advantage.</td>
<td>Explain the need for continuous improvement and development of competitive advantage - through R&amp;D, learning and adapting from others, etc.</td>
</tr>
<tr>
<td>5. Get them to complete a competence map - see below.</td>
<td>This should generate a map or profile from which they - and you - can see where they have competitive strengths and where they need to move to develop further to create or maintain a strategic edge.</td>
<td>This chart provides the focus for discussion and for identifying where more detailed work - research, data collection etc. - is needed.</td>
</tr>
</tbody>
</table>
4.2.1 Mapping strategic competence

Working out where your particular competitive strengths lie is not always easy - not least because there are so many ways in which a firm can differentiate itself. As we have already seen the current global market place is one in which sustaining price competitiveness is extremely difficult - but some firms can offer this if they have exceptional equipment and particular advantages associated with low labour, energy or raw materials costs. But in general competitive edge comes from non-price factors - and particularly from exploiting competencies like design, speed to market, quality, etc. Increasingly these are seen as hard to duplicate, especially if the basis of such competence is the knowledge which a firm has rather than the equipment or particular product designs.

Two tools can help think about competence development and its creation and maintenance. You can use either or both to explore with the firm how far it knows and has thought about its particular competitive strengths.

- 5 forces competitiveness map
- Competence map

(i) 5 forces competitiveness map

This is a simple map (developed by Michael Porter) which represents the competitive strategic battlefield in terms of five forces which interact to shape the challenges for firms. Its main value is as a thought provoking aid to discussion to help arrive at a shared understanding of the threats and opportunities facing the firm. Whilst it is a powerful and simple tool for analysis, it doesn't look in great detail about the choices or the ease or difficulty in following a particular course of action.
The five forces are:

(1) The competitive rivalry between firms themselves - the various players in a particular sector or niche who are trying to do the same things. They are constantly jockeying for position and trying new things out (product and process innovation) in order to develop a strategic edge and hence a stronger position in this space. But all of the firms in this space also have to confront not only what each other is doing but also:

(2) and (3) Bargaining power of suppliers and customers - in some cases the suppliers are strong - for example, a major steel producer selling to a small metal fabricator - in which case the client firm has a weak position and its ability to compete will depend a lot on the major supplier. If, for example, the supplier raised prices, the firm would have little option but to carry that cost. Of course, the relationship is not always weak in this direction; the major automobile assemblers, for example are in a very strong position in respect of the thousands of suppliers to them, and can use this to obtain inputs to their activities in ways which support their own strategies. The classic example of this is the Toyota Production System which developed a network of suppliers who would supply the right quality and quantity at a point just in time for Toyota to use in building its cars. This reflects weak bargaining power on the part of the suppliers in terms of our model.

(4) Threat of substitutes - a company's strategic position depends on the extent to which what it offers is unique and cannot be replaced by something else. For example, a firm specialising in typewriters would need to recognise the weakness of its position and move out of this product area and into something else - for example, word processing software or hardware. Equally a firm which has a product which cannot be easily substituted - either because it is unique or because it has some form of protection (e.g. a patent) is in a strong position.

(5) Threat of new entrants - the final way in which a company's competitive position can be altered is through the entry of new competitors who may offer the same products or services at lower prices or with some other advantages. The extent to which there are high 'entry barriers' - for example, high capital cost or difficult to acquire knowledge - is an indicator of strategic strength. Of course, both (4) and (5) are very susceptible to changes in the rules of the game - for example, a new technology could simultaneously open the door to substitutes and lower entry barriers to other players.

Using the model to explore core competence

The main purpose of the model is to provide a structure for discussion and debate around the theme of strategy. Some particular ways in which it can be used are:

(1) Competitive rivalry - look for niches where there are few firms as rivals and then benchmark your competitive edge against them. Or else look for growing markets in which more firms can still hold on and grow shares. Use it to focus on the competitor nature and number questions.

(2) Bargaining power of suppliers - use this to explore issues of balance and how to develop advantageous relationships. For example, if the supplier is exploiting its
strong bargaining position (like the steel maker) then a strategic response on the customer firm's part might be to explore alternative sources of supply or even alternative materials or processes so as to reduce this dependence. Equally if the supplier power is weak one strategy might be to exploit this weakness by tying the supplier into price reduction or other contract requirements which provide strategically advantageous inputs to the customer firm.

(3) Invest in R&D - develop specialised knowledge by learning how to do something which others cannot do. This does not always have to be high technology - for example Farmhouse Products, a furniture maker in Howick has achieved a strong competitive position in the domestic market through a combination of distinctive competence in design and in the application of particular stains and finishes - something which they have worked hard to learn and develop over many years.

(ii) Competence maps
Think about your organisation, or one with which you are familiar (perhaps even the DTI!). Try and draw a 'family tree' of the key bits of knowledge which the company has used to build up its competitive position. (Look at the example given below if you need some help). How might it develop or combine these in the future to create or maintain strategic advantage?

Example of 3M and its growth of new products from a core competence around coating surfaces with particles
4.3 Case examples

4.3.1 Case 1: South African Technology Succeeds in the metal industry

Bell Equipment was until recently a publicly owned South African manufacturer of a wide range of capital equipment. In terms of its automotive related activities, it is the world's fourth largest producer of Articulated Dump Trucks (ADT's) with more than 10% of the global market. The most striking feature of this significant market share is that in the late 1980s it was almost zero. Based in Richards Bay, the company, using South African technology, has proven itself to be a truly competitive global player in the ADT market.

One of the principal reasons for this growth has been Bell Equipment's ability to sustain innovation. The company has a large research and design team employing skilled engineers capable of designing and putting into production world class products. This is, according to commercial director, Guy Harris, one of the company's key strategic strengths.

"One of our core competencies and key differential factors is our innovative design. The market acceptability of the C series truck launched in 1999 is proof of this. The fact that a major international player such as Deere is prepared to brand it speaks volumes."

Given its sound position in the global market place, and the fact that over 40% of its sales are directed into external markets, Bell recently attracted significant investment from John Deere, with the multinational purchasing a 32% stake in the company in early 1999. This international tie up provides Bell with access to even more markets, thus providing more export opportunities and highlighting the important fact that South African technology can succeed in the global market place.

4.3.2 Case 2: South African Technology Succeeds in the IT industry

Thawte Consulting – An IT Success Story

- Product – Digital certificates for e-commerce
- Employees 59 - 37 (South Africa), 22 (United States of America)
- Market share – 41% of global market for digital certificates on web servers
- Exports – 99.5% of customers outside SA
- Annual revenues - $4million
- Growth of turnover – 11% per month
- Purchase price - $575million - $838million

Thawte Consulting is a four year old company. It has developed a niche in the high-tech. area of issuing and certifying digital certificates. Digital certificates allow potential buyers on the internet to verify the authenticity of the owner of the web server that they intend buying from.
Its founder is 26 year old, Mark Shuttelworth who received his education at the University of Cape Town. The company has a relatively modest turnover of some $4million, but it was recently bought by the US based Internet security group, Verisign at a price the greater of either $575million of Verisign stock or 4.4million Verisign shares.

In 1995, while still a student, Shuttleworth saw an opportunity. This arose because US companies were prohibited by legislation from exporting high level encryption technology that would allow non-US based web servers to be capable of strong encryption. At the time, Verisign, were the only Certificate Authority (CA) recognised by the two dominant web browsers – Netscape and Microsoft. Verisign could not keep up with the demand, particularly from web servers based outside of the US. Eventually Thawte was recognised as an Internet CA by a number of large users when Netscape Navigator 3 was launched. Thawte now targeted its digital certificates at smaller businesses and web start ups, giving excellent service at a much lower price. At the end of 1999, Verisign lost its exclusive recognition by the original browsers and would face competition from a reliable and lower cost competitor. Verisign and Thawte have reached an agreement but the sale is still subject to approval by US authorities.

Why South Africa? Shuttleworth sees South Africa as an ideal base for global internet business:

1. high calibre staff
2. exchange rate advantages resulting in much lower costs – Thawte has deliberately not charged what the market would bear
3. same time zone as Europe
4. excellent educational institutions.

With the sale of Thawte, Shuttleworth and his colleagues are now looking to develop other internet based businesses. They will continue to do so from Cape Town.

4.3.3 Case 3: Southern Antique Supplies

Southern Antique Supplies is a small UK manufacturer of paints and varnishes for furniture restoration. It also buys in brushes, cloths and other items so that it can offer a complete range of products which are likely to be used by both amateur and professional restorers. Over recent years the business has declined considerably, and the margins being made have shrunk to the point where the overall viability of the concern is in doubt.

One consequence was that they called in the Innovation Counsellor from their local Business Link (a government-backed network of advice and assistance for smaller UK firms). He spent time going through the business strategy, balance sheet etc. and was coming round to the same opinion about the future of the firm. But he noticed that during the entire time of his visit one of the sales staff appeared to be on the same telephone call. Intrigued, he asked about the subject and found that the customer had already bought some varnish and brushes but had rung up to enquire about how he could best use them to get optimum results. The half-hour phone call was essentially concerned with the sales person giving extensive advice and encouragement to the amateur restorer.
At this an idea took shape in the Innovation Counsellor's mind and he asked about how often this sort of thing happened. On finding out that it was a frequent occurrence he suggested that they might think about charging for this service. From this seed a new business has grown which is proving far more successful than the old supplies operation - although that is still in existence. Whilst there are many professional restorers who simply require the retailing of equipment and supplies, there are many more people with leisure time and a hobby interest in antique restoration. SAS has developed a completely new - and very successful - service operation with consultants, videos, books and other ways of accessing its deep knowledge base about how to restore furniture well. In essence they have moved from being a supplier of products to a knowledge-based business where people are prepared to pay handsomely for their accumulated knowledge and experience. The fact that in doing so it also creates a new market for its supplies is almost incidental!

4.3.4 Case 4: You are what you know

Plastico Automotive are a medium-sized company with factories in several UK locations and in Spain and Belgium. Their origins are as 'trade moulders' - essentially providing a service to manufacturers in producing plastic mouldings; from this they have grown to become one of the automotive industry's preferred or 'first line' suppliers. They are now responsible for the bumpers, wing mirrors and other external parts and for the dashboard, door panels and other items of interior trim. Turnover is around the $150m mark and their volumes of work extend to production of hundreds of thousands of mouldings for all the major European, US and Japanese manufacturers.

Their survival and growth has been the result of careful attention to strategy and in particular to climbing a knowledge ladder. Moulding an object in plastic is not easy but it is something which an increasing number of firms can do and at competitive prices. Basically the process involves someone producing a design and from this making a mould and related tooling to ensure that the object can be made. This is highly specialised work and requires a high degree of understanding and of combining different key knowledge sets -

- What the customer wants in terms of looks and appeal - the aesthetics of the design
- Functionality - what the product has to do and the strength and other properties which it has to have
- What the polymer is capable of and its particular strengths and weaknesses for this kind of application
- What the manufacturing process will permit and its limitations
- Quality required in terms of tolerances
- Cost minimisation - via value analysis of waste sources, etc.

Once the tool and product are specified the tool needs to be made - again involving specialised knowledge and skills in design and manufacturing to high tolerances and with specialist metals.

The tools etc. are then fitted to a moulding machine - and again specialised knowledge is needed to choose the correct process for the part being made. Most production involves some
variation on injection moulding where granules of the chosen polymer (which have been premixed with chemicals to provide colour and other properties) are fed from a hopper into a chamber in the machine where they are heated until they become plastic. A ram then forces the molten plastic into the mould and the item is allowed to cool enough to set before being ejected. Finally there are various trimming and other post processing operations.

Understanding each of these stages and how to control them is the heart of the mouldings business. Historically trade moulders would receive tools and specifications from a customer and simply mould to order - a process not without its knowledge demands but one where entry barriers are low. Moulding machines are increasingly sophisticated so that if someone has enough money to buy a state-of-the-art machine then fitting a mould and doing a production run is possible. There will still be scope for learning and improving control over variables like temperature, mix and other parameters - and these manufacturing skills are increasingly relevant for high specification, high quality parts like those demanded by the auto industry. For many products, however, the quality requirements are relatively low and firms can enter the market and secure a position by exploiting a low cost base - often using older machinery and low cost labour, materials, etc.

The result is that trade moulding is a highly competitive sector with low entry barriers and little chance for differentiation except on price. For firms that wish to grow and develop the challenge is to find customers who value higher quality and precision and to offer a better manufacturing service based on tighter control and quality assurance. This was Plastico's approach during the early stages of development and they built up good relationships with many auto producers; unfortunately the pressures on such producers meant that they increasingly began demanding high quality and product performance but accompanied by continuing price reductions. Relationships between auto component producers and auto assemblers became difficult as assemblers began to source products more widely and on the basis of low cost and high quality with the entry of many new countries into auto component production this put pressure on established players like Plastico. It was particularly challenging for sectors like plastics moulding where entry barriers were low since there was little scope for differentiation and relatively little room for further cost reduction compared to other developing and industrialising countries.

Under these conditions the threat to Plastico forced them to look at managing their knowledge base and developing skills and capabilities which would help them differentiate. Their strategy was to move further up the design chain and to concentrate on developing close relationships with customers and playing a key role in the early thinking about new products. They already knew a great deal about manufacturing and could bring this specialised knowledge about how to get the best out of plastics mouldings whilst also making them cheap to manufacture without compromising quality. As the industry began looking to more sophisticated use of plastics in cars so Plastico worked alongside the assemblers - and in the process learned a great deal. They pushed the frontiers of technical possibilities - getting involved in experiments to see what was possible. Some of these succeeded and they found themselves able to offer sophisticated moulding techniques (such as binding cloth and polymer to make a 'soft' finish to interior trim components such as door panels) - but others turned out to be costly failures. Nonetheless this process of moving upstream in terms of their knowledge base began to pay off. In the late 1990s they achieved preferred supplier status which meant that they were increasingly part of the inner circle with auto producers, invited to participate in early design discussions and to explore together with the assemblers the new concepts which would eventually find their way into new models.
This process required a significant investment by Plastico in R&D - not in the formal sense as might be fund in a research-based sector like pharmaceuticals - but in staff time, specialist equipment, interruptions to production while testing is carried out, etc. The overheads this represents - together with the costs of experiments which failed but which the end customer would not pay for, and the costs of quoting for business not gained - can be built up into a figure which represents the investment in developing new products and production capability. In the case of Plastico this moved from a very low level - perhaps 1-2% of turnover and not even identified as a separate cost - to close to 10%. We can draw out a number of key points from this story:

- The strategic need to move from commodity production where there are many and increasing numbers of competitors
- The challenge in making the move in terms of investment in knowledge and in the skills and equipment to take them up the knowledge ladder
- Letting go of the simpler - and easier - parts of the business - taking the risk to go for higher technology
- Building new kinds of relationships with customers to ensure they receive information and understand the problems they will have to solve
- Invest in design centre and get close to producers at early stages - concept development
- Develop close links with toolmakers and other specialists to ensure they have access to and learn from them
- Develop links with polymer firms and work with them to colonize the knowledge
- Capitalize on areas of acquired knowledge which may become relevant in future - for example, in recycling technology

Above all the case highlights the need for a long-term strategic view of the role which technology can play in growing the business.
5. STRATEGY - THE NEED FOR FOCUSED CHANGE

This section looks at three main elements:

- What do we mean by strategy - and why it matters
- How might we assess whether a firm does this well?
- Case illustrations

(If you are using the CD-version, just click on the highlighted words to go to that section)
5.1 What do we mean by strategy - and why it matters

No business has a guarantee of survival. Keeping ahead depends on having a clear sense of where you are going and setting targets which are realistically achievable to help you get there. This is the essence of business strategy.

We can see some things which are not good strategies for developing a business. For example, someone running a successful bakery is probably not in a good position to go into motor car manufacturing - no matter how good they are at baking. The set of skills, the equipment, the market knowledge and a hundred other things lie so far outside their range of experience and expertise - their competence - that the move would be a disaster. Similarly someone making motor cars would not necessarily be good at pharmaceuticals or clothing production.

Another classic mistake might be to set a target which is unrealistic. For example, a small foundry might be doing very well in its local market, providing a service to local engineering firms and also supplying in volume to a national pump manufacturer. If this firm set its strategic growth target for the next three years as being to capture 12% of the world's oil and gas pumping equipment market you might well start to worry about the likelihood of getting there. Quite apart from the question of whether the firm would have the capacity to supply the market, if it did succeed there are a hundred other barriers, like the existence of powerful and big global competitors, the need to meet different standards and conform with different regulations, the make-up of the market and the preferences of different customers - all of which make it an unlikely proposition.

Business strategy is essentially concerned with trying to come up with realistic and achievable (even if stretching) targets towards which the development of the firm can be focused. Without a strategy the risk is high that the firm will fail - or at best be buffeted by every wave of change that runs through the economy. As one manager put it, 'if you don't know where you're going, you'll probably end up somewhere else!'

Choosing not to have a strategy is not a realistic choice either - by opting out you simply take away any control you might have about where you are going and how your business is going to develop. So there is an imperative about putting together a strategy.

Developing a strategy

Putting a strategy together is not as difficult as it sounds - it is basically a common sense process based on answering some very simple questions:

- where are we now?
- where could we get to?
- where do we want to go?
- how are we going to get there?
- how will we know when we're there?
Most important, though - in a world which is constantly changing we need to recognise that we will have to repeat the process on a regular basis, and be prepared to change strategies in the light of unexpected developments.

Developing a business strategy is essentially a process of asking and discussing questions about potential routes forward. It needs to take into account the core competence of the business and also its position relative to competitors.

Amongst tools which can help with this process are simple matrices which define the potential space in which a business might move - and look at how attractive (or otherwise) such a move might be. The most famous is the Boston Box - so called because it was developed by the Boston Consulting Group.

This is a simple tool for assessing a company's position relative to others in terms of its product range. It is a 2x2 matrix plotting market share against market growth. The BCG matrix helps a company think about the portfolio of products and services which it offers and make decisions about which it should keep, which it should let go and which it should invest further in.

The matrix is simple to construct. One axis is market share, running from low to high; the other is market growth, also running from low to high.

The company then plots its products on the matrix — for example a product in a fast growing market in which it has a low share would appear in the top left hand area, whilst one in which
it had a high market share but where the market was growing slowly would appear in the bottom right.

To help the analysis and stimulate the subsequent discussion the BCG model offers four descriptions of the product/market combinations which might be found:

- **Stars** represent those products or services which the company has a high share of the market and the market is growing. They should be invested in further to maintain the growth.

- **Cash cows** represent those products in which the company has a high market share but where the market is mature and slow growing or even declining. These products should be 'milked' to provide cash for investments in future product areas.

- **Dogs** are products where the company has low market share and where the market itself is not growing. These should be dropped from the portfolio to release funds for investment in more attractive opportunities.

- **Question marks** are those products in which the company has low share but where the market is beginning to take off or has significant growth potential. They need to be watched closely and investment maintained to keep a presence since they could become tomorrow's starts — but equally the commitment should not be too high since they could also turn out to be tomorrow's dogs!

Other versions of the matrix can be developed - for example, looking at potential markets in terms of their profitability and their growth rate to help identify which markets a firm should be seeking to enter.
5.1.1 From business strategy to frameworks for change - in products and in processes

In order to translate these broad business objectives into action plans for change, the firm needs to be able to develop strategies for its manufacturing processes and for its products. For the purposes of this workbook we will focus on the question of manufacturing strategy.

Manufacturing strategy is a framework within which firms can locate a set of decisions about manufacturing innovation. We can think about building such a framework by asking the following three sets of questions:

(i) Paradigm change

'Good manufacturing practice' at any time is a way of seeing and thinking about the key issues confronting manufacturers and the ways in which they can be effectively managed. If such mindsets are at odds with the prevailing environmental conditions – in short, if the rules have changed, but managers continue to play by the old set – then even a well-crafted strategy is likely to fail because it will be addressing the wrong problems.

The dominant paradigm for much of the twentieth century has been that of mass production – a model which evolved through experiments in the nascent car industry but which took the ideas of Taylor, Ford, Sloan and others and applied them to a much broader set of industries. This model was appropriate under conditions of relative competitive and market stability, but its continuing relevance to the emerging conditions of the 21st century has been seriously questioned. Triggered by the oil crises of the 1970s, a combination of massively increased competition, shifting emphasis towards non-price factors in determining competitiveness, radical technological change, a dramatically different regulatory regime and various other factors has led to a significant rewriting of 'the rules of the game'.

The implication of this is that effective manufacturing strategies will need to be based upon a reappraisal and very likely a change in the dominant mindset/paradigm. But changing paradigms is not easy, not least because the transition requires a considerable amount of 'unlearning' - of abandoning routines and behaviours which have been at the heart of 'the way we do things around here' for many years. Consequently the experience for many firms is that some form of crisis is needed, of sufficient magnitude to 'shock the system' and dislocate the old mindset, enabling a new one to be explored.

One route to avoid this is the use of various tools and techniques which can be used to monitor the firms position against the backdrop of current practice and performance, in order to give early warning of emerging gaps between mindset and reality. 'Benchmarking' of this kind, as an input to strategic reorientation has proved very effective in catalysing change in a variety of industries before crisis conditions emerge. This was very much the case with Xerox, arguably the originators of the approach which used it to identify and respond to the emerging Japanese challenge in the copier market. Other examples include the sectoral benchmarking approach of the International Motor Vehicle Programme (now being followed in the aircraft industry) and the quality benchmarking movement in Europe and the USA and the KwaZulu Natal and Eastern Cape Benchmarking Clubs in South Africa.

(ii) Impetus

A second pre-condition for successful manufacturing strategy is the presence of a motivation to change. The strategy may highlight what has to be done and be able to explain why, but making it happen will depend on mobilising energy, enthusiasm and commitment. This often
translates, in studies of innovation success, to elements like 'top management commitment', 'strong leadership' and the innovation champion. Impetus comes from a clear recognition across the organisation of the need for change, and the directions and targets towards which it should proceed; leadership of this kind provides one powerful way of focusing this. However a number of other 'drivers' can be identified which can be used as complements or substitutes. These include:

- customer focus, whereby the goal of the organisation becomes that of identifying and satisfying the needs of a clearly identified and understood customer. This perspective can be extended through the concept of 'internal' and 'external' customers, such that a customer focus can be developed even deep within the organisation
- policy deployment, whereby the high level strategic aims and objectives of the business are systematically decomposed to a set of individual targets within some form of objective setting and appraisal process
- alternatives/modifications to the incentive system, based on a combination of reward and recognition which provides the motivation for improvements in particular directions – for example, through some form of gain sharing associated with the achievement of strategic targets
- leadership and top level commitment
- crisis, a de facto incentive for mobilising commitment to change – 'we sink or swim together', 'all hands to the pumps', etc.

The important point about motivation is that without it the adoption of even complex and expensive solutions is unlikely to succeed. Case experiences regularly stress the importance of these factors in ensuring success, particularly in the long term. Such drivers for change need to be more than 'this month's flavour'; they need the energy to sustain change over extended periods.

(iii) Strategic planning

With the above pre-conditions in place, the next stage is the development of a coherent framework within which to locate innovation decisions. There are many prescriptions for developing such a framework, but they share a common structure which involves five basic elements:

- audit – where are we now?
- build vision – where do we want to be?
- compare – what do we have to change to get there?
- identify alternative options
- prioritise and plan

These can be organised into a number of different approaches; a typical methodology can be represented as follows:

**Step 1** involves reviewing and focusing the business. This recognises that for all but the smallest firm, there may be a number of different product/market combinations with widely differing strategic characteristics. Where one business might involve a relatively standard product and compete in a market based on price, another may involve producing to customer specifications, where competition is based on fast delivery, high quality and the ability to meet customer needs as closely as possible. Trying to configure a single factory to meet these different requirements is unlikely to be a successful approach, and an alternative model is to
focus on particular families with common characteristics and concentrate development of parallel strategies for each of these.

**Step 2** involves identifying the market requirements for performance within these groupings; the idea of 'order qualifiers' and 'order-winning' criteria are helpful here. This involves defining those factors which have to be present simply to be able to enter the particular competition (such as, for example, minimum levels of price or standards of quality performance), and those factors which win orders (such as faster delivery, better levels of customisation, or high quality of service). Essentially this stage involves building up a map of what the market requires and what competitors are achieving, as a means of setting clear targets towards which capability improvement must be directed.

**Step 3** is concerned with reviewing the internal capability to meet these performance targets. This can be a review of strengths and weaknesses of individual elements or functions in the process, or a wider look at the appropriateness of the process itself, in the light of prevailing technological and market conditions (business process re-design). It is concerned with answering the question 'how far does this process/these elements help or hinder the achievement of the external performance targets?' and is the corollary of step 2 in terms of setting targets and identifying locations for improvement. In particular, it is important at this stage to consider both 'structure' and 'infrastructure' in this process. That is the physical - buildings, equipment, etc. - and the intangible components like the quality system, the work organisation pattern, the production control approach, etc.

**Step 4** involves exploring the range of innovations possible for effecting improvements in those areas identified in step 3. Here again the emphasis should be on wide exploration, looking at both structure and infrastructure opportunities; for example, greater flexibility can be achieved through investment in new equipment, or in changes in working patterns or some combination of the two. Another important dimension here is the extent of change sought; the available continuum runs from radical changes (such as replacement of equipment or even processes) down to minor incremental improvements which can be introduced on existing structure/infrastructure on a day-to-day basis.

**Step 5** reviews the potential choices and selects options based upon some set of priorities. These may be technological (for example, the urgency of need for replacement of worn-out equipment) or market related (for example, concentrating efforts on the most profitable or fastest growing products and markets at the expense of the more mature or declining combinations). The key here is to ensure that choices made are appropriate and do not represent the development of capability which does not match to market need. We will look at this in the next section of the workbook.

### 5.2 How might we measure and assess this?

All of the above explanation points to one thing - in order to succeed firms need a strategic framework for change. Otherwise the risk either not changing at all or changing for the wrong reasons - and in either case they may not survive in an increasingly turbulent world.

How well do they manage this process of strategy development? Once again we can assess this with the help of some simple questions:
<table>
<thead>
<tr>
<th>Question</th>
<th>How to interpret the response</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your business strategy?</td>
<td>If they don't know they are in a very weak position. If they do, go on to question 2.</td>
<td>Stop at this point and discuss the problems of not having a strategy to approach the market</td>
</tr>
<tr>
<td>2. What are the key strategic targets for the business?</td>
<td>If the list has only one factor - offering low price - this may be a high risk case. If they are able to explain their strategy and the particular ways in which they see themselves competing then go on to question 3.</td>
<td>Begin a discussion of the difficulties of sustaining competitive advantage in a world where price competition is increasing. Explore whether they have deliberately chosen this because they have the competencies to offer lower prices or because they do not know/ have not looked at alternative ways of competing.</td>
</tr>
<tr>
<td>3. What are your core competencies - and how are you using them to create strategic advantage</td>
<td>If they are not aware of their competencies they risk either trying to compete on a 'me-too' basis (because they have no distinctive competitive edge) or missing out on market opportunities (because they don't exploit their strengths). If they do, go on to question 4.</td>
<td>Explain the concept and discuss how they can differentiate themselves in an increasingly competitive and open market.</td>
</tr>
<tr>
<td>4. How do you deploy your business strategy to provide a framework for change in your products and in the ways in which you make them?</td>
<td>If they do not understand the need for such specific strategic frameworks they risk having an overall sense of direction for the business but no way of connecting change programmes to it. If they do go on to question 5.</td>
<td>Explain the need for linking product and manufacturing strategies to the overall business plan/.</td>
</tr>
<tr>
<td>5. Get them to complete a manufacturing strategy chart - see below.</td>
<td>This should identify whether or not they have a developed framework for change and also what measures they use to monitor where and what they have to change in order to fulfil the market-driven strategy of the business.</td>
<td>This chart should identify where and what has to change - but it may be that they need to develop their thinking about what to measure and how to measure it in order to get a sharper focus to their manufacturing or product strategies.</td>
</tr>
</tbody>
</table>
5.2.1 Manufacturing strategy chart

Firms which understand and use their business strategies as a framework for change need to deploy those broad directions into specific improvement projects. To do so they need to look at - and measure- where they are doing well and where they need to do better in terms of their ability to meet market challenges and deploy their competencies. The chart below offers a framework for measuring - world class firms should be measuring things in the third column and be able to provide you with detailed information about these critical factors.

<table>
<thead>
<tr>
<th>Typical key market drivers</th>
<th>What this means the business must achieve</th>
<th>How might we measure that?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
<td>Keeping its costs under control and driving them down</td>
<td>Levels of raw material inventory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Levels of work-in-progress inventory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Levels of finished goods inventory</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td>Ensuring careful control during all operations and that anything leaving the factory conforms to customer specifications</td>
<td>Customer return rates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Internal quality - rejects, scrap, rework) rates</td>
</tr>
<tr>
<td><strong>Rapid response</strong></td>
<td>Ensuring things move through the factory as quickly as possible from receipt of order to despatching that order</td>
<td>Time from customer order to delivery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delivery frequency of suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delivery reliability of suppliers</td>
</tr>
<tr>
<td><strong>Flexible response</strong></td>
<td>Ensuring that the different needs of individual customers - in volumes, product variety, special requirements - can be met quickly and effectively</td>
<td>Frequency to customers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Machine changeover times</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Batch and lot sizes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throughout time through factory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production flow</td>
</tr>
<tr>
<td><strong>Product innovation</strong></td>
<td>Ensuring that the product offering is updated and changed on a frequent and regular basis</td>
<td>Investment in R&amp;D/product development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of new products introduced during past 2 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of new products projects which were on time and within budget</td>
</tr>
<tr>
<td><strong>Process innovation</strong></td>
<td>Ensuring that the capability of the firm to do new and better things - for example work to tighter tolerances or faster - is developed</td>
<td>Investment in process innovation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of process changes implemented during the last 2 years</td>
</tr>
<tr>
<td>Meeting industry standards</td>
<td>In many sectors, global buyers require conformance to quality, environmental and labour standards</td>
<td>Achievement of ISO9000 series and ISO14000 series quality and environmental standards and SA8000 series labour standards</td>
</tr>
</tbody>
</table>

**Customer perceptions of the benchmarked firm's performance relative to its competitors**

- Quality
- Price
- Credit facilities
- Financial stability
- Delivery reliability
- Innovation capacity
- Conformance to spec.
- Flexibility
- Packaging

Diagram showing customer perceptions of benchmarked firm's performance relative to competitors in various aspects.
5.3 Case examples: Building quality into the production process - A benchmarking case study

Unless firms build in quality at source the cost implications of more stringent quality control will stifle their ability to meet ever-increasing customer demands for both excellent quality and competitively priced products. A brief case study drawn from a firm benchmarked in 1998 by KwaZulu-Natal Benchmarking cc illustrates this key competitiveness point. This is because the firm that was being benchmarked had to face up to this critical process challenge:

**How was it going to meet its customers’ ever increasing quality demands whilst at the same time lowering its prices?**

As highlighted in the following two graphs, which were generated during the customer benchmark, the firm in question was not only performing admirably in terms of meeting its customers’ demands, it was also performing well above the levels of that of its principle competitors. The firm’s customers were generally happy with its performance in terms of most of the criteria they assessed the firm on, and rated its performance as being above that of its principle competitors. The one significant area where the Company was clearly not meeting its customers’ requirements and where its competitors had an upper hand, however, was in its products’ prices. Not only did customers indicate to us that they were unhappy with the firm’s prices, one even indicated that it would be looking for an alternative source of supply if the benchmarked firm did not improve on this aspect of its business.

The reasons underpinning the firm’s pricing problems emerged during the course of the comparative benchmark with one of its competitors. In support of the customer benchmark findings it was obvious that the firm performed far better than its competitor in terms of the quality of the products it sent to its customers. The customer return rate at the firm was, for example, 4,000 parts per million (ppm), whilst the figure at its competitor varied between 25,000 and 30,000 ppm. Significantly, however, this did not mean that the firm had a significantly better production system relative to its competitor. The firm quite simply had a better quality-inspection department. Rejects were still being produced – the quality department largely ensured, though, that these rejects did not find their way to the customer.

For example, internal reject rates could be improved significantly at both firms. Internal reject rates at the firm varied from 2.48% for one line of its products to 3.74% for another line, whilst the figure at its competitor stood at approximately 5%. In terms of the reported quality standards at the two firms, it was also interesting to note massive variance between the companies’ average figures and those calculated for the two sampled products analysed at each firm. This is highlighted in the following table.

<table>
<thead>
<tr>
<th>Quality levels of two sampled products analysed at each firm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Customer returns: 1997</td>
</tr>
<tr>
<td>Internal rejects</td>
</tr>
</tbody>
</table>
Quite clearly, then, quality control was lacking in terms of the production systems in place at both firms, with this also being evident in terms of the lack of readily available quality measurements during the course of the benchmark undertaking at the company.

Significantly, both the benchmarked firm and its competitor were placing a great deal of their present focus on quality improvements. Both firms recognised that improved quality performance was a requirement for continued supply into the automotive industry, although it was of concern that improved quality performance was equated almost solely with quality accreditations and the level of customer returns.

Quality at both firms was being super-imposed on their production systems, thus limiting the potential benefits that could accrue to the two firms by altering the production systems in place and building in quality at source. There was still a stark delineation of responsibility between quality and production, thus ensuring that any quality improvements would only be possible by increasing production costs. For example, customer returns will only decline because the quality department is monitoring internal rejects more closely.

Quality therefore needs to be built into the benchmarked firm’s production process (i.e. at source). Machine operators need to be multi-skilled to understand and monitor quality issues (e.g. via Statistical Process Control mechanisms), and the production process itself needs to be designed to be more quality focused (e.g. preventative maintenance on machinery, use of correct dunnage, improved production flow, less inventory, etc.).

Quality could be improved significantly without adding additional costs to the production process itself. This is the process challenge facing the benchmarked firm, although it must be noted that numerous organisational weaknesses make the process challenge that much more daunting. For example, the firm needs to improve its human resource development, engender a culture of continuous improvement on the factory floor and work more closely with the firms in its particular value chain, etc.

In terms of the manufacturing performance indicators generated it was found that the benchmarked firm actually performed no better than its competitor. Lead times, throughput times, inventory levels, flexibility, machine changeover times, production flow, absenteeism, worker suggestions, etc. were all very similar.

Whilst the benchmarked firm was meeting its market’s demands in terms of quality it was doing so at the expense of production costs. Both the benchmarked firm and its competitor followed the same principle of manufacture – build what the customer orders plus an additional few percent to make sure all rejects are covered.

This may have sufficed in the past but in the new highly competitive domestic environment such an approach will soon become untenable. The quest for zero internal defect needs to become a reality – only then will quality improve without placing a huge burden on company pricing structures. The acquisition of ISO9000, VDA6 and QS9000 accreditations are all very important but the most significant challenge is an internal process issue: making quality part of the production system itself!
6. INTRA-FIRM CHANGE - CONTINUOUS IMPROVEMENT THROUGH USING NEW TOOLS AND TECHNIQUES

This section looks at three main elements:

- What do we mean by intra-firm change - and why it matters
- How might we assess whether a firm does this well?
- Case illustrations

(If you are using the CD-version, just click on the highlighted words to go to that section)
6.1 What do we mean by intra-firm change - and why this matters

- **Getting lean and fit - the challenge of waste reduction**
- **The seven deadly wastes**
- **How to reduce waste**
- **The river of inventory**
- **The lean toolbox**
- **Tools for doing new things**

Having set out a strategic framework for action - either product or process - the business needs to look for ways of achieving its targets. This will inevitably require change - but the challenge is to make sure that the changes implemented are:

- Going to address the key strategic targets (change for its own sake is as bad as no change at all)
- Chosen from as wide a selection as possible (not every factory problem needs or can be solved by investing in expensive capital equipment)

The specific range of things which can be introduced to help improve manufacturing competitiveness is wide and well-proven. (We give some examples of commonly used tools and techniques in the Glossary section at the end of the Workbook). In essence they can be grouped under two broad headings:

- Tools for doing what we do better - here the emphasis is on reducing waste of different forms - time, energy, cost, space, etc. This group is often referred to as 'lean manufacturing'
- Tools for doing new and different things - essentially concerned with renewing the products which the firm offers and the ways in which those offerings are created and delivered.

Building world class manufacturing requires attention to both groups, but the foundations need to be laid in getting the existing factory up to a good standard before moving on to new products or processes. Evidence from around the world suggests that this approach pays off, not least in liberating money, time and other resources which can be better used in new ventures. For this reason we'll look mainly at these approaches in this section.
6.1.1 Getting lean and fit - the challenge of waste reduction

Waste is a broad term, but we can usefully see it as anything that adds cost, not value...anything other than the minimum amount of resources absolutely essential to meet customer requirements. As Taichi Ohno, one of the 'founding fathers' of WCM and former Chairman of Toyota put it,

"...there is nothing more wasteful than producing something you do not need immediately and then storing it in a warehouse. Both people and machines are wasted and the warehouse puts your money to sleep"

Viewed in this broad way waste becomes a challenge - essentially anything which does not add value to the product or service being offered must, by definition, be waste. So unnecessary movement around the factory, waiting time in storage areas, scrap and rejects due to poor quality and delays in shipping orders because of the breakdown of an essential piece of equipment are all typical examples of waste.

The extent to which competitiveness can be improved by eliminating waste can be seen by considering the high costs currently associated with inefficient use of inputs to production. For example, estimates suggest that the amount of money tied up in inventory - raw materials, finished good, work-in-progress, etc. - in the UK alone represents between £23bn and £41bn. Similarly, estimates suggests that some 30-40% of energy could be saved through more attention to conservation. Or again, paperwork systems in many firms require forests of trees to keep them supplied, quite apart from the costs associated with people involved in operating such systems. Here again, rethinking and simplifying procedures could result in significant savings.

But it's not just money - improvements can come in other ways. For example, in an era when time-based competition is so important, eliminating wasted time is an important advantage. Quality has become an order-qualifying factor in most markets so that reducing waste due to poor quality helps gain and sustain access to those markets.

The seven deadly wastes

Careful and systematic analysis of what goes on in most factories highlights a huge amount of waste under various different headings. Shigeo Shingo, for many years Chief Engineer at Toyota, talks about the 7 deadly wastes which he identifies as follows:

- **overproduction**, where the plant or stages within it make more than is actually necessary to fulfil an order or supply the next stage in production. The causes of this may be a desire to keep machinery utilised or to try and offer better customer service by holding a high level of finished goods in stock. However the costs associated with such policies can be serious - they include not only costs of working capital tied up in inventory and interest charges linked to that, but also the cost of extra storage, handling, paperwork and people to monitor and control it.
- waiting time, where parts or products are waiting for the next operation, machines and operators are waiting for the next batch of work to arrive, or where machines and operators wait for specialist support - maintenance, quality control, etc. Such delays - which are typical of batch manufacturing operations - represent not only wasted time but also imply inefficient flow with high levels of inventory locked up wastefully within the system. It is fairly typical for products in the engineering industry, for example, to spend over 90% of their lives in the factory waiting for something to happen to them and only a small fraction of their time actually being machined or otherwise worked upon.

- transport, where parts and products are handled and moved around the factory more than necessary. For example, in many factories it is common for components to travel many kilometres in the course of their assembly into finished products because of the layout of operations. This kind of problem can occur in factories which are only a couple of hundred metres door to door. Another associated problem is putting things into temporary storage and retrieving them again - which adds not only to double handling transportation waste but also to the waiting time in the plant.

- processing waste, in which the actual process used may be wasteful or inefficient and could be improved upon or replaced. Here the question of maintenance and design for manufacture can make a major contribution to reducing processing steps or finishing operations. For example, a complex assembly operation can be simplified through better design of fixtures and of the product for manufacture - thus reducing the overall processing time, complexity and error rate. Similarly well-maintained tooling can reduce the time spent or even the need for finishing operations.

- inventory, which represents as we have seen, a major cost item. High inventories arise from overproduction but also from other wasteful policies and practices such as buying high volumes of raw materials at a discount and keeping them in stock or holding on to obsolete materials or retaining too wide a product range for too long. The problem of inventory can be put into perspective if we consider that around 40-50% of manufacturing costs (more in some industries like leather or specialist metals) are represented by materials.

- quality, where the presence of errors and defects leads to physical waste in the form of scrap, time waste in the form of dealing with the problem or reworking, inventory waste because of the need to hold more stock to cover for the defective elements, and so on.

- motion, where the problem is that movement does not necessarily mean productive activity. Keeping a machine running may lead to high utilisation figures but if it is producing more than is actually needed the advantages of high utilisation may be outweighed by the costs of extra inventory. Another waste of motion is in searching for tools and other items needed to complete an operation.

The significance of the number 7 is symbolic - there are plenty of other categories we might add to the list. For example, another serious waste is in the potential of human resources within the factory. If people are simply employed as pairs of hands then most of their capability as thinking and problem-solving agents is being wasted - and those firms which have managed to tap into it recognise the significant gains on offer. As one manager put it, 'the beauty of it all is that with every pair of hands you get a free brain!'
**How to reduce waste**

The problem of waste has always been present in factories - but it is only when firms face difficult and tight circumstances that they focus attention on it. When times are good it is tempting to relax and operate in less than efficient fashion.

This goes some way to explaining why the origins of lean manufacturing can be found in Japan where the post-war conditions were very much against them. Faced with shortages of raw materials (and the foreign exchange with which to buy them), with limited skilled labour, with an outdated and badly damaged industrial base, and with markets which were highly fragmented, Japanese manufacturers had to find an alternative approach. The experience of the car industry is typical of the long-term development of a waste conscious approach which gradually overcame these limitations and was then able to build a world class and highly competitive industry.

Central to the approach was the concept of 'just-in-time' - a phrase which simply describes the ideal target of producing things *just in time* for them to be used, i.e. with the absolute minimum of waste. Clearly this is an ideal, but it is a target towards which continuous improvements can be directed. In this form JIT is a simple philosophy, equally applicable to activities within the factory, dealings between factories along the supply and distribution chain and even in many service sector activities. Its main emphasis is on identifying where waste in whatever form exists and focusing a variety of problem-solving strategies on dealing with it.

Its primary focus was originally in the area of inventory management. In Japan, with no natural resources, conservation was critical - but the problem was - and is - just as acute in Western countries. However, the Western approach has traditionally been to use inventory as a way of dealing with uncertainty rather than as something to be reduced or eliminated. For example, on raw materials the lead times and reliability of suppliers are often less than ideal and so the habit forms of holding safety stocks - 'just in case' of problems. The size of such safety or buffer stocks varies but can often be 50% or more of the total inventory. Uncertainty on the factory floor, associated with unexpected problems of machine breakdown or delay is often dealt with by starting new batches and re-routing or rescheduling around the problem - and again inventory accumulation is used as a cover. And uncertainty in the marketplace - about what customers want and when they want it - coupled with a desire to provide good service to customers is again dealt with by holding high inventories of finished goods.

Inventory is being used here as something to cover up or cope with a wide range of problems in the factory and marketplace. If some of those problems could be solved, uncertainty would be reduced and the need to hold so much inventory would fall. But most Western manufacturing operates on the basis of crisis management - dealing with problems as they arise rather than systematically working down to their causes and eliminating them. And even when a problem is attacked, it is often the wrong problem - for example, our preoccupation with direct labour saving when the main cost item for most manufacturers is the cost of material.
The river of inventory

Clearly we need a way of focusing on these waste-related problems in such a manner that action to solve them is forced upon the firm. This principle is at the heart of JIT. A widely used analogy helps explain this, which uses the idea of inventory as water in a lake or river (see figure below). For as long as the level is high, the rocks and other obstacles remain hidden - but as soon as the level is dropped, the problems emerge and can - and must - be attacked directly. JIT begins by identifying problems and then forcing firms to tackle them. The main tactic used to 'reveal' such problems is inventory reduction.

The way in which Japanese manufacturers attacked the inventory problem was essentially to challenge some of the conventional wisdom of batch manufacturing. In particular they focused on the idea of producing in response to need rather than as a consequence of plans and forecasts. Instead of *pushing* inventory into the system in order to make products they turned the process round and used the *pull* from the market place or the next operation as a way of making the system more directly responsive and eliminating unnecessary waste due to overproduction etc.

A direct consequence of this approach is the idea of producing things not in high volume (as typified by Henry Ford and the world of mass production) but one at a time! The reasoning is that anything more would mean waste - parts waiting in a queue to be processed or the other side of a machine waiting for the rest of a batch to catch up with them. Such an approach sounds crazy but the discipline of thinking around batch sizes of only one quickly highlights how wasteful alternative approaches are - and also how inflexible they are. With a batch size of one products could effectively be customised to particular people's needs. And whilst achieving single unit flow - to give its technical name - is fraught with difficulties and often
impossible to achieve, the discipline of trying to reach this target provides a powerful driver for improvement and waste reduction.

The lean toolbox

Translating such a philosophy into action requires addressing a series of linked problems. For example, meeting the challenge of producing in batch sizes of one just-in-time requires some way to:

- reduce set-up times
- guarantee that materials will be there without holding excess inventory
- guarantee machine availability and reliability
- ensure easy and rapid availability of tools and fixtures
- guarantee quality, both of incoming materials and components and of in-process production with zero defects
- ensure smooth flow through the plant
- reduce inventory without the risk of running out of stock
- make the whole plant responsive and agile

The water analogy introduced earlier is a powerful illustration of this. As we drain the level so more rocks become exposed - just as in the factory the process of reducing inventory levels opens up problem issues which must be confronted, not buried again. For example, if the problem is machine breakdown, then some way has to be found - replacement, special maintenance or whatever, to improve its performance. If it is set-up time - then some way has to be found of reducing it. Two principles are important in this process of continuous problem identification and solution. The first is that once one problem is solved, there is always another one to take its place. And the second is that there is no such thing as a 'best' solution - only an opportunity to find an even better one.

Tools for doing new things

Before we leave this explanations section we should briefly focus on the other set of tools which can be deployed within the firm to help meet its strategic targets. These are not concerned with 'doing what we do better' but rather with doing new things - and typically they involve product and/or process development. It is important to see these as a complementary set of activities - successful world class manufacturing firms pay attention both to getting today's products and processes to be as lean as possible whilst also looking to renew them with new developments for tomorrow.
6.2 How can we measure and assess how well a firm handles this?

Firms need to change in order to meet their strategic targets. So we should be looking for the answers to three key questions in trying to assess what they are doing:

- Do they have a programme for change - or are they simply trying to achieve their strategic objectives without altering their practices?
- If they are changing, are they aware/ trying to implement across the wide range of tools available to develop WCM? If not, are there new practices which they might learn about and adopt?
- If they are aware and have implemented a wide range of WCM practices, have they done so to world class standards, or are there ways in which they could develop further?

Given the range of things which the firm could do, how well do they actually measure up? We can make use of a similar scoring system to earlier sections and ask the following questions:

<table>
<thead>
<tr>
<th>Question</th>
<th>How to interpret the response</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What changes have you implemented (or are you planning to make) to meet your strategic targets</td>
<td>If they don't know or if they have no plans they are in a very weak position. If they do, go on to question 2.</td>
<td>Stop at this point and discuss the problems of not restructuring and developing manufacturing in a highly competitive environment</td>
</tr>
<tr>
<td>2. What are the main changes and how do they fit together?</td>
<td>If the list has only one change - planning to purchase or implement new equipment then there is a risk that the change strategy is too narrowly focused. If they have a wide range of change plans - both equipment based and organisational change based then go on to question 3.</td>
<td>Begin a discussion of the potential for non-capital based change and especially around the key techniques of WCM such as just-in-time and layout change.</td>
</tr>
<tr>
<td>3. What are your key performance measures - and which changes have you implemented to improve on them?</td>
<td>If they are deploying their manufacturing strategy they should be measuring key factors like inventory and quality performance and be implementing practices like JIT, layout in cells and single unit flow to help meet them. If they do, go on to question 4.</td>
<td>Explain the need to link factory floor changes to strategic objectives and also how WCM techniques like cellular production and single unit flow can help.</td>
</tr>
</tbody>
</table>
4. Get them to complete an improvement practices chart - see below.

This should identify the key strategic drivers for the business and also what measures they use to monitor where and what they have to change in order to meet the challenges. It should also indicate which improvement practices are being used and why.

This chart should identify the range of practice in place or planned which help to meet the strategic challenges of WCM. Firms can learn and develop further in two ways - by adopting new practices and/or by improving the effectiveness with which they deploy their current ones.

6.2.1 Improvement practices chart

We can look at the ways in which particular new WCM practices help deal with the challenges identified earlier. As an illustration, typical examples are given on the page following. These are based on a set of market drivers which are commonly found in many sectors. But it is important that each firm understands the particular drivers which characterise the markets for their specific products. Unless they are able to do this, it is unlikely that they adequately understand the markets they are in.

<table>
<thead>
<tr>
<th>Key market drivers - targets for manufacturing strategy</th>
<th>Typical performance indicators</th>
<th>Relevant new organisational practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeping costs under control to offer low prices</td>
<td>Levels of inventory in raw materials, work-in-progress and finished goods</td>
<td>'Just-in-time' approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Single unit flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kanban</td>
</tr>
<tr>
<td>Keeping quality high and consistent</td>
<td>Scrap rates (internal rejects)</td>
<td>Total quality management</td>
</tr>
<tr>
<td></td>
<td>Customer returns</td>
<td>Kaizen/continuous improvement in quality</td>
</tr>
<tr>
<td></td>
<td>Incoming quality from suppliers</td>
<td>Statistical process control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplier development/value chain management</td>
</tr>
<tr>
<td>Fast response to customer orders</td>
<td>Lead time from customer order to despatch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery frequency from suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery reliability from suppliers</td>
<td></td>
</tr>
</tbody>
</table>
Market drivers, continued…

<table>
<thead>
<tr>
<th>Key market drivers - targets for manufacturing strategy</th>
<th>Typical performance indicators</th>
<th>Relevant new organisational practices</th>
</tr>
</thead>
</table>
| Flexible response to customer requirements - volumes, variety, customisation, etc. | Batch and lot sizes (the lower these are the more flexibility) | Set-up time reduction  
Cellular production  
Multi-function teams |
| Frequent product innovation | Number of new products introduced during past 2 years  
% of projects completed on-time and within budget | Product development process  
Concurrent engineering  
Early involvement |
| Delivery reliability | Machine availability  
Delivery reliability from suppliers | Total productive maintenance  
Poke Yoke  
Supplier development/value chain management |
| Frequent process innovation | Number of process changes introduced over past 2 years  
% of projects completed on time and within budget | Process development process  
Early involvement |
| Meeting industry standards | Achievement of ISO9000 series and ISO14000 series quality and environmental standards and SA8000 series labour standards | ??????? |

To use the chart the firm should be able to fill in a blank version shown below, listing its key strategic drivers, its key performance measures and the range of improvement practices which it has deployed (and why). From this it is possible to explore their position in terms of:

- Are there practices which they are now aware of or have not yet adopted? (See the example list above for relevant practices).
- Are they implementing their practices as effectively as they could?
6.3 Case examples

6.3.1 Case 1: Lead Time Reduction – A Case Study from India

Changing market conditions have imposed new critical success factors in production. Whole value chains are being pushed towards time-compression. This means that to be competitive, firms need to:

- introduce new products rapidly, that is to reduce time-to-market
- shorten the time they take to satisfy customer orders, that is lead-time reduction

Lead-time reduction in manufacturing can be improved by introducing cellular production, single unit flow and just-in-time production. This speeds up the flow of materials through the shop floor and makes it easier to meet customer orders rapidly.

But shortening lead-times do not only arise from changes on the shop floor. Often, the major delays in meeting customer orders arise from the paper side of the production cycle. In the manufacture of electrical circuit breakers in India, in fact, the major reductions in lead-time came from the parts of the cycle which were outside of manufacturing. Of the reduction from 57 to 24 days (over a period of 18 months), only 10 days were saved on the shop floor.

The net result however was a reduction in lead-time in the production of electrical circuit breakers in India.

6.3.2 Case 2: JIT in Zimbabwe

In the early 1990s, a number of Zimbabwean firms moved their production organisation from large lot production to smaller lot sizes, and sometimes even achieved single unit flow. Stock-turns fell dramatically, in various stages of industrial furniture manufacture, and in the production of agricultural carts with particularly positive impacts on throughput time, labour productivity and floor space.
### JIT in Zimbabwe, early 1990s

<table>
<thead>
<tr>
<th>Sector</th>
<th>Large lot production</th>
<th>Just-in-time production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial furniture:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units of WIP</td>
<td>715</td>
<td>10</td>
</tr>
<tr>
<td>Throughput time (minutes, seconds)</td>
<td>4</td>
<td>2’ 7”</td>
</tr>
<tr>
<td>Space (sq. min)</td>
<td>90</td>
<td>27</td>
</tr>
<tr>
<td>Output/worker/hour</td>
<td>3.6</td>
<td>18</td>
</tr>
<tr>
<td><strong>Large agricultural trailers:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units of WIP</td>
<td>200</td>
<td>3</td>
</tr>
<tr>
<td>Throughput time (hours, minutes)</td>
<td>12’30”</td>
<td>1’ 28”</td>
</tr>
<tr>
<td>Output/worker/day</td>
<td>38.3</td>
<td>228.3</td>
</tr>
<tr>
<td><strong>Automobile batteries:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units of WIP</td>
<td>38</td>
<td>1</td>
</tr>
<tr>
<td>Area (sq. m.)</td>
<td>40</td>
<td>14</td>
</tr>
<tr>
<td>Throughput time</td>
<td>2hrs 20 minutes</td>
<td>16 minutes 3 seconds</td>
</tr>
<tr>
<td>Output/worker/hour</td>
<td>2</td>
<td>2.78</td>
</tr>
</tbody>
</table>

6.3.3 Case 3: Baxi Heating, UK

Introduction
Baxi, based in Preston, Lancashire, specialises in the manufacture of domestic heating and specialist environmental systems for the UK market. The product range includes gas-fired central heating fires and boilers and industrial air conditioning units.

History
The company was set up by Richard Baxendale in 1866, originally as a general iron foundry. The company gradually expanded and an increasing amount of work was carried out for the local textile industry. When the textiles industry started to decline at the beginning of the twentieth century, the company began to look for new markets. As a result the company entered the market for coal fired heating when it patented an under floor draft fire, the Baxi Burnall in 1935. Commercial production of this fire following World War II met with considerable success, such that the company pulled out of general foundry work in order to concentrate on castings for its own products.

Following discovery of natural gas in the North Sea around UK in the 1960's, Baxi developed a revolutionary gas-fired central heating boiler, the Baxi Bermuda, which helped put the company on the road to becoming one of the market leaders in gas-fired domestic heating and the UK's most profitable boiler company. To support this expansion the company moved to larger premises in 1961, to the current site at Bamber Bridge, south of Preston. In 1983 a 15 acre site at Bamber Bridge was acquired to provide further scope for expansion. As the company expanded the size of work force grew from around 300 in the mid '60s to 1,100 in the mid 1980s.

As the chimney breast boiler market matured in the 1980s, the product range was widened to include floor and wall standing boilers. In the late 1980s the company further diversified into environmental control and industrial heating through a number of acquisitions. These included Gradwood Ltd, in Stockport, an industrial heating and ventilation contractor in 1988 and Pace Ltd, in Shipley, a manufacturer of specialised air conditioning equipment the following year.

Move into Crisis
As the company moved toward the mid 1980's a combination of internal and external factors led to a sharp deterioration in performance and moved the company into a crisis situation

External pressures:
- A slow down in growth as markets became saturated. The domestic heating market was forecast to slow to, at best, 3% (growth) by end of the 1980s. However, as recession hit, the market actually declined by a much larger amount.
- Change in market ownership: several of Baxi's competitors had been taken over. Market stability was threatened as the new owners launched aggressive programmes
to increase their market share. Consequently, same markets became very price sensitive and Baxi was forced to match its competitors’ price cuts

- Changes among customers/distribution channels: as builder's merchants restructured from regional to national companies, this led to an increase in their purchasing power which put pressure on Baxi’s profit margins
- Environmental pressures: increasing demands for more energy-efficient boilers put more pressure on R&D expenditure

Internal pressures:
- A rise in the company's cost base: costs continued to rise ahead of the market, largely fuelled by poor labour relations. Future growth seemed unlikely to absorb the extent of this rise in the cost base.
- Rising overheads started to eat into profits.
- Expansion in the product range in terms of both volume and mix. There were up to two dozen variants of some products
- Failure to meet customer demand for specific models despite high overall stocks (stock turn was around nine). This was due to a rotating method of production, whereby a particular model would only be manufactured every, say, seven weeks
- Quality problems: although the company had a reputation for high quality and was well respected, this was achieved only by high inspection and rework costs. There were many recurring quality problems.
- Corporate and strategic planning were underdeveloped.

**Company Improvement Plan (1988)**

The management recognised the need for fundamental change if the company was to survive and maintain its competitive position. It started to address this need for change in 1987 by initiating discussions with consultants and setting up a steering committee that included the Managing Director and the two other directors. (This demonstrated top management commitment from the outset.) The steering committee spend some time researching the issues and consulting other senior managers and shop stewards in developing a plan. The development process also involved visits to Japan and leading world class organisations. Throughout the development and implementation process, regular meetings were also held between managers and shop floor staff.

The outcome was the formulation of a Company Improvement Plan (CIP), based on the introduction of Just-in-Time techniques. The plan aimed incorporated the following aims:

- support business growth plans
- improve customer service and market opportunity
- reduce business operating costs of: stock, cost of quality and space requirements
- reduce lead times
- enable quicker response for new product introductions
- strengthen competitive position
It identified seven specific areas on which improvement activities would focus:

- quality improvement
- balanced production
- lead-time reduction
- set-up reduction
- pull systems
- supplier networks
- housekeeping

Four task groups were set up to managing change in key areas. The first was tasked with setting up a pilot production cell; the second focused on planning and the implementation of a revised approach to planning and scheduling; the third was based around human resource issues and communication, education and training to support the CIP; the fourth task group was charged with the implementation of a Quality Improvement Programme. Each leader of task group liaised with the CIP Project Leader

**Pilot cell (1988)**

One of the first activities under the new CIP was to pilot the JIT principles by setting up a new production cell for floor standing boiler production, which ran ten different models. This ran for four months on a pilot basis and proved to be a tremendous success, generating significant improvements in a range of areas:

- Product cycle time reduced from average of seven weeks to one day
- Throughput reduced from days or weeks to two hours
- Some set-ups reduced from 30mins to less than a minute
- 50% saving in floor space (30,000 to 15,000 sq. ft)
- 60% reduction in distance travelled (2,200 to under 1,000 ft).
- Significant reduction in scrap and rework
- All ten models could be made in a day.

The improvement was also reflected by higher levels of morale. Although some employees were wary that it was still early days, comments from workers indicated clear signs of improvement:

"Anything we don't like or doesn't seem practical they are modifying for us. We have had some say in what we're doing. The commitment throughout and the attitude of management has been good. We have seen a different attitude. It's been better than before."
"Everything is a lot more compact, it's a cleaner and neater area and everyone knows what everyone else is doing. I think it is a friendlier atmosphere. The new job has made the job easier and there is not as much carrying to do around the place."

Due to the success of the pilot, the changes were adopted across the company.
7. INTER-FIRM CHANGE - THE IMPORTANCE OF MANAGING THE TOTAL VALUE STREAM

This section looks at three main elements:

- What do we mean by inter-firm change - and why it matters
- How might we assess whether a firm does this well?
- Case illustrations

(If you are using the CD-version, just click on the highlighted words to go to that section)
7.1 What do we mean by inter-firm change - and why this matters

*Why are value chains important?*
*What is a value chain?*
*Repositioning within value chains*
*Competitive pressures*
*Supply chain management*
*Key steps in developing world class supply chain management*

*Why are value chains important?*

When faced with increasing competitive pressures, the first thing a firm needs to do is to assess its competitive strengths and weaknesses in relation to market opportunities. Then, depending on its underlying potential competitiveness, the firm needs to invest in its internal processes, changing procedures, changing layout, purchasing new equipment, developing and adapting products, and so on.

But however good the firm becomes in improving its internal operations, there is a limit to what it can do to improve its profitability and growth prospects. This is because the firm is imbedded in a value chain, which often involves a long chain of production before the needs of final customers are met. If the other links in the chain are weak, then however good the firm may be at what it does, it may still suffer in the final market because its suppliers, and the customer for its products are not equally efficient.

Increasingly, as technologies develop, as products become more complex and as firms specialise in their core competence, so production chains are becoming more elaborate. For example, in the automobile sector, the old traditional structures at Ford and General Motors meant that their internal operations used to account for 70-80% of the value of the final product. Now, an increasing number of components are bought in, and the large firms only add between 30 and 40% of the value of the final car. Similar trends are occurring in most industries.

In South Africa this outsourcing is likely to become even more important. This is because one of the consequences of operating in a protected economy was that firms were under-specialised. As our economy becomes more deeply integrated into the global economy, so our firms will need to become more specialised. They therefore have an even greater distance to travel than many of the leading international competitors.

For this reason, and following the improvements which many leading firms made in their internal operations during the 1990s, increasing attention is being given by firms to their positions in value chains, and in steps which they can take to improve their value chains.
**What is a value chain?**

A value chain describes the full range of activities involved in the design, production, delivery, marketing and recycling of a product.

![A Simple Value Chain](image)

Even the simpler value chains involve a number of links. And the delivery of a final product may in fact involve more than one value chains. For example, each link in the timber and furniture value chain in itself involves a group of linked suppliers.

![The Timber and Furniture Value Chain](image)
Each of these links in the chain faces a “customer” with different critical success factors. The key categories of “customers” are:

- The final consumer
- The retailer
- The wholesaler and/or the exporting agent
- The final manufacturer in the chain buying a firm’s output (for example, a furniture manufacturer buying wood)
- An intermediate manufacturer buying another intermediate product (for example, a sawmill buying equipment)
- The provider of the basic raw material (for example, the timber grower purchasing machinery)

So, if our industrial sector is to make the transition to global competitiveness, it is important that firm restructuring occur within the context of their positioning in their value chains. This is because:

- If they alone improve, weak performance by their chain of customers and suppliers will undermine their ability to survive and thrive;
- How they are inserted into global value chains will determine their capability to upgrade and improve their performance. For example, in the furniture industry, selling into large-volume retail chains such as Ikea may help South African furniture producers to improve process efficiency (since Ikea will assist their suppliers in this regard). But simultaneously it may prevent them from upgrading their product designs, since Ikea offers little scope to its suppliers to design their products. And, without improved designs, South African furniture firms might find themselves locked into pockets of intense competition.

It is important that each firm understands the strengths and weaknesses of the value chains in which they operate. Where the firm has the ability to influence its suppliers (or its customers) it can take actions to improve their performance through supply chain management activities.

**Repositioning within value chains**

Value chains are becoming increasingly global in nature. The specialisation of firms in core competence now increasingly takes place across national boundaries. For example, again in the furniture industry, pine wood may be grown in Sweden, the designs may be done in Denmark, and the furniture may be constructed in Hungary for German consumers. As South Africa increasingly enters the global economy, so our producers become part of global value chains.

One of the important developments which has taken place since the mid-1980s, is that with China’s entry into global markets, the competitive pressures in the manufacturing link in value chains have increased.
This has meant that the world’s leading firms are increasingly moving out of manufacturing and into design, marketing and the provision of specialised services. This provides both an opportunity and a threat to South African manufacturers. The opportunity arises because we hold the potential for filling these manufacturing gaps as they are vacated by the large industry players. The threat comes because we are not the only potential gap-fillers, and the competitive pressures are becoming intense.

For this reason it is important that South African firms develop the capability to upgrade their own activities, and to help their suppliers to upgrade as well.

**Supply chain management**

Because supply chain efficiency is such an important issue, an increasing number of firms around the world have begun to tackle the problem of upgrading their suppliers. The impetus to these changes came originally from the demonstrated efficiency of the supply chains managed in the Japanese automobile industry during the 1960s and 1970s. This experience showed that supply chains have to be managed if the efficiency gains are to be realised – they will not arise naturally as a result of routine interactions between firms. Since the early 1980s, many firms in North America and Western Europe, as well as those in developing countries have begun to introduce programmes which target an improvement in the performance of their suppliers (as well as in the performance of their customers).

From this experience it is possible to distil the key steps involved in supply chain management (see below). But, as more and more firms have begun to develop supply chain management projects, so it has become increasingly obvious that such programmes lack bite unless the lead-firm simultaneously also actively assists its suppliers to learn. In the most advanced cases, lead-firms realise that learning goes both ways, and that they, too, can learn...
from their own suppliers. There is a major difference between mandating change amongst
suppliers and assisting them to develop the capabilities to make the necessary changes.
Supply chain learning – as distinct from supply chain management – now represents the
cutting-edge of performance amongst leading global firms.

**Key steps in developing world class supply chain management**

- The lead-firm (often called the "supply chain governor") has first to hear a "wake-up
call", which alerts it to the need to improve efficiency. Sometimes this awareness is
only induced by a crisis in profitability, but it can also come from pressures exerted
by its customers, through government support programmes, or from other initiatives.

- The firm then has to begin by making appropriate changes in its internal operations:
there is little point in inducing suppliers to change if the firm has not itself engaged in
a programme.

- Once these changes are in progress, the lead-firm then has to explicitly target supply-
chain (or customer-chain) performance improvement, and then to determine which
key performance parameters will be targeted. Usually this involves fewer, smaller and
more accurate deliveries of inputs; higher quality standards (measured defects in
"parts per million", ppm); more reliable and accurate deliveries; and shorter lead-
times to satisfy orders.

- This requires the rationalisation of the vendor (customer) base, often with a
significant reduction in the number of suppliers, weeding out those that seem unlikely
to improve.

- Thereafter, the new standards need to be communicated to first-tier suppliers (and
customers).

- Once the performance of these first-tier suppliers is reliably audited, and
improvements can be observed, the lead firm either needs to target improvement in its
second- and third-tier directly, or to ensure that first-tier suppliers engage in a similar
programme with second-tier suppliers, and so on down the chain.

- The most progressive firms then realise that learning is a two-way process. Not only
can they actively assist their suppliers and customers to improve, but so, too, can they
learn from these suppliers and customers on how to improve their internal operations.

Leading proponents of supply chain management are found in many sectors, including in the:

- auto industry – especially Toyota (Japan), Nissan (Europe) and Daimler-Chrysler
(USA), Toyota (South Africa)

- electronics industry – all of the major semiconductor and consumer electronics firms;

- electrical industry – ABB in Europe and General Electric in the USA;

- the food sector – SA Breweries in South Africa

- services sector – Tesco in food retailing in the UK, and Woolworths in food and
clothing in South Africa.

International experience also shows that in developing country environments, foreign
investors can act as important vectors in the promotion of supply chain efficiency as they
force domestic suppliers to conform to their global standards.
7.2 How might we assess whether a firm manages inter-firm change well?

Firms need to change in order to meet their strategic targets - but change in-house may not be sufficient to ensure competitiveness of the whole value chain. So we should be looking for the answers to three key questions in trying to assess what they are doing:

- Do they have a programme for change beyond the boundaries of the firm - or are they still trying to achieve their strategic objectives through internal change?
- If they are changing, are they aware/ trying to implement across the wide range of tools available to develop supply chain management? If not, are there new practices which they might learn about and adopt?
- If they are aware and have implemented a wide range of SCM practices, are they helping to enable active supply chain learning and continuous improvement?

Given the range of things which the firm could do, how well do they actually measure up? We can make use of a similar scoring system to earlier sections and ask the following questions:

<table>
<thead>
<tr>
<th>Question</th>
<th>How to interpret the response</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What changes have you implemented (or are you planning to make) inside your enterprise to meet your strategic targets</td>
<td>If they don't know or if they have no plans they are in a very weak position. They risk trying to get others to change to solve problems rather than sorting out their own problems first. If they do, go on to question 2.</td>
<td>Explore the issues of intra-firm restructuring - see previous section. Explain that trying to resolve problems - e.g. in too much inventory or poor quality in the value chain simply by passing the problem along does not improve overall effectiveness.</td>
</tr>
<tr>
<td>2. What are the strategic targets towards which you want your suppliers to move - the key performance indicators?</td>
<td>If they don't know, or if the list is very narrow there is a risk that supply chain development simply becomes a shouting and blaming game with no focus or direction for change. If they have strategically focused and measurable targets for supply chain improvement then go on to question 3.</td>
<td>Explore the need for strategic focus in the whole value chain, just as in the individual enterprise. Without a clear focus there is a risk of no action or else of the wrong changes being made because of unclear or mixed signals about strategic direction for change.</td>
</tr>
</tbody>
</table>
Questions, continued…

<table>
<thead>
<tr>
<th>Question</th>
<th>How to interpret the response</th>
<th>Implications</th>
</tr>
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<tbody>
<tr>
<td><strong>3. Have you rationalised your vendor base in line with these targets?</strong></td>
<td>If they are continuing to work with the same set of suppliers there is unlikely to be any motivation for change. There is a need to weed out those unable or unwilling to change and to send a clear message about the standards required and the goal of continuous improvement.</td>
<td>Explain the need to communicate clearly focused and specific targets - and that acting as an enlightened and strong customer is a key role in supply chain management.</td>
</tr>
<tr>
<td><strong>4. Have you communicated the strategic objectives clearly to suppliers - and have you discussed their improvement plans with them?</strong></td>
<td>If the messages are sent out as one-way ultimatums there is unlikely to be much scope for joint problem-solving and for working together to identify and improve on current practice.</td>
<td>Explore the need for communication and joint problem-solving within the supply chain. Learning and continuous improvement depend on close and cooperative working relationships, aiming to improve the total system, not just telling or mandating change in one direction to solve the problems of one particular firm.</td>
</tr>
<tr>
<td><strong>5. Do you have a well-developed framework for supply chain learning?</strong></td>
<td>Get them to complete the following framework chart which identifies the key issues which need to be dealt with in a high performing supply chain which is able to exploit shared learning and continuous improvement.</td>
<td>Explore the issues raised by the framework chart, especially the need to ensure all the core processes are taken care of and the relationships within the chain are effective.</td>
</tr>
<tr>
<td><strong>6. Do you have a we-developed framework for learning from your suppliers and customers?</strong></td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

**A framework for supply chain learning**

We can think of supply chains as essentially networks of firms which come together to achieve the purpose of ensuring world class supply - on time, at the right cost, to the right quality, etc. As the diagram following indicates we can measure the performance of the network through key performance indicators - and we can communicate a clear and shared sense of strategic purpose - the levels of achievement expected on those key indicators.
How can these be achieved? Three issues are important:

- Individual firms need to recognise the need for their own development - see the section on 'intra-firm' changes. Of course experienced and successful players in the network can play an important role in giving a helping hand in this process.
- There needs to be joint problem-solving activity for those issues which fall between different links in the chain. Such problems can often be resolved by all the involved parties working together to explore alternatives.
- There needs to be a structured framework in which players in the network can sort out key operating issues. The list below identifies 8 core processes which need to be handled within a successful network.

Eight core processes in inter-organisational networking:

<table>
<thead>
<tr>
<th>Process</th>
<th>Underlying questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network creation</td>
<td>How the membership of the network is defined and maintained. Who organizes and manages the overall supply chain - or is it left to chance?</td>
</tr>
<tr>
<td>Decision-making</td>
<td>How (where, when, who, etc.) decisions get taken</td>
</tr>
<tr>
<td>Conflict resolution</td>
<td>How (and if) conflicts are resolved</td>
</tr>
<tr>
<td>Information processing</td>
<td>How information flows and is managed</td>
</tr>
<tr>
<td>Knowledge capture</td>
<td>How knowledge is articulated and captured to be available for the whole network</td>
</tr>
<tr>
<td>Motivation/ commitment</td>
<td>How members are motivated to join/ remain in the network – e.g. through active facilitation, shared concerns for development, etc.</td>
</tr>
<tr>
<td>Risk/benefit sharing</td>
<td>How the risks and benefits are shared</td>
</tr>
<tr>
<td>Integration</td>
<td>How relationships are built and maintained between individual representatives in the network</td>
</tr>
</tbody>
</table>
7.3 Cases

7.3.1 Examples of Supply Chain Inefficiency in South Africa

In general, supply chain efficiency in South Africa is weak (see box below). Where individual firms have managed to develop into learning firms and to approach global standards, they find themselves with weak suppliers, and often also with weak customers. (One of the most important lessons from international experience is that if firms are to become world class performers, they require intelligent and efficient customers).

Some Examples of Supply Chain Inefficiencies in South Africa

- In 1997, a leading capital goods exporter was a star performer in the earthmoving equipment industry, with large and growing exports. But it was faced both with competitive pressures and with poor internal manufacturing procedures. In response to these manufacturing problems, they subcontracted out manufacturing. But although the shop-floor appeared to improve, the problems were only superficially resolved, since the suppliers were themselves inefficient. They worked with large inventories (in one case, a key component was stored out in the rain for months, and then delivered on a "just-in-time basis"!), and quality standards inside the suppliers were only achieved at a high cost of rework.

- In the auto industry, most of South Africa’s assemblers are supplied with a key component on a "just-in-time" basis with frequent but small deliveries. The problem is that some of these deliveries are manufactured on a large scale basis (the antithesis of "just-in-time"), and stored in a warehouses for weeks before they are delivered. The assemblers think that by having frequent small deliveries they are reducing inventory costs – in fact, the inventories are merely being stored elsewhere in the chain.

- In the deciduous canned fruit industry, the canners are all aware of world class quality standards and just-in-time inventory control, and have extensive programmes of quality circles and green areas. Yet, the inefficiencies in the supply chain are widespread – sugar is stored by intermediaries (an unnecessary cost), cans are delivered irregularly and with defects, and steel supplies to the canners are of low quality and delivered only in large volumes and irregularly. The fact that the cans cost almost as much as the canning process itself, and that sugar is a primary cost-component in canning undermines most of the progress made by the canners in improvements to their internal manufacturing processes.

- The efficiency of wooden furniture manufacturers is undermined by the quality and nature of the wood which they obtain from the sawmills. The sawmills have been used to selling into a construction and mining market and are not geared to meeting the needs of the furniture industry for a higher and more consistent quality of “clears”. Moreover, the size dimensions to which the timber is cut are based on old imperial measures, so that the furniture manufacturers have to “design around” these inputs, rather than to be able to decide what is best and then to procure the necessary size from their suppliers. But the problems of this sector are not only to be found amongst the supplying sawmills, since the furniture manufacturers themselves are often poor customers. They do not communicate their needs effectively, they are not prepared to pay a premium for quality and appropriately-sized wood, and change their orders with little notice.
There are good reasons for these weaknesses. In previous decades, extensive protection against imports meant that South African manufacturers could continue to operate inefficiently. Not only were they protected against foreign manufacturers, but the protective environment often led to monopolies, which gave little incentive to cooperate with other firms. Finally, the apartheid era was a low-trust environment, and supply chain efficiencies can only work effectively when firms learn to trust each other.

7.2.2 Supply Chain Efficiency in South Africa

It has become increasingly difficult for South African firms to continue to operate with outdated procedures as the economy has become increasingly exposed to global competition. There is increasing evidence that many firms have begun to upgrade their internal operations and in some cases firms have made rapid progress in coming up to global standards. There is also some evidence that lead-firms are beginning to adopt better supply chain management programmes, particularly in the automobile industry (see box below).

**Improving supply chain management in the South African automobile industry**

- Toyota SA offers extensive Toyota Production Systems (TPS) training to its suppliers and actively helps its key suppliers implement improvement programmes so as to enhance the competitiveness of its supply chain.
- Several first-tier-tier component manufacturers are reducing the number of second-tier suppliers they procure from and are actively working to improve the competitiveness of the remaining suppliers.
- By using e-business strategies a number of the vehicle assemblers are improving the interface between themselves and their first-tier suppliers. This has resulted in less inventory holding, increased flexibility and improved efficiencies at both the assemblers and the suppliers.

7.3.3 Case 1: Value chain competitiveness - The challenge facing KwaZulu-Natal Benchmarking Club members

A recent set of benchmarks completed for KwaZulu-Natal Benchmarking Club members has highlighted the need for Supply Chain Management (SCM) programmes as mechanisms for improving their international competitiveness. One of the most striking findings to have emerged from the six comparative international benchmarks that were undertaken is the clear existence of an “apparent just in time (JIT)” production system in the domestic automotive industry. This means that JIT production does not extend down the automotive industry’s value chains – only from the South African assemblers to their first-tier component suppliers - with this leading to a lack of competitiveness in the value chain as a whole.

Findings from the six international benchmarks suggest, for example, that the first-tier international automotive component firms deliver no more frequently to their major customers than their South African counterparts. And yet the delivery frequency of their second-tier suppliers is completely different, with the Benchmarking Club members fairing very poorly in comparison to their international competitors. The differences between delivery to customers
and delivery from suppliers is clearly illustrated in Figures One and Two. Roughly 45% of both the domestic and international benchmarked firms deliver daily or more frequently to their customers, with about another 45% delivering every two to three days. And yet only 16% of the Benchmarking Club members have their major suppliers delivering to them on a daily or more frequently basis, with the international figure still roughly 45%. Whilst none of the international firms have major suppliers delivering to them less frequently than weekly, the figure for the Benchmarking Club members is an extremely high 27%!

**Figure 1.**

**Delivery Frequency to Major Customers**

<table>
<thead>
<tr>
<th>Delivery Frequency</th>
<th>Percent</th>
<th>International Firms</th>
<th>Local Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily + / Daily</td>
<td>46.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every 2-3 Days / Weekly</td>
<td>46.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worse Than Weekly</td>
<td>45.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.67</td>
<td>10.00</td>
</tr>
</tbody>
</table>

**Figure 2.**

**Delivery Frequency of Major Suppliers: 1997**

<table>
<thead>
<tr>
<th>Delivery Frequency</th>
<th>Percent</th>
<th>International Firms</th>
<th>Local Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily + / Daily</td>
<td>46.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every 2-3 Days / Weekly</td>
<td>53.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worse Than Weekly</td>
<td>56.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.67</td>
<td>26.67</td>
</tr>
</tbody>
</table>
The problem associated with the significant difference between the two figures is further illustrated when one compares the inventory figures of the two groups of firms. As is obvious from Figure Three the KwaZulu-Natal Benchmarking Club members are holding on to significantly more inventory in comparison to their international counterparts.

**Figure 3.**

*Average inventory holding: International vs. local firms (1997)*

<table>
<thead>
<tr>
<th></th>
<th>International Firms</th>
<th>Local Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of days</strong></td>
<td>29.40</td>
<td>69.20</td>
</tr>
</tbody>
</table>

**Customer Demands**

There are of course numerous reasons for the relatively poor performance of the Club members in this regard. Firstly, at the demand side of the value chain, South African assemblers are notorious for their unreliable call-offs, resulting in a safety-first buffer-stock holding policy at domestic automotive component firms. This does not appear to apply as severely at the international firms with many of them claiming that their customer orders are reliable, thus giving them time to co-ordinate their own value chain activities.

**SCM Programmes**

Notwithstanding this fact it is still critical to note that the majority of the international firms closely monitor their suppliers and have SCM programmes to build their competitiveness. This does not appear to be the case in the South African automotive components industry, with most of the benchmarked Club members paying little attention to this critical facet of their operations.

Relationships with suppliers are generally still kept arms length, although significantly there has been some change at two of the South African benchmarked firms, with supply chain rationalisation programmes having been instituted, and more rigorous monitoring of their performance established.
Supply Chain Difficulties
This bodes well for the future, although major hindrances to the development of successful SCM programmes still clearly exist, for two important reasons:

Many of the smaller second-tier suppliers that supply into the automotive industry are cash strapped. They do not have the resources to rapidly up-scale their production in line with their new “preferred supplier” status; and even when they do have the resources to do so they tend to be suspicious of the sustainability of their new status, particularly given previously antagonistic supply chain relations.

Large suppliers such as ISCOR, ALUSA, AECI, etc. are very unresponsive to the overtures that are made to them as part of SCM initiatives. A large percentage of these firms’ production is exported and they are thus often disinterested in the problems of domestic automotive component firms. They therefore continue to offer poor levels of service, are inflexible, and often deliver products of dubious quality. Changing the mind-sets of these “dinosaurs” is beyond the ability of any individual automotive component firm and this therefore operates as a significant constraint to the competitiveness of the industry.

Foreign Sourcing
Replacing these suppliers with foreign supply is possible but this can often compound rather than resolve value chain problems, particularly given the geographical distance of South Africa from most major automotive producing regions, the small volumes that are usually purchased and the complexities involved in co-ordinating extended value chains.

Management Attitudes
Whilst external economic factors are clearly then an important contributor to the comparatively poor performance of the benchmarked firms, importantly, so are internal management reasons. When a purchasing manager at one of the benchmarked firms was recently asked why they only ordered products every two weeks from one of their large volume suppliers in the Gauteng, an interesting response was received. He noted that this was necessary in order to take into account contingency factors such as wildcat strikes, the supplier’s vehicle breaking down, being hijacked, etc!

The fact that the Gauteng is only eight hours from Durban was not mentioned at all. Forty-two truckloads of product could be sent to the firm over a two-week period and it is impossible that all of these trucks could be waylaid in some unfortunate manner, thus highlighting the unnecessary stock holding of the firm. Unless this particular firm drives its own JIT production requirements down the value chain in which it finds itself it will struggle to improve its competitiveness.

The same can, of course, be said for all the other firms that are caught in inflexible and uncompetitive value chains. Unless management at the benchmarked Club members take up the challenge of driving JIT demands down their value chains (notwithstanding the difficulties of doing so) resolving competitiveness problems further up their value chain will prove more difficult and unfortunately far more costly.

At the opposite end of the spectrum dynamic SCM programmes at firms could go a long way towards bolstering their own firm-level competitiveness, with this leading to the improved competitiveness of the value chain in which they find themselves.
7.2.4 Case 2: Value chain restructuring in the saligna wood furniture industry

South Africa has very large deposits of eucalyptus (saligna) wood. Since these were planted and maintained rather than inherited as a gift of nature, they fit the world’s requirements for environmentally sustainable hardwoods. There is thus the possibility of using this saligna timber to fill a profitable niche in the global furniture industry for sustainably-produced hardwood substitutes. The problem confronting the South African saligna furniture industry in the late 1990s was the shortage of available timber. For this reason, a value chain grouping was assembled by the Industrial Research Project at the University of Natal.

Over a period of 24 months, this group – representing government departments, manufacturers, timber traders, industry specialists (both academic and consultants) and timber growers and mills – met at frequent intervals to address the timber-supply problems. During this period, a number of important objectives were met through the formation of a series of problem-oriented teams spanning participants from various links in the chain. They dealt with five related challenges:

1. **Product Matrix Group.** This group was concerned with establishing what exactly were the timber requirements of various user groups? Understanding requirements and meeting them more precisely could conceivably improve recovery rates. This group originated from manufacturers complaining about the unreliability of the timber measurement being provided. They claimed they were being sent the wrong sizes and wanted timber in metric sizes. This prompted the mills to respond by saying that they had never been informed of this, and hence they had carried on cutting to old imperial measurements for decades. The ramifications of this down the chain were enormous. Not only did the raw material supplied create lower wood recovery rates, it also affected production, and had a knock-on effect on design and marketing. For manufacturers were trying to design to fit in with the timber supplied rather than producing the most optimal designs for marketing and manufacturing – the tail was wagging the dog. Hence this working group, led by the sawmills, worked on a variety of issues and spawned a number of overlapping technical working groups, initially through improving knowledge flows through a questionnaire sent to all timber product customers to try and establish *optimal sizes* and to get consensus on a range of *dimensions* that manufacturers felt most comfortable with. The mills then experimented with *new grading systems* to see if this could increase the total availability of clear wood. The mills providing selected manufacturers with *uneven lot sizes* using 2nd mill runs and *random widths* letting the manufacturers design and cut their own wood sizes to see if this could maximise recovery rates. Most recently they have begun to collect more accurate data on total demand and availability in order to determine overall existing and potential *supply and usage* of saligna in South Africa.

2. **Young trees working group.** A major problem confronting the sawmills was the length of time a tree stayed in the ground before it was cut. Mature saligna trees tended to be felled only after 20-25 years. Here the interests of millers and manufacturers seems to diametrically opposed. The shorter the length of time before felling, the faster the return on capital for the growers and mills. The older the felled tree, the better the quality and density of wood for the furniture manufacturers’ products. Hence the question posed by the mills to the manufacturers: what are the real limits to using younger trees between 8 to 16 years old? This would not only address the current timber shortages, and potentially make it more profitable to focus on saligna for timber products. The mills provided selected manufacturers in this technical working group with young, much rougher, timber
of around 8-10 years old. The manufacturers in turn experimented with its utilisation for different products and partial usage with a product. Success was however relative. The manufacturers using saligna wood for high value added interior furniture found little problem in being able to integrate young timber into their product. However the success was extremely limited for those manufacturers who used saligna to produce lower value added garden furniture. They required much older, stronger timber to withstand the climatic effects of the European outdoors.

3. Density and grading. These two working groups posed another issue of the possible utilisation of less dense timber. Younger trees are less dense, and portions of older trees are also of lower density. What densities are suitable for which applications use by furniture manufacturers? This gave rise to the manufacturers again experimenting with creating possible prototypes with different densities of wood and the mills experimenting with different grading systems to differentiate more closely the relative densities of the wood provided. Once again the prototype experiments followed a similar pattern to that of the young timber. Successfully introducing lower density timbers would require a much better grading system, as less dense timber is only suitable for specific applications, and could prove disastrous for the quality reputation of the timber if used for the wrong applications. Better grading would also help to improve the recovery of “clears”, which the Product Matrix Questionnaire showed were most in demand.

4. Privatisation and the supply of timber. The intended imminent privatisation of the state owned SAFCOL forests with large expanses of saligna plantations had major ramifications for nearly all parties within the group. SAFCOL and DWAF (the state-owned company and the government department responsible) were intending to only sell the plantations off as one huge lot to a single buyer. The manufacturers saw this as potentially bringing on stream-untapped supplies of mature saligna and hence an easy solution to their supply problems. However they were threatened by the possibility of the new buyer adopting an undifferentiated approach to the plantations and adopting an easy route of sending all the felled logs to their chipping and pulping mills. The small independent growers and sawmills wanted the opportunity to bid for it and viewed the tender as discriminatory. The one large corporate sawmiller focussing on board timber that did not own much plantation land was concerned at not being able to gain access to this newly available timber resource. The timber plantation and sawmilling company most likely to win the bid, whose timber product division representatives was involved in the saligna value chain group, had its own internal contradictions. For in the absence of the group being able to provide cogent alternative reasons, they were concerned that their parent company dominated by the pulp and paper divisions would adopt the easiest route of consigning most of this pristine timber for chipping, export and pulping. This was the only technical working group led by the external intermediaries who attempted to coordinate the value chain group response and use their own economic expertise, political contacts and influence with the government department most directly involved in the privatisation process.

5. Exporting profile. Apart from tackling the link between the mills and the manufacturers at the production end of the value chain, the other major set of issues that the value chain group addressed was the profile of furniture exports. Essentially this centred on upgrading through moving up the value chain by improving design, branding and marketing. However despite setting up technical working groups along similar lines as those concerned with supply issues, little progress has thus far been made. A design and branding working group composed of manufacturers and the government based export
council representative produced very little concrete results. The other initiative was a marketing exercise undertaken by a technical working group producing a ‘joint front’ at the 2000 Cologne Fair. Basically all the manufacturers in the group pooled their resources and with DTI assistance presented one large joint manufacturer/government platform at the Fair. This had mixed results. Garden furniture dominated and it was undifferentiated in design and product. Manufacturers were basically copying each other rather than cooperating to produce a distinctive and differentiated design brand.

7.2.5 Case 3: Clustering as an Example of Inter-Firm Cooperation: The Case of Gloserv

Gloserv (Pty) Ltd started operating nearly two years ago. Initially they planned to simply market for furniture firms. However, over time they have come to represent the only example of an exporting cluster in the South African timber products sector. The cluster, currently comprising four timber product manufacturing partners and a manufacturer of metal frames, sells Saligna garden furniture to the overseas and domestic market.

Initially Gloserv operated as a marketing agent, working on a commission basis. This soon evolved into a much closer working relationship with a small (although steadily growing) number of South African manufacturers. Initially manufacturers cooperated with Gloserv around design issues, but were fully responsible for manufacturing, shipping and debtors, with Gloserv handling marketing. However, it soon became clear that there was a need for a central finishing plant to ensure uniformity and quality of finish, as well as to handle packaging and offer central warehousing facilities. With the establishment of the finishing plant Gloserv began to take on new responsibilities which established it as a cluster driver rather than simply a marketing agent. A design studio was established at the finishing plant, with manufacturers focusing solely on production. Over time Gloserv has taken over the cluster’s debtors, moving to a system of purchasing stock from cluster manufacturers for resale. At the same time they have realised the benefits of central buying, and begun to purchase fittings on behalf of the cluster. Increased buying power allowed them to look to more competitive overseas suppliers, with the savings utilised to upgrade the product by moving to brass fittings. Most recently Gloserv has begun to purchase timber on behalf of the cluster as a way of overcoming supply problems and counteracting price increases. Gloserv has also established a relationship with the Industrial Development Corporation that will allow cluster partners to access funding for capital investment. Gloserv handles all marketing and sales through its local operation and its subsidiary Gloserv USA, which operates a warehouse and distribution centre in the USA.

Three of the cluster’s manufacturers share production of its main lines, while each manufacturer also specialises in a number of the smaller lines. Three of the timber products partners are small enterprises, with less than fifty employees. These three manufacturers derive between 50-100% of their turnover from Gloserv, which is a level of concentration perhaps higher than the ideal. The fourth partner contributes only excess capacity to the cluster, deriving an estimated 10-20% of turnover from Gloserv.

Gloserv offers an example of the way in which cooperation between competing manufacturers can lead to improved access to inputs, finance and the export market, particularly for small firms. Clustering co-ordinated by a marketing agent is simply one of the ways in which cooperation can be co-ordinated. Joint ventures or the establishment of exporting consortia are other examples of the way cooperation may be organised.
7.3 Case 4: Developing supply chain learning (SCL) in a semiconductor equipment value chain

An outline of the chain

This is a value chain culminating in the production of equipment for the semiconductor industry. The final customers include international firms such as Intel and National Semiconductor. The British firm "governing" production in this sector – “Semi-equip” - has a commanding global share in its particular segment, with annual sales of approximately £350 million, and a market share in excess of 50 per cent. The market is highly cyclical but there is strong underlying growth. Sales have quadrupled in the last 10 years but production can vary by 20 to 30 per cent per month.

SCL in this value chain can be observed through three-tiers of the supply chain, and one-tier of the customer chain. The chain includes medium-sized firms (Semi-equip has an annual turnover of £350 million and employs 2,900), and a range of smaller sized firms (ranging from a turnover £4m and 81 employees to £500,000 and 9 employees).

The extent of improvements in the chain

The dynamism of Semi-equip is to a considerable extent matched by the dynamism of its supply chain, which is not surprising since many of the suppliers are heavily reliant on Semi-equip’s business. Some key performance indicators in the chain are:

Semi-equip
Sales: quadrupled over past 10 years
Global market share: 60%
Incoming deliveries in kanbans: 30% (1996) - 80% (1999)

Metal forming supplier (first-tier)
On time delivery: 87% (1997) - 100% (1998)
Scrap (internal and external): 1.5% (1995) - 0.15% (1999)
Set up time as % production time: > 15% (1995)- 10% (1999)

Sub-component Assembler (first-tier)
On time delivery: 95% (versus average to Semi-equip of 93%)

Abrasives supplier (second-tier)
Sales: grown 29% since 1995
Lead time: weekly (1996) - next day delivery (1999)
However, as we shall see, these gains were achieved with only a minimal input from Semi-equip to improve the competitiveness of its supply chain. Two points can be learnt from this:

- With a more intensive supply chain management programme, the improvements would have been even more significant.
- It is important to understand why Semi-equip’s supply chain programme was limited and how it was perceived from the vantage-point of its suppliers. From this it is possible to identify both the blockers and enablers to supply chain improvement. Although these lessons reflect the UK operating environment, they will nevertheless also be relevant to a greater or lesser extent in the South African environment.

The drivers to change

The origins to SCL go back to the mid-1980s. The primary driver was a radical change in technology by Semi-equip in an attempt to reduce the cost of its product. This was successful, and product prices are now lower than they were in 1989. This innovation was followed by the need to respond to the demands by customers for significant demand variations, and to deliver reliably on time.

Since 80% of product cost is bought in, Semi-equip has been required to improve the performance of its suppliers. Early in the 1990s, therefore, Semi-equip began to get to grips with its supply chain.

Semi-equip’s Supply Chain Programme

Setting up the programme

The first priority was to reduce the number of suppliers. The objective in reducing the number of suppliers was to develop longer-term relationships, with more of a partnership and co-dependency. During the course of the decade, significant progress was made in meeting this objective, and in the key assembly plant the number of suppliers fell from 500 in 1995 to 100 in 1999.

Thereafter, Semi-equip concentrated on meeting two major objectives:

- to get its suppliers to deliver to the line in kanbans and with absolute reliability. Here the pilot scheme began with local firms and with suppliers with whom there was a high transaction cost.
- to respond to problems arising when suppliers are unable to meet this objective.
Although these steps were designed to achieve supply chain efficiency, they do not constitute a structured plan, involving an overview and analysis of its supply base. Nor do they reflect a proactive approach towards supply chain efficiency and SCL. Thus, as long as suppliers deliver reliably in kanbans and offer cost-down, Semi-equip is not concerned with their internal operations. Consequently they have no team of supply chain engineers dedicated to supply chain learning. One of the major reasons why Semi-equip has not gone for cascading SCL, is that demand varies so widely that they would not like to take responsibility for the suppliers business – “what we are not going to do is tell our suppliers how to do their business”.

**Running the programme**

The Supply Chain Manager has a team of 22 people, distributed around three sites and meeting on a weekly basis. When they have problems with a supplier they set up a supplier development team, comprising of equal numbers from Semi-equip and the supplier. The team sets joint targets and has regular reviews. Typically, they will meet once a month until the problem is resolved (generally within six to twelve months). However, in some cases the problem might be more critical and difficult to solve. For example, a major component input is castings, which are highly susceptible to quality problems. Semi-equip gets its castings from a number of firms in Birmingham, none of whom has a culture of lean manufacturing. So, the supply chain manager has visited one of these suppliers 30 to 40 times, and Semi-equip has established four supplier development teams; they also have a full-time tester on site in this supplier’s plant. They introduced kanbans about four years ago, but only in some products, and in the interim have widened these to all the products from the suppliers. However this process has gone slowly, partly because Semi-equip is working with a family-owned firm (with a turnover of about £10m). In the first quarter of 1999, 95% of deliveries were in kanbans with between 95 – 100% on-time delivery and less than one per cent quality problems. This compares with a situation four years ago when there were no deliveries in kanbans only six percent was on time and quality problems were found in 4-5% of products.

Over the last four years the supply chain manager has devoted three months to this supplier and taking into account the inputs of other team members, approximately 12 person months of effort have gone into this particular supplier development.

But not all efforts to improve suppliers have been as effective. A French supplier produces electric motors to Semi-equip’s design. Because of the specificity of this design it is difficult to break with the supplier and they have to work on this relationship. However the supplier has no conception of lean manufacturing or rapid response and so Semi-equip is forcing it to hold finished goods stocks. But it is assisting the French firm with a stocking model to show it that it has a problem with its procedures.

**The view from below**

The view of the supply chain programme from the suppliers to Semi-equip is somewhat less positive. One of its first-tier suppliers observed that the best of Semi-equip’s plants only provides information with 80-90% accuracy, and the worst plant with 30-40% accuracy. Another first-tier supplier was equally hampered, describing Semi-equip’s system as "nebulous and not factual... It's not accurate... It's very frustrating, to avoid blackmarking... In fact our worst supplier is Semi-equip [some of their sub components come from Semi-equip]... [Semi-equip] pay lip service, and do lots of talking, but... It's a shame to see what's happening".
Nevertheless, despite the fact that Semi-equip’s internal operations do not function effectively and limit the capacity of its first-tier suppliers to produce optimally, there has in fact been a process of SCL even when seen from below. The following key lessons have been learnt:

- "We have learnt a whole new concept of purchasing". Together with its first-tier suppliers, and in an attempt to share the costs of fluctuating final demand, Semi-equip has introduced a purchasing system whereby the costs of inventories are shared between it and its suppliers. However, the suppliers are expected to still maintain finished good inventories, so the primary advantage gained from this innovation is to ensure reliability of supply rather than to reduce overall inventories.

- By observing the systems introduced in Semi-equip, one of the first-tier suppliers has made use of kanbans in its internal operations and reduced its lead times. Semi-equip “didn’t send anyone down, but they were at the end of the phone”.

- There is some evidence of the development of learning capabilities in one of the suppliers. When problems arise - for example in the case of quality - a team is formed consisting of three of its own staff together with its customers staff, meeting regularly at monthly intervals for about two hours on alternate sites.

- The production manager at one of the suppliers visits Semi-equip two to three times a week. Although most of this is to compensate for a Semi-equip’s poor forecasts, this provides the opportunity to see cell-leaders and to learn about innovations on the shop floor.

Nevertheless, despite these improvements amongst the first-tier suppliers, the process of SCL is not well developed. As one of the suppliers put it, “essentially this involves better communication between our two plants rather than any systematic attempt by Semi-equip to [directly] assist our operations”. This shows most clearly in relation to stock holdings in the supply chain. Although Semi-equip has given most attention to the logistics in its supply chain, it has made no attempt to ensure lean production capabilities amongst its suppliers. Consequently, the primary innovation it has driven through its supply chain has been to share the financial burden of inventories, rather than to reduce them.

None of Semi-equip’s suppliers felt that it had learnt anything from them. This is a weakness, not least because the suppliers are aware of the weaknesses in its internal operations and the distance between its stated and actual logistics handling – “we were not given the opportunity to help them”.

**Cascading learning to the second and third-tiers**

Some of the changes introduced by Semi-equip are beginning to cascade down the supply chain. One of its first-tier suppliers has begun to introduce a buffer-stock system with 20 (out of 308) of its own suppliers to share the costs of inventories. (It is significant, though, that this does not involve a reduction in overall inventories, but merely a sharing of the costs). In one
case it also led it to work intensively with one of the suppliers, helping them design and install a direct feed line, and involving weekly visits. It has also passed on the stockhandling lessons it learnt from Semi-equip to another customer. However, "our principle is adopt our philosophy if you wish - that's as far as we can go. We have no direct input on how our suppliers [or our customers] handle their suppliers”

Another first-tier supplier has also begun to provide assistance to its own suppliers, particularly by providing them with kanbans “Because we provide corrective action reports to our customers, we have begun to do the same thing for some of our suppliers”. In one case, a very small second-tier supplier employing nine people was assisted to introduce a three tray filing system to organise orders from different customers. This system was loosely based on the first-tier supplier’s ISO system. The same first-tier supplier provides advice on kanbans and approves quality procedures in many of its own suppliers by undertaking site visits. Smaller companies are provided with a certificate of quality requirements and these are monitored on a regular basis. "because we provide corrective action reports to our customers, we have begun to do the same thing for some of our suppliers... We try to persuade our suppliers to undertake small changes to make things Murphy proof”. -tier. However, none of these initiatives are modelled on any of the systems introduced by Semi-equip.

At the same time, changes in the second-tier of the supply chain have begun to filter upwards from the third-tier to other customers in the same and related chains. From this it is clear that there are multiple points of learning in this supply chain with overlaps to related chains, rather then a single point of learning from the "governing firm" to the rest of the chain. Similarly, lessons learned from one customer are readily transferred in transactions with other customers. For example the metal working first-tier supplier is also a customer of Atlas Copco in Belgium and IBM in the UK. Early in the 1990s, senior management attended a series of workshops run by IBM, and the lessons learnt at this time subsequently proved to be important during the restructuring in 1995 and 1996. Similarly, visits were made to the Atlas plant in Belgium, and the lessons learnt were implemented to improve production for Semi-equip and other customers.

Time, blockers and enablers

Market failure is evident in this sector. Semi-equip began its process of change in the mid 1980s, and changes emanating from the third-tier were introduced in the early 1990s. Yet, despite these multiple points of change, SCL is only in its embryonic phrase in this chain.

The major blockers to change are:

- The slow and inconsistent pace of change within Semi-equip and some of its first-tier suppliers.

- The reluctance to become too dependent on suppliers. For example, Semi-equip is reluctant to introduce open-book costing, since at times when material costs are falling, they are unable to realise the short-term gains. Similarly, and particularly when final demand is as volatile as it is in this sector, many suppliers are reluctant to become too dependent upon a single final customer.
A lack of systematic overview to the problems of supply chain learning. Most purchasing managers fail to take a strategic overview to their supply chains, and to focus on SCL. Instead, their expertise lies in bargaining over price, and in ensuring compliance on delivery reliability.

Consequently, in most cases each firm in the chain merely mandates improvements from its suppliers. When problems arise they will react and try and solve these on a reactive, fire-fighting basis. There is an absence of a culture of proactivity, both in relation to the broader problem of supply chain development, and the more specific challenges which arise in promoting SCL.

As far as enablers are concerned, it appears that:

- Visits to the shop floor of customers and suppliers by production staff are critical to the learning process. Those occasions where the learning initiative was confined to senior management tend to have been characterised by low levels of learning.

- Joint teams, involving a combination of management and production staff from both plants, appears to be a successful way of facilitating learning. It provides the capacity to complete the cycle, combining experience, experimentation, reflection and conceptual development.

- E-business does not appear to be a significant feature in this sector. There is extensive communication by fax - "faxbans" - and through the use of e-mail, but no plans for the introduction of electronic data interchange proper. Moreover, even where faxbans and e-mail are used, the quality of much of information which has been transferred is poor. This means that despite the best of intentions to integrate logistics between different links in the chain, the ultimate result is that production is only effectively co-ordinated when supplier staff visit the line at Semi-equip and determine what is required on the shop floor, rather than relying on the information which has passed through what is supposedly a structured approach to supply chain efficiency.

- In general large firms are more difficult to influence than small firms, since they have lower degrees of dependence.

- Proximate suppliers are much easier to work with. Semi-equip is extremely reluctant to acquire equipment from any supplier without extensive operations in the UK, and is similarly reluctant to source from the Far East since fluctuating demand requires close coordination of logistics along the chain.
APPENDIX: THE WCM AUDIT

This is designed to be a simple assessment framework to help look at businesses and estimate how far they have travelled on their journey towards world class manufacturing (WCM). It builds on the questions raised in each of the sections of the Workbook and provides an overall summary profile which can be used to start a discussion.

The tool is based on a simple 5-point scale to score WCM capability, ranging from 'absolute beginner' to 'highly developed'. In visiting a factory and/or carrying out a discussion with its managers you should be able to get a sense of where you would place it on the scale and provide a score for each section of the WCM model framework. Don't worry if you find it hard at first - use the more detailed questions in each section of the Workbook to help you.

When you have finished, plot each of the scores on the blank 'spider' chart at the end. This will give you a simple visual profile which highlights areas of strengths and weakness and can form the basis of discussion and for formulating plans about improvement and development.

Section 1: Understanding the market drivers

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<td>The firm has no idea of how it competes, or even of what the market expects from it</td>
<td>The firm has limited understanding of how it competes - usually based on simple notions of price</td>
<td>The firm understands the range of factors - price and non-price which affect how it competes but not really their relative importance</td>
<td>The firm understands the range of factors involved and their relative importance but tends to assume that the same factors apply across the business rather than segmenting these out into focused businesses</td>
<td>The firm is well-aware of its competitive drivers and can construct a competitiveness profile. It actively seeks the information it needs to underpin these measures and to build a clear picture of its competitiveness</td>
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Overall score =
### Section 2: Awareness of core competence

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<td><strong>The firm has no idea of how it competes, or what - if any - distinctive competitive edge it can offer</strong></td>
<td><strong>The firm has limited understanding of how it competes - usually based on simple notions of price</strong></td>
<td><strong>The firm understands the range of factors - price and non-price which affect how it competes and its distinctive competitive advantage - core competence. However it is not actively seeking to maintain, protect or develop this.</strong></td>
<td><strong>The firm understands its core competencies and is seeking to maintain and protect these and to create new sources of advantage</strong></td>
<td><strong>The firm is well aware of its competitive drivers and can construct a competence profile. It is actively scanning for new ways to develop its competencies and to develop and deploy these in new products and processes.</strong></td>
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**Overall score =**

### Section 3: The strategic framework

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<td><strong>The firm has no clear idea of its strategy</strong></td>
<td><strong>The firm has a simple strategy but does not have specific targets for particular segments of its business</strong></td>
<td><strong>The firm is aware of its core competencies and its strategy is based not only on what the market wants but also how this relates to their core abilities to meet and lead the market</strong></td>
<td><strong>The firm has a well-developed business strategy but does not deploy this into separate frameworks to guide improvements in manufacturing process or products.</strong></td>
<td><strong>The firm has a developed strategic framework to guide change, and has deployed its business strategy to specific frameworks for product and process (manufacturing) improvement. It actively monitors and measures a number of key variables to arrive at targets and priorities for improvement</strong></td>
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Section 4: Intra firm change

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<td>1</td>
<td>The firm has no idea of what it should change or how it should change in order to become more competitive</td>
<td>The firm has a limited agenda for change but this essentially involves adopting new equipment and following general trends in the industry</td>
<td>The firm uses key performance indicators to monitor and measure where they need to change, and explores solutions from a wide range of options including both new equipment and also organisational change</td>
<td>The firm has a clear strategic framework, driven by regular measurement, for identifying and implementing changes in its factory. It also searches widely for 'best practice' and is an early adopter of new ideas and technology.</td>
<td>The firm uses a clear manufacturing strategy to drive its programme of factory improvements and monitors and measures against key performance indicators to ensure this continues to meet strategy objectives. It searches widely for 'best practice' and is generally held up as the leading firm in the sector from whom others learn and against whom they benchmark.</td>
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Overall score =
Section 5: Inter-firm change

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<td>1</td>
<td>The firm has not implemented internal change and may not be aware of the need to do so</td>
<td>The firm has improved its own operations and has a framework for continuing development of its own operations. It is now seeking to work with the supply chain to improve inter-firm activities but at present these lack a clear focus or set of target measures</td>
<td>The firm has a clear set of strategic targets for development of the supply chain and has communicated these clearly to its vendors. Some attempt has been made to 'weed out' suppliers unwilling to participate in improvement activities</td>
<td>The firm has a clear strategic framework for change and all firms in the chain understand the key performance measures. However improvement activities are largely the responsibility of individual firms to identify and implement.</td>
<td>There is a clear framework both for the strategic targets and the mechanisms for achieving them across the value chain as a whole. Joint problem diagnosis and solving is the norm and there is evidence of learning and improvement amongst all players in the chain.</td>
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**Overall score =**
Now plot each of the scores on the following framework - this will give you a simple profile for discussion of relative strengths and weaknesses in moving towards WCM.