

**An engineering management framework for the SA clothing industry
with a focus on Kwa-Zulu Natal**

Thesis submitted in fulfillment of the requirements

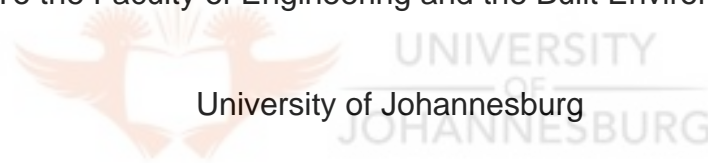
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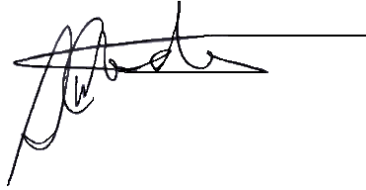
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DECLARATION

I declare that all the information in this research is the result of my concerted efforts and my original work, not published before.

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke at the end, positioned above a horizontal line.

Signature: _____

Date: July 2007



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ABSTRACT:

The SA clothing industry shed over 67 000 jobs in the past three years (Bell, 2006). There was a possibility that more jobs may be shed in the South African clothing industry over the next few years (Bell, 2006). The SA Clothing and Textile Workers Union (SACTWU) reached a wage agreement with nine clothing employer associations for a 5% increase in urban areas and between 6.4% and 8.3% for non-metro areas in 2006 (Reeder, 2006). The cut, make and trim (CMT) industries who were registered with the bargaining council found it a financial burden to negotiate wage increases yearly as production costs were escalating and organisations found it difficult to compete both nationally and internationally. If laying off of workers in the clothing industry continues, the unemployment rate would continue to rise, thus increasing the poverty levels in South Africa. The SA clothing industry in particular was being challenged by forces both externally and internally. Global competition, market performance and the changing technology were some of the factors that affected the industry. This study aims to highlight the importance of existing practices that, if implemented systematically, could improve the current plight of clothing manufacturers (Urbach, 2006).

The methodology of the research comprises a qualitative exploratory and descriptive design. The purpose of exploration was to gain insight into current manufacturing practices by systematic observation and discussions at clothing manufacturers in Kwa-Zulu Natal. Personal and telephonic interviews, discussions and direct observation were used to gain insight into the issues and strategies employed. Relevant literature in conjunction with national and international manufacturing trends was used to create a framework of best practices. Parts of the framework were tested at clothing manufacturers in the Durban region. A sample of clothing manufacturers were targeted by categorizing them into three groups, namely small, medium and large manufacturers. Case study type comparisons were made at various locations to analyse the strategies employed.

The objective of the framework aims to enhance current practices through the employment of best practices found in industrial engineering, operations management and quality management. This would assist manufacturers in improving their productivity levels, meeting lead times, reducing costs of manufacture and providing the customer with a quality product at a market related price. By implementing a systematic approach to continuous improvement, manufacturers would be able to distinguish themselves from competitors.



LIST OF ACRONYMS

| | |
|----------|--|
| BC | Bargaining Council |
| BCEA | Basic Conditions of Employment Act (75 of 1997) |
| CASE | Community Agency for Social Enquiry |
| CCA | Cape Clothing Association |
| CCMA | Commission for Conciliation, Mediation and Arbitration |
| CF | Compensation Fund |
| CMT | Cut, make and trim |
| COFESA | Confederation of South African Employers |
| COSATU | Congress of South African Trade Unions |
| CSIR | Council for Scientific and Industrial Research |
| DTI | Department of Trade and Industry |
| ECC | Employment Conditions Commission |
| FEDUSA | Federation of Unions of South Africa |
| GATT | General Agreement on Tariffs and Trade |
| GAWU | Garment and Allied Workers' Union |
| IDC | Industrial Development Corporation |
| ILO | International Labour Organization |
| LRA | Labour Relations Act (66 of 1995) |
| MFN | Most Favoured Nation |
| NACTU | National Council of Trade Unions |
| NACTWUSA | National Clothing and Textile Workers' Union of South Africa |
| NEDLAC | National Economic Development and Labour Council |
| NCMA | Natal Clothing Manufacturers Association |
| NPI | National Productivity Institute |
| SABS | South African Bureau of Standards |
| SACTWU | Southern African Clothing and Textile Workers' Union |
| SADC | Southern African Development Community |
| SALRI | Southern African Labour Research Institute |
| SARS | South African Revenue Services |

| | |
|---------|--|
| SETA | Sectoral Education Training Authority |
| SMME | Small, medium and micro enterprise |
| StatsSA | Statistics South Africa |
| UIF | Unemployment Insurance Fund |
| WD-471 | Wage Determination for the Clothing and Garment Knitting Sector |
| WTO | World Trade Organization |



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CHAPTER 1 – CURRENT STATUS OF THE CLOTHING INDUSTRY

1.1 INTRODUCTION

The SA clothing industry shed over 67 000 jobs in the past three years (Bell, 2006). There is a possibility that more jobs may be shed in Durban (Kwa-Zulu Natal). The Alexander Report mentions that between July 2006 and May 2007 there was a drop of 5275 in employment figures (Palmi, 2007). The cut, make and trim (CMT) industries find it difficult to negotiate wage increases as production costs escalate beyond proportion. If the lay off of workers continues in the clothing industry, it would increase the unemployment rate, thus impacting on the economy. Statistics South Africa estimates that the South African population stands at approximately 47.4-million and the unemployment rate stands at 25% of the total population (www.southafrica.info).

The growth, employment, and redistribution (Gear) document predicted that, the researcher quotes: “As South Africa proceeds with trade liberalisation and adapts to international competition, downward pressure will be placed on unskilled wages. If this is not accommodated by the labour market, then unemployment will rise and irregular, insecure forms of employment will increase” (Gear, 1996).

Thus, as one observes the trends in the clothing and textile industry, there is evidence that the above prediction is becoming a reality. Chinese goods are flooding the South African market, not only clothing and textiles, but also electrical and electronic goods, motor vehicles and many other products. Chinese imports are having a major impact on employment all around the world, and South Africa is no exception (Echikson, 2006). Approximately 30-million jobs worldwide are at risk and the world unemployment rate (January 2006) stands at 6.3%, approximately 191.8 million (www.ilo.org).

The implementation of “Proudly South African” labels were created with a view of persuading shoppers to purchase South African production. New

regulations enforced all textiles to carry labels stating the country of origin. The labels also required manufacturers to state whether imported or local fabric was used. These regulations enabled consumers to make informed decisions about the product purchased and offenders faced fines of up to R5000. It would be illegal to say "made in South Africa" if fabric was imported (Krige, 2007).

Manufacturers that find it impossible to compete on garment price move their production facilities to non-metropolitan areas in South Africa while others move out of SA. The justification for relocation primarily centred on labour costs. Clothing manufacturers relocated to areas such as Qwa-Qwa, Isithebe, Lesotho and Swaziland to name but a few locations. The enforcement of labour rates by the bargaining council cause manufacturers to either relocate, operate as an unregistered organisation or shut down their plants as they fail to comply with bargaining council requirements (Krige, 2007).

The South African clothing and textile union (SACTWU) argue that the rate of pay of South African machinists is low. The trade unionists are concerned that with the diminishing workforce in the clothing industry, their bargaining powers are being eroded. Unions are retaliating as their membership numbers are declining. With the wage structure impacting on the organisations' success, manufacturers negotiate plant-level agreements to remain outside the scope of the bargaining council (Makgalemele, 2006).

Johann Baard, a divisional director of Seardel Investment Corporation, SA's largest clothing and textile company, said that the clothing, textile, leather and footwear (CTFL) industries had lost "many thousands" of jobs over the past few months and their workforces were "virtually halved" since 1995. Rex Trueform, a 67-year-old manufacturer of men's suits with a workforce of 1000, warned that its Cape Town factory faced closure after several years of losses caused by changing fashion trends and cheap imports. Baard mentioned that the landed value of a men's shirt made in China is sometimes less than the cost of the cotton fibre required to produce it locally (Paton and Bisseker, 2005).

The SA clothing and textile industry is challenged by various factors. This study would assist to implement process improvement strategies that would improve the current plight of manufacturers and help prevent job losses through innovative thinking.

China is strategizing in capturing a bigger share of world markets. The Chinese clothing and textile industry has approximately 15 million workers and 300,000 factories. The lifting of the trade quotas on January 1, 2005 by the world trade organisation promoted the influx of imported goods into South Africa. This means low cost garments for the global consumer but on the other hand pain and suffering as millions of jobs are lost worldwide (Paton and Bisseker, 2005).

China's foreign trade volume passed the \$1 trillion mark, making it the world's third largest trading power as reported by the official Xinhua news agency. The World Trade Organisation (WTO) estimates through a forecasting model that China's share of the world market could rise up to 50 percent by 2010. It was projected by a Hong Kong-based executive that 70% of clothing and textile in the world could eventually be produced in China (Paton and Bisseker, 2005).

1.2 CHINA AS A GLOBAL COMPETITOR

Africa is struggling to compete with Asia. South African manufacturing sectors, especially clothing and textiles manufacturers that fail to compete in the global market would eventually liquidate due to the impact of both national and international competition (Edwards, 2001).

Chinese imports are impacting on global clothing and textile manufacturing because of their low production costs. China is raising the benchmark of competition in the value chain for the manufacturing sector in South Africa. The surging Chinese clothing and textile industry also grabbed the US and EU markets (Echikson, 2007).

China's appearance as a global player in international trade is undoubtedly threatening world markets. World market reporters calculated that the Chinese share of the global market could rise from 7% to 25% in two decades (Mamoepa, 2006). In order to survive this holocaust of imports in the global economy, manufacturers need to adopt the framework of process improvement practices to enhance their competitive status (Edwards and Golub, 2002).

Chinese business related infiltration into South Africa and the rest of the world is focused on expansion. The momentum and assertiveness with which the Chinese organisations are accessing world markets is a matter of concern. Chinese organisations are eliminating competition of conventional suppliers of manufactured products in South Africa and the rest of the world markets through a focused competitive strategy based overwhelmingly on prices (Mamoepa, 2006).

The trade between China and Africa reached about \$29,5bn in 2005. This is an increase of approximately 59% in comparison to 2003. China's core trading partner in Africa is South Africa and with the implementation of trade liberalisation there is certainly a trend of growth that may remain strong. However, with pressure from various stakeholders in the clothing and textile sector, the South African government negotiated an agreement of preventing Chinese imports of clothing and textiles into South Africa (Mamoepa, 2006).

South African exports to China mainly comprise raw materials and imports finished goods. Chinese products in Africa are expanding at a phenomenal rate. This relationship can be seen as strategic as China focuses on the supply-side. The purpose of Chinese pursuits within the African continent is predominantly for securing material inputs in their manufacturing endeavours. China has strategically positioned itself through its investment and brand initiatives, which coincides with its political authority on the continent (Mamoepa, 2006).

With an influence of this magnitude, China is over-ruling by setting the terms for trade negotiations. The African continent's gain would be in the supply of commodities and agricultural produce. "Africa must shift from being an exporter of primary raw materials" said President Thabo Mbeki. (www.info.gov.za, 2007).

1.2.1 THE IMPACT OF CHINESE GLOBALISATION

Job losses in the United States in the clothing and textile sector reached over 300,000 in the three years prior to 2006. The remaining clothing and textile jobs in the US could be wiped out in the near future as projected by the National Council of Textile Organisations, which represents more than 30 US textile companies. Chinese exports of clothing and textiles products to the US jumped by approximately 65% between 2002 and 2006 which show that the quota system is being exploited by the Chinese government (Nordas, 2004).

The United States mentioned that it did not want to prolong the implementation of trade quotas. Clothing and textile manufacturers in the US asked the government to review the situation and implement a safeguard quota system that would enable them to survive Chinese imports. The European Union is also affected by the Chinese imports and asked China to control its export initiatives (Nordas, 2004).

Garment workers' leader Roy Ramesh Chandra mentioned (during a recent international labour conference in Tokyo) that approximately one million women workers would be jobless in Bangladesh). With the escalating poverty levels in India many women workers are forced to use other avenues as a means of livelihood. The impact of Chinese dominance encouraged 72 trade groups in 36 countries to appeal to the WTO to maintain the trade quotas until the end of 2007 (Nordas, 2004).

The Chinese Vice-Foreign Minister Zhang Yesui mentioned that China would take a responsible attitude towards the WTO agreement. To pacify the situation, China would be considering measures such as export tax, to curb

the amount of exports. While trade disagreements could come up in the coming years, the stakeholders are in concurrence that the Chinese dominance in the economy could continue to be a threat (Mamoepa, 2006).

"The reason that they removed the quotas on January 1 2005 was so that trade can be freer, so to go back and put more restrictions on trade was going against the free trade that everyone wants," said Sun Huaibin, spokesman for the China National Textile Council. Sun Huaibin mentioned that overall trends need to be evaluated to prevent unnecessary trade conflicts. He also mentioned that Chinese products offered excellent value for money to its consumers and on this basis China should benefit by accessing global markets (le Roux, 2007).

China is focused on the creation of jobs for the population of its 1.3 billion people. With the implementation of the export tax and regulations on export permits it could not afford the de-stabilisation of exports in the global economy. "In his address to parliament on March 5 2005, Prime Minister Wen Jiabao set China's total export growth target for 2005 at 15%, evidently reflecting concerns from the US and EU over the expected increase in textile exports." Chinese imports to South Africa increased by 480% since 2002 (le Roux, 2007).

The lifting of import quotas on the 1 January 2005 and the elimination of the 1974 Multi-Fibre Arrangement (MFA) prompted countries such as China and India, which have an abundance of labour, to flex their muscle in clothing and textile exports at the detriment of small manufacturers in developing countries. (Hartzenberg, 2005).

Dean Spinanger, who is a senior fellow at Germany's Kiel Institute for World Economics, said: "China was more and more becoming a market economy. Now the EU and the US want to turn this around and go back to government intervention." "The WTO was for freer trade, certainly in principle. For the EU and the US to immediately step on the brakes to stop the flow of Chinese exports was abominable," he said (Spinanger, 2004).

“Besides imposing new import quotas on Chinese textiles, the EU and the US considered the introduction of import restrictions on Chinese products that are deemed to be "dumped" in other trading partner markets at prices below cost, he said.” “However, any safeguard mechanisms would not be totally successful in protecting jobs in Europe and the United States as production could move to other South-eastern Asian countries if new limits are put in place,” he added.

"This problem is not a new problem but a part of an overall market process," said Lu Tong, a researcher at the International Economy and Organisation Research Institute of the China Academy of Social Sciences. "The Chinese government is watching this closely but Chinese textiles are very competitive on the global market, so the government is not going to take any measures interfering with this," he said (Spinanger, 2004).

The South African rand has been unsteady over the past 10 years. It was important to note that clothing and textile organisations have found it difficult to compete in an environment where the currency appreciated against the US Dollar and the Chinese currency by 30% in 2002 and a further 25% between January 2003 and October 2003. China's currency was pegged at ¥8.28 against the dollar, but the new move effectively strengthened it by 2.1%, to ¥8.11 to the dollar (news.bbc.co.uk).

The Rand was at R7.24 against the dollar (Sunday Times, 12/11/2006) effectively weakening by about 11% during 2006. The competitors especially in the East weakened their currency against the Rand and linked the currency to the US dollar to remain in a competitive position. The fluctuation of the value of the rand created inconsistency in export/import of goods as global trade use dollars to standardise their trade negotiations (news.bbc.co.uk, 2007).

The CPI (consumer price index) moved by 23% over the 3 years prior to 2005. Inggs, (2006) mentioned that “during this period, employment costs increased

by over 30%, property rates by 45%, insurance premiums increased by between 650 and 800%, electricity costs by approximately 72%, water by 43% and transport costs by 25%” (Inggs, 2006).

Although these costs do not directly impact the clothing and textile industry, they impact on the standard of living of employees in clothing and textiles. Labour rates in South Africa's clothing and textile industry increased in the region of 10 to 15 percent per year. The wage rate in Durban was R500.00 per week (355 US dollars per month) and in Qwa-Qwa (low wage area) it was R240.00 per week (170 US dollars per month) (excluding overtime and shift allowance) (Basdeo, 2005). This is in comparison to the competition from countries in the East that pay between 40 - 100 US Dollars per month (Edwards and Schoer, 2001).

The South African government said that the clothing and textile industry needs to be more competitive in view of global competition. The eastern countries are able to generate jobs in the clothing/textile supply chain due to the subsidies and allowances they receive from the government, while being protected by tariffs in the local market.

On a positive note Inggs (April,2007) has mentioned that the “DTI Durban has backtracked on its quota restrictions for clothing and textile imports from China by amending the regulations to allow importers and retailers that show significant commitment to the local industry to be allocated extra quotas” (Inggs, 2007).

According to the DTI, the imposition of the restrictions would provide an opportunity for the clothing and textile sector to increase employment by 50 000 to 60 000 new jobs, which was about 2 083 a month. Renato Palmi, a researcher at the University of KwaZulu-Natal, said some companies might employ more people as a short-term measure but this would not be sustainable once the quotas had been removed. Palmi said that manufacturers have not invested in machinery in the past 10 years and that

their strategies of performance improvement are limited, making them even more vulnerable to competition (Inggs,2007).

There is no simple strategy for winning the globalisation game as it created winners and losers in international trade. Global trade is a complex process that changes the way in which economies work. The research conducted by the International Labour Organisation entitled “Trade and Employment: Challenges for Policy Research,” said that there is a global premium for skills, which is a major contributor of competitiveness and is driven "above all" by technology. The benefits would be greater if measures are put in place to assist workers affected by the issue of globalisation (Hazelhurst, 2007).

1.2.2 TRENDS IN THE SOUTH AFRICAN CLOTHING INDUSTRY

Finance Minister Trevor Manuel mentioned that protection of the clothing and textile industry would “create a lazy industry.” He was replying to a question about incentives planned for business owners and another question about what encouragement there had been in the budget (2007) for exporters, particularly in the clothing and textile industry. Manuel said government would continue to support the local textile industry (le Roux, 2007).

He emphasised that China, predominant in the textile industry, was not “all things, to all people, for all time. You can get right up to their doorstep... their veranda”. Protection is not something in a budget, it would be something within trade agreements, but the big risk was that protection “often makes companies lazy” (le Roux, 2007).

South Africans were excited when the President stated that the clothing and textile industry was a major player in the creation of jobs. It is an industry that is a major player in the economy of SA and deserves recognition from major stakeholders such as the Government, DTI, DoL and employers. Without doubt, the clothing and textile industry needs a safety net that could enable it to gain its local market share (le Roux, 2007).

The SA government, some years ago, was confident about the fact that the local clothing and textile industry was inefficient. They encouraged manufacturers from the eastern countries to develop businesses in South Africa. The established industries could not handle the challenge and left a trail of destruction before collapsing. The experience should be an indication to the SA government that the clothing and textile industry performed well in a restrictive environment (le Roux, 2007).

Challenging lessons were learnt by stakeholders in government, industry and labour. The industry needs to plan for its survival through the application of its intrinsic strength. Dialogue between stakeholders within the clothing/textile pipeline would improve the plight of SA manufacturers. Governmental policies need to be implemented to enhance the economic viability of organisations. Competitive organisations like the Seardel group, House of Monatic and Levi Strauss were unfazed by the quotas and performed exceptionally. Hassim Randeree, president of the Clothing Trade Council of SA mentioned that the upgrading of skills and technology could improve the industry (Inggs, 2006).

Moving into the future with a positive outlook, retailers should try and provide more support to local clothing and textile manufacturers. Stability of the economy and the creation of viable investment conditions would stimulate the industries growth opportunities. Although it is a difficult period for the SA clothing and textile industry, there are many positive issues that could turn the industry around. There is a prominent industrial development council (IDC), an export council, a sector education and training authority (SETA) and a textile federation team that supports the local industry (Herman, 2006).

Some of SA's neighbouring countries like Lesotho, Mauritius and Madagascar have performed excellently in comparison to the South Africa clothing and textile sector in the areas of export products, economic growth and the creation of jobs. Patel, secretary of Cosatu, mentioned that the reduction in competitiveness had a chain reaction throughout the value chain which eventually led to human suffering (Inggs, 2007).

The clothing and textile operations require strategic management principles. The contribution of the researcher in this investigation is to provide a framework of process improvement methodologies specifically applicable to the clothing manufacturing industry that, if applied effectively, could improve the competitive status of the South African clothing industry, thus preventing job losses.

1.3 BACKGROUND

1.3.1 GLOBAL COMPETITION

More organisations are feeling the inefficiencies and loss of productivity due to a lack of strategic focus. Given the increased challenges facing organisations today, the trend is either to keep up or disappear. Statistics show that from the Fortune 500 companies, 46% disappeared during the 1980s alone. One of the major reasons for this disappearance is the resistance to a changing world (Vermeulen, 2000).

The phenomenon of globalisation is spreading worldwide and is impacting on all organisations. Markets in South Africa opened up phenomenally after 1994 and trade between nations increased. Globalisation and international competition became the driving forces of the revolution in the nature of the world economy and world class trends. The process improvement tools that could save the South African clothing manufacturing industry were strategies planned and implemented through leadership and commitment (Botha, 2000).

1.3.2 LITERATURE REVIEW

The clothing supply chain continues to influence industrialisation throughout the developing countries. Thus, consumer industries are struggling to maintain their share of the global market in terms of fashion design, production and distribution throughout the supply chain (Byrne and Rigby, 2000).

The President of the Clothing Federation (CLOFED) mentioned that “he has never before seen in South Africa's relatively long history of textile manufacture, since 1830, that the industry was experiencing such a reversal of the Rand's value base.” The retail industry maintained its impetus in terms of supply to the ultimate customer but the sourcing of finished clothing and textile products changed to an eastern focus (Richards, 2000).

Kahn (1998) mentioned the significance of implementing a competitive strategy that would enhance manufacturing capabilities in order to compete in the global economy. A competitive strategy would cultivate strengths that could be used as a weapon against competing organisations.

The dimensions of competition vary in its context and have been argued extensively. Organisations implement priorities according to their needs. Porter (1996) categorised competitive advantage in terms of price; flexibility; quality and dependability. Ward et al (2000) identified five different dimensions namely price; quality; dependability; product flexibility; and volume flexibility.

Chan et al (2002) proposed a combined list of competitive priorities, including plant and equipment, production planning and control, labour and staffing, product design and engineering, and organisation and management.

Hill (2000) argued that organisations should use criteria that win the orders. He focussed on price, delivery, quality, product design and variety. Hill also mentioned performance as qualifying criteria in an organisations quest for service delivery.

Krajewski and Ritzman (1996) mentioned “a more detailed list by differentiating four different aspects namely, cost; quality; time; and flexibility. Their list then included low-cost operations, high-performance design, consistent quality, fast delivery time, on-time delivery, development speed, customisation, and volume flexibility.”

Stevenson (2006) mentioned that an organisation can compete on three major issues namely:

- cost leadership – competing on the basis of price;
- differentiation – a unique product that is valued by customers; and
- focus - a niche market for its products developed on cost and differentiation strategy.

The use of technology in the clothing and textile industry is always a major factor in its competitive struggle. It is controlled by the established industries in Japan, Europe and the USA. However, technology is not the only way to achieve competitive advantage, but the understanding of systems methodology based on cost and productivity (Kilduff, 2000). Information technology also plays a major role in processing information using real time technology, thus facilitating communication and feedback by the touch of a button. The information technology explosion is shaping business operations in all its contexts (Forza and Vinelli, 2000).

In the South African context, competitive strategies that require implementation as a matter of urgency from the researcher's perspective would be leadership that is people orientated with an insight into cultural diversity, technological upgrade in all contexts, financial management by understanding organisational costs, service delivery with quality management imperatives and last but not least, performance management.

1.3.3 LOCATION OF CLOTHING MANUFACTURERS

Clothing and textile manufacture, which is highly labour intensive, requires a low level of skill with low-wage manpower. The choice of location depends on many factors. Some of these factors include trade-ability issues such as location of customers, location of suppliers, logistical implications and government regulations to name but a few. These factors influence both developed and developing countries no-matter where they are located (Weitz, 2006).

As an example, Mexico could be considered a strategic location for clothing and textile manufacture for the North American markets while China, India and Korea could be considered for the Asian markets. Managerial implications such as cultural differences, communication barriers and the ability to adapt are important variables that need to be considered when selecting a location. Therefore the location of plants is of strategic importance to an organisation (Stevenson, 2006).

1.3.4 SOUTH AFRICA IN THE GLOBAL ECONOMY

The primary focus of the South African government's manufacturing strategy is targeted at competitiveness. The DTI report (2003) identified value matrices which include price of input and output, technology and innovation, skills, and effective regulation. Evaluating these from an international perspective, other factors that are imperative are costs in all its contexts, service delivery, manufacturing strategies and quality (DTI, 2003).

While clothing manufacturers are grappling with inefficiencies in their organisations, their focus is on market performance. However, market performance is dependent on the organisation's ability to respond to customer demands which are inherent of style variations. The SA clothing and textile industry is in urgent need of applying strategies that would ensure its survival in the global economy. The evaluation of style dimensions is important in the creation of production management strategies that would ease the manufacturing process. Manufacturing strategies require support from production systems in order to be successful. As competition continues to influence the markets, South African manufacturers recognise the importance of improving their productivity levels (Mangxamba, 2007).

The researcher was exposed to the clothing manufacturing industry and experienced labour inefficiencies due to poor manufacturing strategies. In the review of relevant text, journals, newspapers and the World Wide Web, it was apparent that process improvement strategies were discussed on a broad scale covering a multitude of issues applicable to industry in general. The

researcher decided to direct his efforts towards the application of process improvement strategies in the South African clothing industry. This industry is in dire need of constructive effort to survive.

The strategies mentioned are vital for success in the global economy. It is the researcher's perception that the diversity of the workforce, human interaction, lack of communication at all levels and perceived internal politics, are some of the reasons for poor organisational performance. The formulation of a combination of applicable strategies would enable the clothing industry in South Africa to survive in a global economy. South African organisations require creativity and insight to strategically position itself in the marketplace.

Government interventions could improve by firstly addressing conditions under which organisations compete more favourably and secondly through directly supporting initiatives that would improve the competitive status of organisations (Hazelhurst, 2007).

The South African national micro economic policy document "Micro Economic Reform Strategy" and the "Integrated Manufacturing Strategy" of the Department of Trade and Industry (DTI) both identified the clothing and textile industry as a priority sector to support. The reason behind the choice is the fact that it is the cheapest and easiest sector in which to create jobs. The DTI introduced a number of supportive measures that had various degrees of success. Most notable of these support measures was the Duty Credit Certificate Scheme (DCCS). The scheme provides incentives in export initiatives (DTI, 2002-2003 report).

The Department of Labour (DoL) vision statement is "to strive for a labour market which is conducive to economic growth, investment and employment creation and is characterised by rising skills, equity, solid labour relations, respect for employment standards and worker rights". Their mission statement is: "The Department of Labour will play a significant role in reducing unemployment, poverty and inequality through a set of policies and

programmes developed in consultation with social partners, which are aimed at:

- Improving economic efficiency and productivity
- Skills development and employment creation
- Sound labour relations
- Eliminating inequality and discrimination in the workplace and the
- Alleviation of poverty through employment” (www.labour.org.za)

The South African clothing industry requires the implementation of the elements mentioned above, and promptly. The Department of Trade and Industry suggested that SA firms should have process improvement strategies and should develop manufacturing capabilities to meet market needs.

An examination of style characteristics in relation to dimensions of manufacturing strategies is important in developing the production management approach needed for clothing producers. Production systems should be in place to support these manufacturing strategies. As international competitiveness continues to be a critical issue, the clothing industry acknowledged the need for improved production systems (DTI, 2002-2003).

South African organisations analyse the advantages offered by low-wage regions which could achieve labour cost savings. On the contrary this may not be a unique opportunity for some organisations as there is an implication of training costs, communication barriers and quality of production.

The most important aspects to consider in the clothing industry are (Kilduff, 2000):

- Labour. In the SA situation, wages comprise approximately 60% of the cost of manufacture. Due to clothing manufacture being labour intensive it is the most demanded resource. Highly skilled labour is required in the construction of quality fashion garments with specialised machining and manipulation skills which are not readily available in remote locations.

- The market. Marketing plays a crucial role in the fashion industry. Strategic marketing focuses on developing niche markets that should contain logistical costs. Understanding the market requirements is imperative in a global setting.
- Efficiency. Organisations need to implement performance management strategies to improve return on foreign and local investments through efficiency and productivity measurements.
- Strategic management. To promote long-term strategic objectives through specific managerial or technological competences.
- Location. The decision on location is an organisation's strategic intent and requires thorough investigation as it would influence all the other operational aspects of the organisation.

1.3.5 GLOBAL MANUFACTURING STRATEGIES

The implementation of global process improvement strategies within an organisation is dependent on the ability of the organisation to embrace change. Co-ordination mechanisms are required to enhance operational activities while technological equipment support would improve the organisation's success rate (Weitz, 2005).

- Production resources. There are many phases in the clothing manufacturing process which require various technological features. Therefore the location of facilities is important to synchronise the various activities in the clothing supply chain. The design phase, where fashion attributes are defined, are generally done internally given that it plays a substantial role in the firm's success. Garment assembly (sewing the various parts together) and the pressing of garments are labour intensive and therefore could be relocated to low-wage areas.
- Co-ordination mechanisms. Organisations that establish subsidiaries abroad need to establish co-ordination mechanisms with the central controlling body. This sometimes necessitates the relocation of the senior management team abroad. The amount of influence on the

foreign organisation is dependent on the type of investment that is made (Bolisani, and Scarso, 1996).

- Technological investments. There are automated processes in the clothing manufacturing process. Technologies include automated cutting, pocket setting and placquet setting to name a few. These impact on the cost structure and time efficiency of the product. The adoption of automation requires substantial investment from the organisation.
- Information technology. Information technologies such as CAD and telematics impact on the value chain of clothing manufacture. CAD systems impact on the efficiency of design, and also the fabric cutting process. Telematics help in the flow of information throughout the organisation and abroad. However, their use is still problematic in the SA clothing industry as investments run into millions of Rand (Golub and Ceglowski, 2001).

Swamidass and Newell (1987) concluded “that manufacturing strategies could improve the organisations capability”. The model created by Kim and Lee (1993) suggested “that manufacturing strategies are related to the choice of production systems.” Ko et al (1998) who surveyed U.S. clothing manufacturers “found that the adoption of the quick response strategy (QR), for manufacturing, is dependent on production line features.”

There are numerous descriptions of the plight of the clothing industry. The researcher would like to mention methodologies that would improve the performance of the industry through simple and creative thinking in the engineering and technology management environment.

As the literature survey does not provide an explicit framework for clothing manufacture, the researcher formulated a framework of process improvement methodologies from a multi-disciplinary approach, using operations management, industrial engineering and quality management.

1.4 AIM

The aim of this research focussed on the exploration of different improvement strategies applied around the world with a view of the development of a framework that, if applied effectively, would benefit the South African clothing industry.

1.5 OBJECTIVES

The objectives served by the study were:

- The analysis of the different strategies of manufacture in use in Kwa-Zulu Natal.
- The development of an engineering management framework of process improvement methodologies through the analysis of international clothing manufacturing strategies for application in the clothing industry.
- The implementation of parts of the framework in the work environment and the discussion of experiences.
- The improvement and revision of the framework where applicable.
- Recommendation of the future use of the framework in the clothing industry based on the information generated by the investigation.

1.6 RESEARCH METHODOLOGY

The research comprises a qualitative exploratory and descriptive design (Cooper and Schindler, 2006). The purpose of exploration was to gain insight into the current phenomenon of process improvement strategies by systematic observation and discussions at a sample of clothing manufacturers in Kwa-Zulu Natal. A case study type questionnaire was developed to obtain information within the industry in Kwa-Zulu Natal. Some information was considered confidential by the manufacturers and was not provided. For the purposes of this investigation, clothing manufacturers were categorized into

small, medium and large manufacturers. Personal interviews and direct observation were used to gain insight into the issues of strategies employed. National and international improvement strategies were evaluated to create the framework. Elements of the engineering management framework were tested at clothing manufacturers in the Kwa Zulu Natal regions and proved to be effective.

1.7 POTENTIAL OUTCOMES AND BENEFITS OF THE STUDY

In the execution of the study, a number of new outcomes and benefits were derived. These were:

Outcome 1:

The creation of an increased understanding among all levels of employees, that, process improvement strategies would improve the competitive status of the clothing industry through the use of the engineering management framework. Education and training, discussions, posters, among others would achieve this.

Outcome 2:

The creation of an enabling environment in the industry that would lead to increased profits.

Outcome 3:

The reduction in unemployment and the improvement of productivity through the implementation of the engineering management framework. The engineering management framework is a significant tool that could benefit the South African clothing industry towards becoming a leader in clothing production on the global market, thereby improving its competitive status .

1.8 SIGNIFICANCE OF THE STUDY

If the engineering management framework is implemented effectively, it could:

- improve productivity for the organisation;
- create a safe and healthy environment within the workplace;

- motivate and empower the workforce to take responsibility for their environment;
- improve return on investment for the organisation;
- improve quality, delivery and cost of manufacture;
- create a synergy within the supply chain with sharing of information and the understanding of the different production processes;
- enable clothing manufacturers to communicate among themselves and share human capital and machinery as required.

The above could be measured over a period of time in monetary terms, evaluating the present, and upon successful implementation, the benefits as expressed by management, as well as the change in the motivational level of the employees.

1.9 LIMITATIONS

Process improvement strategies would be discussed in context of its applicability in the clothing industry. The names of the companies would not be used in order to protect company confidentiality. Geographic areas were limited to Kwa-Zulu Natal. Organisations forbid the sharing of information among organisations and people that were spoken to requested to remain anonymous.

1.10 THESIS AND RESEARCH ROADMAP

Chapter one provides a background of the investigation through the research proposal. Chapter two introduces global strategies in the clothing industry and its comparison to the SA context as the industry experienced the global impact of trade liberalization. Chapter three focuses on the impact of globalization in SA and an overview of current practices. Chapter 4 describes the survey in the clothing industry through a case study. Chapter 5 introduces the engineering management framework which could be used as a “survival toolkit.” The framework provides a practical approach that can be

implemented without major financial implications and is strongly recommended for implementation. Chapter 6 introduces aspects of the framework to clothing industry which proved to be successful. Chapter 7 focuses on the implementation of modular manufacturing as part of the framework through a case study approach and chapter 8 concludes the research with an emphasis that the framework could add value to struggling clothing manufacturers through a structured engineering management approach.



CHAPTER 2 - GLOBAL STRATEGIES IN THE APPAREL INDUSTRY

2.1 INTRODUCTION

The main focus of attention in this research document is an attempt to identify and evaluate how the South African clothing industry may achieve "competitiveness". The efficient and effective application of an organisation's total resources would improve the competitive position of the organisation, thus making it successful. Competitive performance is not something that could be imposed onto an organisation. Competitiveness is a phenomenon that is unique, and intrinsic to the company (Adewole, 2005).

Roth and Miller (1990) mentioned that manufacturing strategy is viewed as the effective use of manufacturing strengths as a competition weapon to achieve organisational goals. The application of a well formulated strategy could be a distinguishing factor that enhances the competitive position of the manufacturing facility.

This could focus on cost variables, quality initiatives and flexibility in the manufacturing process. The application of strategy determines the level of business performance in the manufacturing process. In the SA clothing industry, organisations are generally focusing their efforts on niche markets, quality and cost parameters and labour skills in order to remain competitive (Velzen, 2006).

2.2 THE IMPACT OF HIV AIDS IN SOUTH AFRICA

The clothing industry exists because people wear clothing throughout their lives. With a reduction in the population, the demand for clothing would reduce, thus requiring fewer clothing manufacturers. South Africa is being plagued by the HIV Aids epidemic. According to UNAIDS estimates, there is about five and a half million people suffering from the aids virus. (www.avert.org/aidssouthafrica.2007). The South African population is estimated to reduce from 45.2 million in 2004 to 40.2 million in 2050. The

South African Gross Domestic Product (GDP) may also decline by approximately 17% by the year 2010, thus impacting on the South African economy. The emphasis is that without people, no industry is necessary (www.dti.org.za, 2005).

2.3 STRATEGIES APPLIED IN AUSTRALIA

2.3.1 INTRODUCTION

In the mid-1980 the Australian government decided to gradually reduce import barriers on the clothing and textiles industry. The downside of this action was that clothing producers became uncompetitive. McCallum (2001) mentioned that quotas were abolished by 2000, and import duties were down to 15 per cent for woven fabrics and footwear and 25 per cent for garments. Consequently, the number of people employed in textiles production dropped from 20,300 in 1985 to 6,300 in 2001, and the combined fall for clothing and footwear was 71,900 down to 51,700. Australia's clothing imports rose to 78 per cent by the year 1999 in comparison to 25 per cent a decade prior to 1999 (Buxey, 2005).

Local retailers used this opportunity to procure clothing and textile products offshore and dominated the local markets while traditional suppliers began to face competition from “house” labels. Clothing and textile manufacturers faced a dilemma in their operation and began shutting down, while the larger organisations outsourced their production volumes from countries like China and India (Buxey, 2005).

The local textile manufacturers were also affected by this situation as clothing producers imported the major part of their raw materials from nearby countries. The designers in the Australian clothing industry formulated the latest fashion trends and specify the type of fabrics to be used, thus leaving the manufacturers to purchase their raw materials from the textile plants. This phenomenon led to the rapid development of cut/make/trim (CMT) manufacturers embarking on clothing production (McCallum, 2001).

Garran (2000) mentioned that the Australian Government's Import Credit Scheme allowed businesses to ship fabrics to Fiji and claim export credits, which were used to offset tariff payments on future imports. Finished goods returned duty free, under the South Pacific free trade agreement.

A managing director of a clothing producer mentioned that it was arduous to continue under the current circumstances due to the reduction in the market size and there was no clear competitive advantage that was established by manufacturers (Gettler, 1999). He also mentioned that products with a low value should be outsourced, but organisations should retain specialised production with short runs based on the philosophy of quick response. Manufacturers should focus on value-adding projects such as brand management, customer focus, design and supply chain management (Buxey, 2005).

2.3.2 STRATEGIC RESPONSE IN AUSTRALIA

Clothing organisations differentiated between their focused products that were manufactured in Australia and products that were imported. The decision was that the top of the range fashion items would be manufactured at home while products that competed favourably on quality and price could be imported (Buxey and Kosminder, 1997).

The most advantageous manner of retaining market share in the Australian market was to develop and promote a brand name based on its reputation of value for money to the customer. The label of "Made in Australia" created an impression of quality excellence for the consumers in comparison to the label of "Made in China." China's focus was in price competition through their mass production facilities, although this may have changed in recent years (Buxey and Kosminder, 1997).

Another advantage could be achieved by focusing on high variety fashion items that were in demand for a particular market segment in the areas of

clothing, footwear and sports-wear. The ability of flexible response to a customer provided a competitive advantage to the manufacturer. This required the recurrent delivery of orders to customers, for products that were relatively expensive. The frequent communication within the supply chain enabled the industry to understand new developments and fashion trends through the sharing of information (Buxey and Kosminder, 1997).

2.4 DEVELOPMENTS IN USA

The USA's clothing retail outlets transferred the power to negotiate from the small garment producers to the retailers (Abernathy et al., 1999). Retailers demanded goods at a low price and thus outsourced garments from the eastern countries. American manufacturers decided to relocate their plants to neighbouring countries such as Mexico and Venezuela where labour was abundant at a low cost. Certain high fashion manufacturers who carved niche markets became profitable due to their customer focus, high quality of production and short lead times that demanded premium prices.

Cheng (2002) reported that Levi Strauss was the only US based manufacturer that still had a number of manufacturing plants based in North America. Unfortunately over the past few years prior to 2006 only two Levi manufacturers remain in the US in comparison to 31 plants in 1997 (Cheng, 2002). This jeans manufacturer focused its efforts on product design and a rigorous marketing campaign. Levi-Strauss also established a plant in Cape Town, South Africa which is a profitable venture. US factories are experiencing similar plights as the rest of the world and are moving into low-wage areas such as Mexico.

US clothing and textile manufacturers experience similar changes in their operations in comparison to South Africa and Australia. Rapid changes in the business environment with regard to technology, mechanization and automation, information technologies are fundamental changes that offer both challenges and opportunities for clothing and textile manufacturers. Organisations are gearing themselves by restructuring their production

facilities with the adoption of manufacturing strategies that are profit driven, innovative and with creative thinking, product flexibility and reliability, quality orientation and a delivery service with a focus on meeting customer demands (Buxey, 2005).

2.5 DEVELOPMENTS IN THE UK

Clothing and textile manufacture has been long established and an important economic driver in the United Kingdom. The industry is steadily declining over the past years, with employment rates diminishing from one million 25 years ago to approximately 316000 in 2005. This was a loss of approximately 65% of the clothing and textile jobs (Hughes, 2005).

During 2005, in the UK local clothing production output declined drastically and this impacted on retail sales volumes. This phenomenon can be attributed to the following issues, namely:

- the import of cheaper products from low wage economies;
- communication barriers between manufacturers and retailers;
- breakdown of honesty and trust among stakeholders;
- failure to invest in design, information and communication technologies, thus preventing the dissemination of value information (Hughes, 2005).

The UK industry decided to act on these variables by establishing strategies that could improve the profitability of organisations. The focus areas revolved around the following issues:

- The implementation of information and communication technologies (ICT) that would enhance the flow of information in real-time, thus improving decision making.
- The implementation of computer aided design and computer aided manufacture (CAD/CAM) technologies. This would improve cycle time in the manufacturing process.
- Knowledge sharing created strong inter-company relationships through quick responses to customer demands.

- Management information system (MIS) that would help organisations to share vital information and focus on business improvement (Adewole, 2005).

2.6 DEVELOPMENTS IN SWITZERLAND

Switzerland focused its attention on the development of clothing and textile manufacturing equipment and won 31% market share in 1997. Due to the investment in research and development in production engineering techniques, the machinery used in clothing and textile manufacture evolved into state of the art facilities. Swiss organisations' invested in innovations which transformed their strategies into world class leaders in machine manufacture. This led to an improvement in productivity levels that warranted high wage rates for Swiss employees (Stengg, 2001)

Switzerland is also affected by the impact of globalisation which had an impact on the customer and their preferences. The Swiss economy changed in response to globalisation, which impacted on consumer preferences. The Swiss government's challenge was to implement change which would not influence people's behaviour, creating negativity and an atmosphere of resistance to change. The Swiss believed that its government needed to assist people in their society in dealing with the rationalisation and retrenchment process. The Swiss department of trade and industry developed policies and procedures in dealing with the effect of globalisation. The strategies included the following;

- The application of science and engineering for technical advancement;
- The improvement of their business performance;
- The use of grants that would secure capital investment and protect approximately 75,000 jobs by 2008 (Stengg, 2001).

The programme was implemented and supported by the Swiss government and this assisted the industry in maintaining its competitive position.

2.7 DEVELOPMENTS IN ITALY

The Italian clothing industry relied heavily on local subcontractors, and focussed on quality of production and overhead expenditure. Effective supply chain management principles were implemented for stakeholders in the value chain of clothing and textile production which were dispersed in various corners of the globe (Hill, 2000).

A sub-assembly type operations strategy of quick response was used. As an example, a shirt could be assembled with short, mid and full-length sleeves, with or without a collar. The assembled bodies were common and stored as inventory. The application of quick response methodology was used to complete the garment according to customer preferences. The scheduling of production was done on short notice with the completion of work in progress inventory. Thus, orders were delivered within a period of 13 to 27 days.

Abernathy, et al (1999) mentioned that textile manufacturers were producing the fabric and also completing the garment. The textile producers sold finished products such as sheets, carpets, and socks directly to the American retailers. Products that were fashion orientated sought a higher value on the retail market.

2.8 DEVELOPMENTS IN NORWAY

The Norwegian clothing and textile industry suffered a similar fate as the industry declined at a rapid rate (Espeli, 1997). Organisations that developed strategies such as technological advancement and niche markets were able to maintain their status in the market. The niche markets focussed on items such as ropes, fishing nets, textiles used in combat, sleeping bags and so forth (Espeli, 1997).

The clothing and textile industry includes organisations that cover a wide range of raw materials, production processes and products. There was a steady decline in employment and companies from 1970 until 1990. The level

of activity stabilised in the 1990's and the industry has grown more robust. The oldest company in the clothing sector A/S Timms Reperbane was established in 1772. The clothing and textile industry is located all over the country.

The market for textile products and ready-made clothing (imports) is characterised by rapid changes in fashion trends and demand. The most important domestic markets are corporate customers, public departments and customers who like Norwegian design and quality.

Helly Hansen, which has its headquarters at Moss, is an internationally renowned manufacturer of work clothes, leisure wear and sports clothing. Important functions such as designing and marketing still take place in Norway, but the clothes themselves are mainly manufactured in the Far East (Espeli, 1997).

2.9 DEVELOPMENTS IN THE EUROPEAN UNION

Textile manufacture is a highly adaptable and readily transferable form of activity. There is a movement of clothing and textiles from Europe eastwards to Hong Kong, Japan, Korea and other regions of the Pacific Rim. The intense international competition from newly industrialised producers like China drove many European producers out of business. Despite the efforts of West European manufacturers to retain market share, increased infiltration was evident, which involved a marked decline in levels of output and employment in the countries of the EU community overall (Stengg, 2001).

In the EU the total number of people employed in textiles and clothing was estimated at 2.7 million, of which 1.5 million were employed in textiles alone. Official statistics clearly show that the European textiles sector is steadily losing ground, as measured by share of world trade, despite the defensive intent of the various provisions of four successive Multi-Fibre Arrangements in textiles and clothing (Stengg, 2001). However, the textile industry continues to be significant to the European economy, especially to some countries, and

further decline is impacting painfully on many EU economies. For this reason there is growing concern in Western Europe over its ability to compete with national and international manufacturers (Keenan et al, 2004).

The European textile and clothing manufacturers are relocating to low cost areas where there is skilled labour. They are moving the source of competitiveness away from low cost, towards other more sophisticated factors, such as design, fashion, new fabrics and so forth. They invest heavily in research, development and in technology in order to produce new techniques of production which enable them to reduce the impact of labour cost (Stengg, 2001).

Table 2.1 Adjusted cost of production in selected countries

| | |
|-----------|------|
| Denmark | 0.74 |
| Germany | 0.58 |
| France | 0.57 |
| Italy | 0.48 |
| Spain | 0.41 |
| Greece | 0.35 |
| Ireland | 0.35 |
| UK | 0.34 |
| Portugal | 0.29 |
| Denmark | 0.74 |
| Germany | 0.58 |
| France | 0.57 |
| Tunisia | 0.23 |
| Morocco | 0.22 |
| Turkey | 0.21 |
| Hungary | 0.25 |
| Hong Kong | 0.25 |
| India | 0.24 |
| Indonesia | 0.21 |

| | |
|-------------|------|
| Thailand | 0.20 |
| Vietnam | 0.18 |
| South Korea | 0.15 |
| China | 0.14 |
| Tunisia | 0.23 |
| Morocco | 0.22 |
| Turkey | 0.21 |

Source: Compiled from KSA Factors Cost Comparisons Study, (1995)

Table 2.1 shows that there are distinct variations in the cost between countries in producing a textile item in 1995. This has a major impact on an organisation's ability to export or import textile and clothing products. The composition of the local market stimulates a nation's competitive advantage. If customer requirements are fulfilled through the application of process improvement strategies, it would ease competition against foreign rivals (Buxey, 2005).

During the 1970s and early-1980s the demand for clothing and textiles was static. The main markets allowed production to be planned over a number of months. Long-run orders of standardised products promoted price-competition. This led to a transfer of price sensitive production away from European suppliers. In the 1980s the change of fashion was on the increase. The result was a proliferation in the range of styles, patterns and colours of textile goods (Taplin and Winterton, 2004).

European textile and clothing producers were advantaged by their domination of world fashion trends. Their high rate of fashion change and a highly segmented demand was certainly more easily satisfied by local producers than by those that had moved to remote locations (Taplin and Winterton, 2004).

The competitive advantage of EU producers included, among others:

- Quick response to changing demand;
- Low distribution costs;
- Low inventory costs.

A segmented market places an emphasis on creativity, originality and quality. Consumers associated goods bearing a brand name with style and quality. This separated “unknown” producers whose primary competitive advantage was based on low wage costs and/or long production runs.

The EU clothing and textile industry became demand-led and fashion oriented where retailers placed an increased emphasis on proximity. Suppliers who met the demand of the industry were selected as partners in business (Taplin and Winterton, 2004).

2.9.1 DEMAND FOR CLOTHING IN EU

The rate of growth of demand plays an important role in determining the rate of investment. Growth of an organisation permits the adoption of new technologies at a faster pace. With a low demand of products, organisations tend to be more resistant to embrace new technologies. This makes existing facilities redundant (Stengg, 2001).

However, it should be remembered that the EU market still remains one of the greatest world markets and that this feature should act in favour, ultimately of local producers. Production in the textile industry expanded at an average annual rate of 2.1% over the 1990s (Stengg, 2001).

2.9.2 THE SUPPLY CHAIN IN THE EU

The presence of competitive supplier related industries is a determinant of national advantage. The value chain determines the competitive status of an organisation by evaluating the value-added component which contributes to

buyer value. “A firm’s value chain is an interdependent system or network of activities, connected by linkages” (Stevenson, 2007).

The close working relationship between suppliers and manufacturers enables an advantage over competitors. Suppliers help organisations gain quick access to information, to new technologies and perceived new methods and opportunities. Suppliers are also a means for transmitting information and innovations from organisation to organisation. On the other hand, organisations have the opportunity to influence suppliers’ technical efforts as well as serve as test sites for development work. Research and development and joint problem solving lead to faster and more efficient solutions (Porter, 1996).

The European clothing and textile industry offer good opportunities for the development of these forms of linkages in textiles. On the one side there is a concentration of competitive textile machinery producers, and some chemical giants, such as ICI, which are able to provide new technologies, new materials and fibres to local producers. On the other side are the clothing and textile producers who use the latest technology to their advantage. The EU textile sector is composed of small and medium sized organisations that employ 18% of the total workforce and generated 15% of total turnover in 2005 (Taplin and Winterton, 2004).

Many of the companies are absorbed in a culture of short production runs for a variety of customers. Benetton, an Italian clothing manufacturer harnessed the synergies with the structure through an efficient central design, marketing and distribution facility. All Benetton shops, factories and subcontractors are linked by an on-line computer system. Computerisation has three major advantages: speedy transmission of orders; facilitates management of inventory; permits “real-time” communication (Stengg, 2001).

The value chain located in close proximity promotes the innovation process and achieves a degree of mutual co-ordination which resembles that of large integrated organisations. By contrast, when organisations are locally

concentrated, but act independently of one another, they suffer the disadvantages of limited size with a lack of sharing research and development ideology (Taplin and Winterton, 2004).

As international competition increases, with the emergence of new “players” such as China and eastern Europe, organisations need to establish a strong base from which to compete, one which recognises that successful competition could no longer hinge on cost advantage and would increasingly centre upon market proximity, quality, design and flexibility. Smaller, under-resourced organisations are unable to improve efficiency, quality, flexibility and market awareness unless they apply strategies to improve their competitive position (Bessant et al, 2003).

The large number of related organisations in the various textile districts has enabled the development of a sophisticated division of specialisation. The wide range of services and products that is offered enables local organisations to develop linkages and share resources. This is important since it allows the development of an integrated supply chain, from sourcing of fabrics through to final sale. Such localised buyer-supplier-sourcing chains make easier the quick response to fast fashion cycles and production of small batches of products manufactured and distributed with short lead times, thus giving organisations a considerable competitive advantage over foreign suppliers (Bolisani and Scarso, 1996).

Presently, the EU clothing and textile industry is uncompetitive in terms of factor cost (in particular labour cost), but is better positioned in terms of other factors, notably composition of demand and local supporting industries. This allows local producers to be competitive in the top-end quality, high-fashion segments of the market.

2.10 CONCLUSION

To survive the impact of the globalisation of markets and maintain their current status, the clothing and textile industry around the world need to

respond by implementing strategies that improves their competitive status. Lasting improvements in clothing and textile manufacture in developed economies are dependent on their abilities to adopt the principles of quality management, dependability, elasticity and technical leadership (Ferdows and de Meyer, 1990).

Organisations that achieved success focused on aspects such as organisational capability with a drive to address problematic issues that occurred, specifically driven by organisational leadership (Bessant et al., 2000). As Hill (2000) pointed out, many manufacturing or production managers are focused on improving the efficiency of their processes, and concentrated on short-term, rather than longer-term, goals. Hence, manufacturing had little input into corporate strategy.

Organisations need to develop an advantage that is sustainable, leading them into the future, rather than the focal point being operational efficiency. The development of strategies on a continuous basis embedded the philosophy of continual improvement within the structure of the organisation (Bessant, et al., 2000).

Good interpersonal relationships among the workforce and the communication strategies applied create a favourable climate for decision making between workers and their supervisors. The national value system is therefore important when undertaking the formulation of a strategy in manufacturing (Nel, et al., 2006).

Managers fail in recognising the innovative potential of the workforce. The implementation of quality and improvement strategies is vital for the manufacturing environment. Manufacturers are encouraged to create and implement training initiatives based on best practice improvement initiatives that would promote information sharing. These initiatives would consolidate strategies for long term benefits for the entire organisation (Locke et al., 1995).

Clothing and textile manufacturers need to adapt themselves in relation to the globalisation of markets by implementing various aspects of quality and continuous improvement. There is a major change to customer focus by listening and fulfilling the requirements of customers.

Manufacturers with a strong customer base need to explore the market further. There is a strong emphasis on service levels on manufactured products rather than the physical attributes of the product. Clothing and textile manufacturers are attempting to incorporate their manufacturing strategies into their overall business strategy, which would impact improvement initiatives throughout the organisation. Often, the changes and improvements were implemented in areas where it made the least impact (Harrison, 1996).

SA clothing and textile manufacturers are also affected by the issue of globalisation, and are lagging behind in the implementation of process improvement strategies that could improve productivity (Harrison, 1997). The next chapter would focus on the clothing industry in South Africa.

CHAPTER 3 - THE CLOTHING INDUSTRY IN SA

3.1 INTRODUCTION

The South African clothing and textile industry has the potential to create jobs, but this potential has been steadily diminishing over the last ten years before 2007 (Mamoepa, 2007). In this context, the clothing industry is regarded as a powerful engine for economic and employment growth. Nevertheless, the performance of the clothing industry, whether in terms of efficiency, working conditions or degree of social protection, is unstable. The industries' ability to generate sustainable and productive employment varies according to geographical locations (Weitz, 2006).

In general, wages, job security, health and safety, opportunities for skills training in the smaller enterprises (< 50) compare negatively with those offered by larger enterprises (> 100) (Basdeo, 2006). As most new jobs are in the micro and small enterprises, addressing their poor working conditions and sometimes exploitative practices constituted a mammoth task for the bargaining council (BC). Moreover, evidence indicates that improvements in working conditions and social protection are key ingredients of business efficiency and competitiveness (Harrison and Dunne, 1998). Sound policy and regulatory environments, with the existence of collaborative structures are crucial for achieving a fair balance between enterprise development and workers' well-being. This leads to some of the issues affecting the industry (Barnes, 1998).

3.2 ISSUES AFFECTING THE SA CLOTHING INDUSTRY

The experiences of the clothing industry are not that unique to SA. The experiences of the Australian clothing and textile industry are for instance very similar to SA. The clothing industry in SA was privileged before 1994 because the clothing and textile market was protected by government. As South Africa rejoined the global economy after 1994, it faced escalating competition from

both the domestic and international markets (Richards, 2000). The current issues affecting the industry, among others are the following:

Import tariff structures rose to protect in-house material inputs. The tariff penalised organisations that sourced inputs from foreign markets. The cost of raw material is a critical component in the clothing and textile supply chain. The impact of competitive prices is a detrimental factor in the survival of the industry (Barnes et al, 2004).

The value chain within the industry is characterised by working within “silos.” The limited communication and independency of organisations stifled information sharing in the clothing and textile industry in SA (Audet, 2004).

Organisations use government incentives, such as duty credit certificates (DCCs) for exporting their products which assisted in offsetting the costs of production. However, many organisations are not enlightened about the DTI incentives as the process is cumbersome (Audet, 2004).

Organisations experimented with different ways of improving productivity but failed to implement process improvement methodologies of performance measurement. Organisations moved parts of their manufacturing plants to locations such as Isithebe, Qwa-Qwa, Ladysmith, Newcastle, Lesotho, Swaziland and so forth. Other organisations focused their efforts on fashion product lines, introducing information management systems, and making contacts with markets abroad for cost effective input materials (Barnes et al, 2004).

Both the management and the workforce require critical skills thinking that would empower the workforce in totality to make decisions for the benefit of the organisation (Stapelman, 2000). A skilled workforce that is empowered to make decisions in a teamwork setting would be able to provide innovative ideas, thereby improving productivity in the organisation (Golub, 2000).

Niche opportunities are being missed by the clothing and textile industry as clothing exporters focused their attention on product development to maintain customer allegiance (Barnes et al, 2004).

The application of technological innovations and process improvement strategies is important to maintain the competitiveness of the South African clothing and textile organisations with public-private partnerships.

Back to basics. It was observed that 75% of the cut, make trim (CMT) organisations were not applying the fundamentals of operations management such as performance management, garment costing, productivity calculations, work-study principles and so forth (Basdeo,2006).

3.3 SOME RATIONALE FOR THE STUDY

The focus of the study was firstly to prevent job losses in the clothing industry by applying an engineering management approach and secondly to improve the competitive position of organisations. The issues of concern are competitiveness and labour productivity as SA is ranked number 46 out of 60 countries (Scheepers, 2005). The protection of the SA domestic clothing markets created two scenarios: Firstly, it made national production more costly in South Africa due to a lack of competition from external sources. Prices were held within the domestic market. Secondly, it made South African clothing and textile exports more costly on the international markets. This was because of the high cost of material inputs used by SA manufacturers. Therefore the clothing and textile industry in SA focused their markets on the domestic scene rather than being export orientated (Barnes, et al. 2004).

Although clothing and textile manufacturers in SA are more developed than manufacturers in Sub-Saharan Africa, the challenges the organisations face with respect to export initiatives are still a matter of concern. The management of the transition from a domestic market to international market participation is problematic for organisations. The South African government offered export incentives schemes such as the duty credit certificate but manufacturers did

not pursue export initiatives. South Africa is committed to the world trade organisation (WTO) rules and regulations and is faced with duty barriers on clothing and textile imports being lowered. The incentives for manufacturers changed from price to marketing initiatives based on the world trade organisation principles (Audet, 2004).

South African organisations face a learning curve in striving for competence based on global strategies in comparison to international players. South African organisations are required to learn to compete with global markets in the context of the clothing and textile industry (www.da.org.za.,2006)

Day (1993) mentioned that the clothing and textile industry had been a major industry for developing countries as they moved toward economic and industrial development. This was true for a number of reasons. Start-up capital costs, particularly in the clothing side of the industry, were low and the physical capital base was relatively mobile. Labour requirements were high, making location of these industries attractive in countries with large supplies of relatively inexpensive labour.

The clothing industry in particular has a workforce of predominantly women employees. The generation of employment opportunities especially for the women folk creates growth of the economy as women labour was under-utilised in the agrarian economy. Household income is thus diversified, away from a traditionally heavy reliance on men who were sole supporters' of the family, especially from an African background (Palmi, 2007).

The topic of employment is relevant in the South African situation as it is one of the challenges faced by national government. The DTI reported that according to its per capita income, South Africa ranked as an upper-middle income country. Thus, many segments of the country's population face challenges with regard to improving education, housing, health, and welfare which parallel those of lower income countries. South Africa also faces important challenges in the area of employment generation. With as much as 40% of the employable labour force unemployed in some parts of the country,

labour intensive development strategies are key topics of discussion (www.statssa.gov.za, 2005)

The clothing production process is labour-intensive and therefore considered as an important sector for the creation of jobs in the economy. The implementation of competitive strategies for the preservation of current jobs and the in a global economy is therefore the focus of this study.

3.4 MARKET TRENDS AND INTERNATIONAL POLICY

Besides the effects of globalisation of clothing and textile industries, the changes in policies and market practices in SA have a major impact to clothing and textiles. The changes due to quota-free trade caused a wave of poor quality, cheap textile and clothing to flood the SA market (le Roux, 2007).

In such an unsettled environment, people are in search of security. The SA government is seeking social and economic development, while manufacturers are keen on keeping a viable industry. Supply chain management has become an important variable in clothing and textile production (le Roux, 2007).

An important factor in the export-orientation of SA clothing and textile products is the cost of material inputs. Inputs for clothing manufacture could be sourced abroad at competitive prices but manufacturers favoured the local textile inputs. The assembly of clothing production took place in countries where the sourced fabric and trim is imported at low tariffs because of the AGOA agreement. This keeps the cost of manufacturing at a minimum level (Kilduff, 2000).

For the promotion of clothing and textile exports, the productivity levels need to improve so that export markets could be developed. Certain countries offered incentives to manufacturers such as relaxed wages, modernised power and telecommunications facilities to encourage the establishment of

export industries within their borders. These industrial sites came to be known as “export processing zones” (Kilduff, 2000).

Besides the advantages gained through the duty certificates, other issues such as “customs services, port facilities, banking, telecommunications, domestic truck/rail transport, and sea/air transport in/out of the country were provided.” Finally, by managing the costs in the area of location through the alignment of procedures for foreign capital inflows, and the reduction of government interference in the marketing and production of garments, government promoted the development of economic policies in conjunction with international trade (DTI, 2003).

Low-wage labour is used for the performance of simple tasks in clothing manufacture. Higher paid skilled labour manages the functions of design, production management and financial aspects of the organisation. Certain countries became dependent on imports of certain products as the skill levels of labour improved (Ng and Hung, 2001).

Clothing and textile production and trade are changing on an ongoing basis. Global clothing and textile organisations are beginning to adjust to changes in the market. These changes held important implications for the competitiveness of organisations. Due to cost competitive pressure that is placed on clothing organisations, many decided to relocate their facilities abroad, while still maintaining overall control of the facility. This scenario brought with it an additional set of problems, namely, communication barriers, cultural diversity and skilled labour, to name but a few (Bolisani and Scarso, 1996).

Agreements were developed to allow clothing and textile organisations in developing countries to import raw material inputs and transform them into assembled clothing production. The assembled production was re-imported by the host country at a reduced tariff rate. Bolisani and Scarso (1996) called this “Outward processing traffic” (OPT), which took place between “Germany and Eastern European countries such as Poland and the Czech Republic,

between France and Mediterranean clients such as Morocco and Tunisia, and between the United States and Mexico and Caribbean partners” (Bolisani and Scarso, 1996).

Similarly, South Africa developed agreements with neighbouring countries such as Botswana, Mozambique, Lesotho, and Malawi which allowed for the export of raw materials from SA and the import of finished goods into SA at preferential rates (Barnes, 2004).

The cost factor in the production of clothing products is not the only competitive factor in a global market, although it is very important. When costs of manufacturing are compared to all other costs such as the overhead costs associated with developing international market linkages, merchandising, service, inventory management, lead times, transport and trade, and quality control, it becomes a negligible cost factor (Bolisani and Scarso, 1996).

In the fashion industry, consumers are fashion orientated and would like to separate themselves from the rest of the people. The clothing supply chain is required to fulfil this requirement of consumers by offering the latest fashion trends in fabric texture and styling. Clothing companies that keep the fashion trend with an emphasis on fashion design and a focus on quality garments appeal to the target market and achieve their profit margins.

In contrast, manufacturers that focus on standardised products maintain their competitive position, but to a lesser extent. Customer choice is a major issue, with an assortment of similar products available at their disposal. Thus, manufacturers have to contend with shorter production runs and frequent changeovers, increasing the cycle time in production. The competitive clothing organisation needs to be responsive to the changing demand parameters of consumers (Basdeo, 2007).

May-Plumlee and Little (1998) mentioned that retailers are becoming an important contributor in the supply chain, in connection with the design of products and merchandising. Private brands developed by established

retailing organisations captured a major market share, especially among the younger generation. The US imports the major part of its branded labels through franchises and licenses as retailers target the lowest cost factor for the products.

There are a number of responsibilities when considering import/export initiatives. Some of these include the management of inventory, order management and the maintenance of delivery. Suppliers require computerised systems that follow the value chain in clothing production management. The effective management of the supply chain pipeline, together with regular communication using the latest communication technologies in all stages of the production process, enhances the competitive strategies of an organisation in comparison to organisation that fails to meet these requirements (May-Plumlee and Little, 1998).

Quality is another focus area of the customer. Customers expect textile fabrics which do not dis-colour and wash onto other garments. The seams need to be well constructed on the garments without loose thread protruding. The fit of the garment needs to enhance the outer image of the person. A strategy pursued by the larger clothing manufacturers is automation.

The computerisation of the cutting room, difficult to handle assembly sewing operations, and the final pressing operation improves the garment appearance and look in the manufacture of clothing. The US clothing and textile industry changed their operations into the “pull” system of manufacturing based on demand of products. The implication is that customer dimensions are scanned into a computer system in real time technology, thus prompting the manufacturer to construct the garment within a short space of time. The technology allows the creation of tailor made styles and sizes that are body hugging in detail and fit.

Glock and Kunz (2005) mentioned that the use of body scanners by manufacturers and retailers allowed customers to order clothing cut and assembled according to a large array of computerised patterns so that the

final product fitted individual body types correctly. The use of snapshot fashion ordering systems and digital fabric printing allowed mass customisation to be realised, i.e. the manufacture on a large scale of speciality products tailored to individual consumer style and colour preferences.

Stakeholders funded this project, namely clothing and textile manufacturers, researchers, and the U.S. Department of Commerce were involved with research and development initiatives that made this breakthrough possible. The private-public collaboration was investigating another project based on sourcing efficiency, management of inventory and the elimination of supply chain bottlenecks that improved service delivery by reducing the throughput time from fibre to customer.

The synopsis provided information on changes that occurred in the clothing and textile industry over the past decade, which are impacting on SA operations. These constant changes are creating a “chain reaction” throughout the world markets, prompting clothing and textile manufacturers to embrace technologies that would enable them to survive in an ever changing environment.

3.5 CLOTHING PRODUCTION IN SOUTH AFRICA

3.5.1 AN OVERVIEW OF THE CLOTHING AND TEXTILE INDUSTRY

The clothing, textile and footwear industries in South Africa were protected by tariffs that were implemented by the National Party government before 1994. The government supported the industry through the Industrial Development Corporation (IDC) that provided incentives for the clothing and textile industry. Products were manufactured and marketed on the SA markets and exported production comprised 6% during the 1970s (Audet, 2004).

The SA clothing-textile pipeline went through tremendous changes since 1994 as the country was exposed to the international arena.

3.5.2 THE IMPACT OF TRADE LIBERALISATION

The Multifibre Arrangement (MFA) developed by the world trade organisation governed the clothing and textile industry during the period 1974 and 1994. This agreement (the MFA) provided a safety net by restricting the amount of imports that impacted the local clothing and textile industry. The South African government then introduced the General Agreement on Tariffs and Trade (GATT) which was implemented by the World Trade Organisation (WTO). In 1995 the WTO's Agreement on Textiles and Clothing (ATC), was formalised. This arrangement focused on the reduction of trade quotas on clothing and textile production over a period of 10 years. This would align the industry with policies and regulations stipulated by GATT. The agreement enforced all quotas on imports be eliminated by January 1, 2005 (Audet, 2004).

Table 3.1. The World Trade Organisation Agreement (www.da.org.za)

| Step | Percentage of products to be brought under GATT and have quotas removed | Percentage of products to be brought under GATT and have quotas removed annually |
|--|---|--|
| Step 1: 1 January 1995 to 31 December 1997 | 16 % (minimum, taking 1990 imports as base) | 6.96% |
| Step 2: 1 January 1998 to 31 December 2001 | 17% | 8.7% |
| Step 3: 1 January 2002 to 31 December 2004 | 18% | 11.05% |
| Step 4: 1 January 2005 ATC comes to an end WTO members fully integrate their industries into GATT and eliminate all quotas | 49% | No quotas left |

The liberalisation programme impacted the clothing and textile industry throughout the world by exposing markets to domestic and international competition and gave the local industry minimal time to recover from these changes.

3.5.3 THE TARIFF LIBERALISATION PROGRAMME

Since the early 1970's, there was a focus on export orientation in SA clothing and textiles. The tariff liberalisation programme was implemented to promote exports through the granting of incentives. The effects of the programme were argued, as it failed to promote economic growth in the clothing and textile industry. The DTI (DTI, 2002) confirmed that the industrial policies had not had the desired impact on the growth rate and employment creation in the clothing and textile industries. Trade programmes that were against the world trade organisation policies were eliminated and SA import tariffs became the lowest in comparison to other countries (Van der Westhuizen, 2004).

Although the tariffs had an impact from a legal perspective, another serious issue was that the illegal and under-invoiced imports which were being allowed onto the SA market reduced the amount of protection (Barnes et al, 2004).

3.5.4 EXPORT-LED GROWTH ENCOURAGEMENT

The economy was stimulated through the export of South African production. Raw materials purchased on world markets at competitive prices were important in fostering the competitive status of SA manufacturers. The government facilitated this through the Customs and Excise Act 19 of 1994 (www.sars.org.za).

The Duty Credit Certificate Scheme (DCCS) was a widely utilised export incentive in SA. Local exporting clothing organisations earned rebates of approximately 35% of the worth of the exported products. These rebates were

used when clothing manufacturers imported raw material inputs for their manufacture such as fabric, yarns, buttons and so forth (Morris, et al.2004).

The DCCS had flaws in that it allowed the import of cheap goods that were affecting the domestic market. In order to address this setback, a revised DCCS was implemented in February 2005 that extended for two years (Robbins et al., 2005).

3.5.5 INTERNATIONAL TRADE AGREEMENTS

There were trade agreements between the United States and the European Union. On the 1 January 2000 the European Union and South Africa signed a Trade and Development Cooperation Agreement which provided that European Union tariffs be reduced to zero over a six year period. South African tariffs were to be cut to approximately half of the most-favoured nation (MFN) tariff level over a period of eight years. The most favoured nation (MFN) clause binds a country to apply to its partner country any lower rate of import duties that it may later grant to imports from some other country. As an example, the tariffs on clothing products imported from the European Union were be lowered from 40% to 20%, on fabric from 20% to 10%, and on yarn from 15% to 7.5% (Gibbon, 2002).

The US Africa Growth and Opportunities Act (AGOA) that was implemented in 2001 provided countries that participated in the agreement, with a reduction in tariff duties for clothing products being exported to the US market for eight years. In the SA situation, the three processing stages of clothing production, that was the value chain of yarn to fabric to garment production needed to be completed to qualify for reduced duties. Certain developing African countries were fortunate in that only one stage in the production process required completion for a period of four years in order to qualify for reduced duties (Van der Westhuizen, 2004).

3.5.6 THE EXPORT PROCESSING ZONE

South Africa did not effectively promote the export policy in the clothing and textile industry. Exemptions were granted to organisations from certain taxes and labour laws. Thus cheap goods were produced with a focus on the export markets through the creation of “export processing zones.” This was a boost for the industry in terms of employment opportunities and economic growth. (Van der Westhuizen, 2004).

3.5.7 SOUTH AFRICA’S LABOUR POLICY

Trade and labour liberalisation had not gone together. With the SA government’s focus on supremacy of a free market, employers in the clothing and textile industry are resistant towards the continuous escalation of wage rates that are exerted from major stakeholders, the workforce, the union and the bargaining council. The inflexible South African labour legislation has major implications on human resources in the industry. The high labour costs pressurised several SA organisations to relocate to neighbouring countries, where labour costs are cheaper (www.da.org.za, 2005).

3.5.8 MINIMUM WAGE LEGISLATION

The determination of wage rates has a major impact on cost structures of organisations. This is especially so when the various cost contributors, namely fixed costs, variable costs, location of production facilities and systems of production differ significantly. Clothing manufacturers in South Africa remunerated at an average wage of R12.50 per hour (R500.00) per week for a machinist in an urban location (Wage Board, 1997). This makes it virtually impractical for South African manufacturers to compete with manufacturers in Hebei province in China who pay R5.00 per hour (R200) per week to machinists (Nel et al, 2006).

3.5.9 STATUTE LABOUR REGULATIONS

Section 16 of the Basic Conditions of Employment Act of 1997 provided legislation regarding a wage premium for overtime work and work done on Sundays, which impact labour costs. South African organisations are required to remunerate employees 1.5 times the normal hourly wage for overtime work or work done on Saturdays. Sunday remuneration is double the standard hourly wage rate. The rest of the clothing and textile manufacturers around the world do not apply similar remuneration structures and China is no different (Nel et al, 2006).

3.5.10 BUSINESS PROCEDURES

South African law formulated procedures regarding the establishing of businesses. There is a major time factor in the completion of various legal documents. The Democratic Alliance mentioned that the legal process in connection with the restructuring of the workforce takes approximately three months. These are some of the issues that prevent the establishment of private industries (www.da.org.za, 2005).

3.5.11 IMPORT COMPETITION

Many organisations are placed under pressure by liberalisation and import competition. Organisations are impacted upon with regards to their employment rates, profitability, product design, development and range and the application of technological expertise. Current experience suggests that liberalisation has an influence in the entire value chain in all its contexts. Organisations are forced to change their products or their production techniques due to the high level of competition in the industry. Certain organisations used the opportunity to establish export initiatives. Eighty percent of the organisations reported that there is a major threat to the domestic market as imports are increasing on a regular basis (www.da.org.za, 2005).

China and South Africa signed a voluntary restraint agreement to limit the flooding of Chinese clothing and textiles products into South Africa. (www.newsratings.com, 2007). Clothing workers are extremely happy that such an undertaking was reached among government players and that there is a possibility that their jobs may be safe. This would give the local industry a chance to rebuild itself. "We need to use the space created to ensure we make our factories state-of-the-art and improve training of workers on a scale that would develop South Africa into a world-class producer," clothing and textile union representative mentioned in a press conference (le Roux, 2006).

3.5.12 THE INCREASE IN CHINESE IMPORTS

According to the Democratic Alliance "the volume of imports of made-up textiles such as blankets, bed linen, kitchen and toilet linen and curtains from China grew by 80% from 2001 to 2002; 196% from 2002 to 2003; and 88% from June 2003 – June 2004. The current portion of all imports into SA made up by Chinese imports was as follows: fabric – 40%; textiles – 60%; clothing – 86%" (www.da.org.za,2005).

According to the Department of Foreign Affairs, South Africa forged links as a significant trading collaborator of China on the African continent. The total value of China-Africa trade amounts to approximately 21 percent of the total volume of China-Africa trade. South African exports to China was in the region of R14.02 billion and imports from China reached R46.72 billion in 2006 (www.dfa.gov.za, 2007).The table below provides an overview of China-South Africa trade statistics.

Table 3.2. China-Africa Trade statistics (www.dfa.gov.za)

| Year | SA Exports | SA Imports | Trade Balance |
|------|-------------|-------------|---------------|
| 2006 | R14 109 861 | R46 718 798 | -R32 698 937 |
| 2005 | R 8 763 191 | R31 476 631 | -R22 713 440 |
| 2004 | R 6 580 392 | R23 021 153 | -R16 440 760 |
| 2003 | R 6 704 340 | R16 600 250 | -R 9 895 910 |

3.5.13 THE PRICE DECREASE OF CHINESE IMPORTS

With the escalating degree of Chinese imports, the economic assessment of Chinese imports grew in the region of 44% during the year 2003. It was reported by the textile federation that SA customs authorities allowed Chinese garments into SA at free on board prices. It was found that the price of the imports were lower than the price of raw materials on the world market. (Inggs, 2005).

3.5.14 SOME REASONS FOR THE LOW PRICES OF CHINESE IMPORTS

The DA reported some of the reasons for Chinese supremacy as the following:

- The Chinese currency,
- low labour costs and
- state-subsidised textile and clothing firms (www.da.org.za, 2005).

According to the world trade organisation (WTO, 2005) China's currency was undervalued in the region of 40% against the US dollar. This greatly enhances China's ability to export its clothing and textiles at low prices. The Rand was significantly unsteady against the dollar over the past few years prior to 2005, depreciating in the region of approximately 30%. The demand for Chinese clothing and textile production strengthened across the global markets, impacting on the SA domestic market (Barnes, 2004).

Approximately 50% of the textile industry and 25% of the clothing industry in China is owned by the Chinese government, while many are subsidised by national government, provinces or municipalities. In addition to this, Chinese exporters obtain a rebate of up to 13% on their exports. Chinese clothing and textile organisations receive financial assistance in the construction of facilities which often did not require repayment (www.da.org.za, 2005).

3.6 TRENDS IN THE CLOTHING AND TEXTILE INDUSTRY IN SA

The clothing and textile industry is on a downward spiral since trade liberalisation. Some of the issues are discussed below.

3.6.1 DECLINING VALUE

Barnes, et al (2004) mentioned that the clothing sector performed poorly. The researcher quotes from Barnes, "By comparing the average of the indicators for the period 1994-8 with the average for the period 1999-2003, it was clear that the sector's performance deteriorated. In particular, there was deterioration in real value added at basic prices (10.4%), real-exports (4.4%), employment (0.6%), output per employee (11.9%), remuneration per employee (6.8%) and gross mark-up (7.8%). Interestingly, both exports and employment increased (by 1.8% and 1.1% per annum respectively) from 1994 to 1998, but declined (by 8.0% and 1.1%) from 1999 to 2003, while real value added declined consistently over the two periods. Real output per employee declined from R67,935 to R60,716 between the two periods, whilst remuneration per employee also fell (from R18,935 to R17,224)."

3.6.2 EMPLOYMENT TRENDS

Employment in the clothing and textile industry is unsteady. It fell by 18.8%, from 124 687 employees in 1993 to 101 234 by Sept 2004 – a loss of 23453 jobs. It is important to note that official statistics is likely to underestimate total clothing industry employment as informal, micro and home industries tend to be excluded. It was estimated that total clothing and textile employment to be 158,879 by end 2005 (Barnes et al, 2004).

Employees of the clothing and textile industry experience problems in finding suitable employment. Some of these employees formed closed corporations and excelled in their ventures.

Table 3.3 Employment trends in the SA clothing and Textile industry (www.statssa.org.za, 2005).

| | Spinning, weaving & finishing | Other textiles | Knitted/crocheted fabrics & articles | Clothing |
|---------|-------------------------------|----------------|--------------------------------------|----------|
| 1993 | 35 260 | 30 695 | 15 976 | 124 687 |
| 1994 | 35 839 | 32 053 | 14 567 | 124 538 |
| 1995 | 34 641 | 32 369 | 13 682 | 134 945 |
| 1996 | 45 566 | 32 886 | 19 158 | 149 219 |
| 1997 | 42 744 | 32 713 | 18 484 | 136 433 |
| 1998 | 30 169 | 26 725 | 14 540 | 113 577 |
| 1999 | 26 278 | 27 719 | 11 661 | 122 380 |
| 2000 | 25 379 | 30 097 | 11 150 | 125 237 |
| 2001 | 25 203 | 28 169 | 10 701 | 122 513 |
| 2002 | 26 634 | 27 904 | 10 913 | 122 531 |
| 2003 | 23 029 | 34 765 | 12 675 | 103 935 |
| 09/2004 | 19 954 | 31 516 | 10 107 | 101 234 |

3.6.3 CLOSURES OF CLOTHING ORGANISATIONS

Clothing and textile organisations in South Africa that are unable to cope with the changes in industry sought closure as a resolution. According to the Inggs (2006) approximately thirty clothing and textiles companies closed since July 2002. Many of these organisations sought legal advice on the process of liquidation. Closures are wide ranging, from textile manufacturers that produce standardised products to clothing manufacturers who focus on the fashion trends of the industry. Chinese imports proved to be intimidating force for the entire clothing value chain.

3.6.4 PARTIAL CLOSURES OF ORGANISATIONS

Organisations that are involved with standard products found the competition stifling. These organisations (especially textiles) are pressured to shut certain parts of the operations only. A very good example is Coats South Africa that closed its spinning and twisting departments. It imports yarn ready for the dyeing process from sister companies around the world. Such organisations streamlined the production process to focus on specialised products (Barnes et al, 2004).

Organisations that focused on niche markets managed to become highly profitable. The National party supported a textile manufacturer in the production of parachute fabric manufacture and material for bullet-proof vests and airbags. Other organisations that maintain their competitive edge are those that supply the paper/pulp industry and the mining industry. (www.da.org.za, 2005).

3.6.5 SOUTH AFRICAN ORGANIZATIONS FOREIGN TAKE-OVER

Trade liberalisation prompted organisations to focus on its competitive abilities. In this regard an investment in the latest technology and human assets is required. Foreign investment is imperative to bolster the industry in its pursuit of becoming competitive. The latest example is Edcon, which was taken over by the Anglo-American group in April 2007. Approximately 30 percent of the clothing and textile firms in SA are under foreign ownership as organisations strained under competitive pressure (Audet, 2004).

3.6.6 RELOCATIONS OF SOUTH AFRICAN ORGANISATIONS

Many clothing and textile firms, South African clothing industries (SACI) as an example, relocated to industrial districts such as Isithebe, Madadeni and Ladysmith. The organisations in urban areas are required to comply with the Bargaining Council regulations and unionised labour, thus escalating the cost of production. Rural areas constituted discretionary wage rates as determined

by the employer and minimal union interference. The union has an important role to play in the South African clothing industry but stakeholders need to apply themselves in a harmonious relationship (Robbins, 2004).

Many clothing and textile manufacturers abandoned their South African operations to set up facilities in neighbouring countries such as Lesotho, Swaziland and Botswana. The Botswana government provides incentives for clothing and textile manufacturers to invest in the country. In addition to this, there is skilled labour at approximately half the price of SA. These manufacturers are allowed to import raw materials according to the AGOA agreement (Barnes, et al. 2004).

The Botswana government provided incentives to draw organisations into the country. The major incentive is the payment of approximately 80% of the payroll costs for the first three years. Botswana provides excellent investment opportunities where the clothing industry could thrive. Taxes imposed on clothing manufacturers are much less than those imposed in SA. One textile manufacturer that set up its facilities in Botswana was Waverly Blankets, which relocated in June 2001 (Robbins, 2004).

3.6.7 PERFORMANCE OF THE INDUSTRY

The clothing industry in SA is performing in the region of 85% labour efficiency (Basdeo, 2005). Capital expenditure on new assets averaged approximately 1.4% of sales (Robbins, 2004). With clothing manufacture being labour intensive it is important to advance through the investment in capital requirement and technological innovations to overcome the competitive nature of the industry. Exports decreased, while imports increased. Labour efficiency of the SA clothing operators is approximately on par with the United Kingdom, European Union and the United States but it is the application of technology, working culture and productivity levels that are a matter of concern (Basdeo, 2005)

3.7 GLOBAL AND LOCAL POLICY FRAMEWORK

3.7.1 MULTILATERAL AGREEMENTS

Multi-Fibre Agreement (MFA): The MFA came to an end on December 31, 2004. This meant the termination of all quotas on textiles and clothing trade between WTO member states. This is having an impact on clothing and textile industries around the world. China is using this as a weapon to flood the clothing and textile markets. In a quota-free world, experts in clothing and textiles envisage that China's dominance on world markets would continue at an alarming rate, and double its exports over the next five years (Gibbon, 2002).

China and India are expected to dominate global production, with preliminary evidence from early 2005. India's overall clothing and textiles exports increased 33% in January 2005, when compared against January 2004 figures. China experienced an even more astounding 546% increase (WTO, 2006).

African Growth and Opportunities Act (AGOA): It was formulated by the United States and allowed tariff preferences to 37 Sub-Saharan African (SSA) countries. The programme stipulates that clothing production consists of US fabric, yarn and thread, or from fabric, yarn and thread that is produced in an AGOA-beneficiary SSA country (Barnes, 2004).

3.7.2 NATIONAL GOVERNMENT POLICY

Duty Credit Certificate Scheme (DCCS in SA): The programme was initiated by the South African government and provided incentives for SA manufacturers to export their products. The programme ended on the 31st of March 2005. This was replaced by an Interim Clothing and Textiles Scheme to run until the 30th of September 2006. The objective of the DCCS was to promote the exports of the clothing and textile products from SA manufacturers (Barnes et al, 2004).

The exporter thus claims a rebate for exported goods. The DCCS was exploited as the rebates were sold to importers who gained tax relief on imported garments. Thus retailers received between 30-40% discount for importing clothing and textiles into South Africa. This impacted on the domestic market by reducing demand of local production (Barnes et al, 2004).

The misuse of the DCCS damaged the domestically oriented clothing firms. In addition, the appreciation of the Rand during 2003 reduced exports of clothing manufacturers, leaving many organisations uncompetitive in their export initiatives by 2004 (Barnes et al, 2004).

Table 3.5 Exchange rate in SA (www.oanda.com 18 Feb 2006)

| Year | Average | As at 31/12 |
|------|---------|-------------|
| 2001 | 8.62 | 12.11 |
| 2002 | 10.53 | 8.66 |
| 2003 | 7.57 | 6.65 |
| 2004 | 6.44 | 5.67 |
| 2005 | 6.38 | 6.35 |

The information on table 3.5 above indicates that the SA Rand strengthened by approximately 50% between 2001 and 2005. This meant that imports which were priced in US dollars cost 50% cheaper 4 years ago. This poses a major threat to SA manufacturers as cheap imports are flooding the market.

3.7.3 PROVINCIAL GOVERNMENT SUPPORT

Provincial governments of the Western Cape and Kwa-Zulu Natal set aside funding to support the clothing and textile industry. The Western Cape government was funding a Cape Clothing Cluster (Ralis, 2005). The objectives were as follows:

- Joint action between clothing firms to achieve financial stability;

- Knowledge enhancement through the exchange of expertise;

The objectives focus on four areas, namely

- human resource development;
- manufacturing excellence;
- supplier development and;
- capital upgrading.

The Kwa-Zulu Natal Clothing and Textiles Cluster were formulated on the principles of the Cape Clothing Cluster which was formally launched on the 1st of August 2005. Both provincial governments funded a variety of smaller projects and research to gain an in-depth understanding of the dynamics of the sector. The Ralis (Rapid Appraisal of Local Innovation Systems) Project was completed in the Western Cape in 2006 and provides valuable information on improving the industry.

The view of the clothing sector is that government policy is not providing an environment conducive to industry growth. The strength of the Rand makes South African clothing exports less competitive in their destination markets with many exporters losing international contracts. The strong Rand also fosters increased domestic market competition through the availability of cheaper imported clothing.

The DCCS replacement programme is placing exporting firms in a difficult position with regards to the viability of securing future export contracts. Illegal imports are further dampening the spirits of clothing and textile manufacturers. A common belief among industry stakeholders is that the customs service department failed in the policing of clothing imports into the country. Finally, the sale of discounted products on the local market impacted local production (Bennet, 2003).

3.8 THE CLOTHING SECTOR IN DURBAN

The largest clothing and textile cluster can be found in the Durban Metropolitan Area (DMA) in KwaZulu-Natal. The Kwa-Zulu Natal National Bargaining Council for the Clothing Manufacturing Industry list as at May 2007, cites a total of 347 registered clothing companies employing 26785 persons (Palmi, 2007). The gross output of the industry is in the region of 79%, and production wages is estimated at 76% of the provincial clothing wages (Barnes et al, 2004).

Bennet (2003) mentions that clusters of clothing manufacturers can be found in the Durban central business district in the regions of Beatrice and Gale Streets and in Stamford Hill, Sidney and Umbilo Roads. In the southern metropolitan regions, clothing producers are found in areas such as Chatsworth and Umkomaas, whilst in the northern metropolitan area they are found in the Phoenix and Springfield industrial parks (Bennet,2003).

At least 300 clothing firms focused on the cut/make/trim production process. Some of the reasons for the development of the industry in Durban were skilled labour, competitive labour rates and the location of raw material inputs that was readily available (Barnes et al, 2004).

Low barriers led Indian entrepreneurs' ready access into the clothing industry. The low set-up costs together with the domestic market demand encouraged entrepreneurs to set up facilities which promoted the industries' growth in Durban, especially in terms of CMT operations through the 1980s.

The rapid development of the clothing industry became a major weakness as manufacturers failed to develop links with the retail sector. To aggravate the situation, the industry in Durban is plagued with clothing imports. Wage rates became a contentious issue as manufacturers found it difficult to meet the bargaining council rates (Barnes et al, 2004).

According to Minor, (2002) clothing manufacturers experienced vulnerability to competition on both the domestic and international markets. Organisations within the Industrial Council are regulated by the bargaining council to remunerate employees according to regulated wages while a certain number of manufacturers operated unregulated (Minor, 2002).

An increasing number of CMTs manufacturers in Durban are consequently resorting to “informalisation” (garage operations at home) to enable them to compete. Several CMT manufacturers are pressured into operating unregistered to compete on the basis of product cost (Basdeo, 2005). The South African Revenue Services is taking steps to get small business on board with South African Revenue Service regulations, but there is an element of those manufacturers that remain “undiscovered” and operate in rural areas (Basdeo, 2005).

Although there is intense competition, only a handful of manufacturers took cognizance of the impact. Manufacturers adopt the attitude of “operation for the day” and survived the past few years. It is hoped that action, both from manufacturers and government, would be taken in time to save the manufacturers’ from liquidation. It is evident that there are gaps within the supply chain as manufacturers operated independently (Bennet, 2003).

From a manufacturer perspective, price is a critical issue. Barnes et al (2004) mentions other factors such as quality, delivery times, innovative capacity, quick response, and flexibility are becoming important as qualifiers within the industry, particularly in the higher value added segments of the market (Barnes et al, 2004).

Clothing manufacturers face another dilemma, the cancellation of orders due to not meeting delivery dates. The result is the carrying of excessive levels of inventory which results in cash flow problems. The clothing manufacturing industry places major emphasis on garment specifications and the achievement of quality production and with low quality inputs and a low technological level this is virtually impossible to achieve (Morris, et al. 2004).

3.9 CONCLUSION

The experience of the South African clothing and textile industry suggests that although there are returns for exporting initiatives, the organisation needs to understand its competitive potential from an international perspective. Organisations that took advantage of the export markets, maintained their position on the basis of their technology, production capability and quality orientation.

The desire to become part of the international market and combat the effects of trade liberalisation and globalisation can be achieved by the investment in process improvements in all its contexts. The adaptation of technologies, skills development and the empowerment of the workforce through effective communication are essential ingredients in creating a relationship that would improve the organisational climate (Robbins and DeCenzo, 2007). This provides impetus for the development of an engineering management framework suggested further on in this thesis.

The clothing and textile industry is an economic driver that could create new opportunities for Durban and the country as a whole. Whether the clothing and textile industry in Durban and the rest of Kwa-Zulu Natal would respond accordingly depends on how organisations and their respective stakeholders react to this scenario. Chapter 4 describes the survey in the clothing industry through a case study.

CHAPTER 4 CASE STUDY OF THE CLOTHING INDUSTRY

4.1 INTRODUCTION

The DTI 2005 report indicated that micro and small enterprises have a huge potential in job creation in developing countries and especially in South Africa. The clothing and textile industry is a major role-player in economic development in developing countries in particular. The performance of the clothing industry in terms of productivity, working conditions, social protection, is a matter of concern. From a general perspective, wages, job security, health and safety and opportunities for skills development compare negatively between the various levels of the hierarchy in the industry. Generally the smaller organisations create employment opportunities, but with poor working conditions and frequent exploitation of labour. Therefore, it is imperative that labour unions be involved to protect their members. Improvements in working conditions and protection of the workforce are key factors for business success. This chapter provides an overview of the experiences of manufacturers in the clothing industry in Durban through a case study application using a questionnaire (Appendix 1).

4.2 THE CLOTHING AND TEXTILE SECTOR IN KWA-ZULU NATAL

There are many challenges facing the clothing and textile industry in the world, and SA is no exception. Competition from both the domestic and international markets is crippling both the clothing and textile industries. However, with a reservoir of experience and expertise within the industry, it could re-establish itself as a forceful industry with an ability to challenge competitors both domestically and internationally through a focus on added value, exceptional quality and the effective application of all resources through technological application. This led to the formulation of the business process improvement framework in chapter 5.

Other aspects that influence the clothing and textile industry into the next decade include issues such as mechanisation and automation, research and

development, expertise and skills base, quality orientation, and above all, the eradication of import quotas. The DTI recently embarked on negotiations and finalised an agreement with China to limit imports of clothing and textiles into South Africa. Other factors influencing the decline in the industry include the following:

- an inability to adjust to the change in the industry;
- the lack of effective performance management and leadership qualities;
- inefficiencies in all departments of the industry;
- top heavy structures;
- family-owned businesses which were operated conservatively with low investment and a lack of managerial qualities;
- lack of knowledge, skills and training strategies in the industry;
- lack of strategic thinking and positioning;
- pressurised industry with poor labour relations;
- working in “silos”;
- lack of efficient communication between departments and organisations;
- internal politics marked by an “apartheid mentality” (Esset, 2003)

4.3 METHODOLOGY

The research methodology adopted in the investigation included a literature review of available documents on the industry such as Clofed, Texfed, relevant research reports from the DTI, NEPAD, newspaper articles, journal articles such as the International Journal of Clothing Science and Technology and Operations Management, interviews and discussions with organisational staff and leadership (Cooper and Schindler, 2006). Research results are presented in an integrated format where data from literature and other available documents are discussed together with own research data gathered from interviews and questionnaires.

4.3.1 THE TWO MAIN SOURCES OF INFORMATION COMPRISED:

4.3.1.1 INTERVIEWS/DISCUSSIONS

A substantial quantity of information was obtained from a succession of interviews and discussions conducted with different stakeholders from industry, including workers, supervisors, line managers, management and unions. It was extremely difficult to obtain information from all the stakeholders as time was a crucial issue in a highly competitive production environment. Workers were busy with producing output while the researcher spoke to them on a one on one basis. Groups of workers were spoken to during breaks. Interviews were conducted with middle and senior management on a one on one basis in their offices. However, all interviewed personnel forbid the exposure of their names to any person within and outside the organisation.

4.3.1.2 OTHER SOURCES

In addition, the researcher utilised information from public and private sector data. The information gathered by the DTI, Statssa, and the SETA proved invaluable.

This study was conducted by collecting information on the current status of the clothing industry in Kwa-Zulu Natal, focusing primarily on the Durban Metropolitan area. As per Cooper and Schindler (2006) the research comprises a qualitative exploratory and descriptive design. The purpose of investigation was to highlight current practices and manufacturing methodologies by direct observation at clothing manufacturers in Kwa-Zulu Natal in South Africa and to accurately and carefully describe experiences relating to manufacturing practices. Personal interviews and direct observation also formed the basis of information gathering.

The sample in the investigation comprised clothing manufacturers in the Durban and surrounding areas totalling 146 factories of a possible total of 416 factories. Of the 146 formal factories, 3 were from the informal sector. To

initiate and speed the investigation process the researcher conducted telephonic interviews, in-factory interviews with managers, supervisors and shop-floor employees. To obtain an insight into current manufacturing practices, the researcher visited factories for approximately five hours and recorded while observing the entire chain of activities from input raw materials to the dispatching of finished products. A structured questionnaire as indicated in Appendix 1 was also used during the interview process. Certain questions were considered confidential and no answers were given. The results of an interview in raw data form are shown in Appendix 2. The raw data was updated and converted into a summary of activities in table format in Appendix 3.

4.4 LIMITATIONS OF THE STUDY

A research project generally has limitations. In this case, because of the competitive nature of the clothing industry, managers were weary of being interviewed. The primary obstacle encountered was that data for the clothing, textile, footwear and leather sectors was combined and approached as one sector. Therefore some data that was supplied included clothing and textiles. Due to the rivalry among manufacturers, the researcher was prohibited from sharing information among manufacturers and was asked to keep information confidential and participants anonymous. Information retrieved between all levels in the organisation was done under oath of remaining anonymous.

4.5 DESCRIPTION OF THE INDUSTRY

This section presents descriptive statistics from the survey sample, with comparisons to the overall industry where possible, for a number of variables. To respect the anonymity of factories, names and other direct identifying information are not included. Factory leadership strictly forbade the researcher from using actual company names, production output and productivity levels.

The formal clothing manufacturing sector is made up of four basic categories in factory sizes. As per Basdeo (2006) factories can be broken up as follows:

- Large organisation (with a staff complement of more the 200 people)
- Average organisation (with a staff complement of 50 to 199 people)
- Small organisation (with a staff complement of between 6 and 49 people)
- Micro-enterprises (with a staff complement of less than 5 people)

The clothing industry is dispersed throughout South Africa, but is condensed in the provinces of KwaZulu-Natal and the Western Cape. In Kwa-Zulu Natal, the clothing and textile facilities are found in and around the Durban Metropolitan area with pockets in the north and south coasts, Newcastle, Ladysmith, and Qwa-Qwa. In the Durban metropolitan region (only) there are about 300 organisations employing over 15000 workers. The major part of the South African clothing industry is dominated by small and average sized organisations, i.e. those employing less than 200 employees which make up the majority of CMT manufacturers (Edwards and Schoer, 2001).

According to the National Bargaining Council statistics, it is estimated that there is approximately 827 formal (registered) clothing companies in South Africa. The clothing and textile industry in South Africa is predominantly South African owned. There are a substantial number of foreign-owned organisations which are located in non-metropolitan areas. The majority of CMT manufacturers, as well as micro-manufacturers receive their customer orders from the larger independent organisations (Bennet, 2003).

Many industrialists from Chinese origin established clothing and textile operations in areas such as Hammarsdale, Mooi-river, Ladysmith, Isithebe and Newcastle. Clothing manufacturers appear to be medium-sized and focused on exclusive outer-wear for the middle to upper-end of the market. These manufacturers sometimes outsource their production to CMT (cut, make, trim) operations. The investigation focused on a limited number of “larger” organisations as these organisations restructured their facilities totally. The organisational employment information is characterised in table 4.1.

Table 4.1 Size of organisations interviewed

| Size | Informal | Micro | Small | Medium | Large |
|-----------------------------|----------|-------|-------|--------|-------|
| No of employees | 1-30 | 1-5 | 6-49 | 50-199 | >200 |
| No of companies interviewed | 3 | 10 | 54 | 75 | 4 |

The intention of this investigation was based on "full package clothing manufacturers." These are manufacturers who completed the entire value chain of clothing production i.e. from design of fashion to the dispatch to retailers. However, due to the "diminishing" nature of the large organisations, which have decentralised their operations, the focus moved to the small and medium sized organisations.

A number of organisations that have excelled particularly on the branded label markets are listed on the Johannesburg Stock Exchange (in the Clothing and Textiles Division). Some of the prominent players include organisations such as Seardel, Pals, Ninian and Lester, Goldina, Adonis, Levi. Some of these organisations were part of the investigation process. There is a significant connection between some of the local clothing manufacturers, and their foreign "counterparts."

Many of these organisations are connected to international conglomerates and set up independent facilities that are overseen or worked independently under licensing agreements. Household brand names such as Jockey international, Guess, Versaci, Gucci, Armani, Diesel, Levi, operate under franchise or license agreements. The size of the organisation correlates with the working conditions (table 4.12) where 80% mentioned a satisfactory work environment (Edwards and Golub, 2002).

4.6 SURVEY EVIDENCE THROUGH CASE STUDY APPLICATION

The survey focused on a qualitative approach of gathering information through questions based on the current experiences of the industry. Information was gathered through telephonic discussions, personal discussions with groups and individuals and direct observation. Appendix 1 provides questionnaire topics of the various categories of information gathered from the organisations while Appendix 2 provides an example of raw data from an organisation. Selected tables are shown in this chapter. Should the need for the examination of the data arise, please refer to Appendix 3 that provides information in tabular format.

4.6.1 OWNERSHIP

Table 4.2 Categories of ownership

| Ownership | No of companies | Sample size | Percentage |
|-------------------------------|-----------------|-------------|------------|
| Subsidiary of SA company | 52 | 146 | 36 |
| Subsidiary of foreign company | 3 | 146 | 2 |
| Privately owned | 61 | 146 | 42 |
| Owner Managed | 26 | 146 | 18 |
| Joint ventures | 3 | 146 | 2 |
| No change in ownership | 125 | 146 | 86 |

In the sample investigation 36% of the organisations are affiliated to a “larger” South African organisation, 2% are part of an international organisation, 42% are privately owned (i.e., independent) companies, 18% are managed in-house as family organisations, and 2% are an experiment conducted by international organisations as a joint venture. The majority of the sample (86%) mentions that there is no transformation in their change in ownership over the past twenty years, but this does not mean that ownership would not change in the future. Due to the pressure on the industry, the larger organisations decentralised their operations into smaller independent

business units, but are strategically controlled by the parent company. The entire clothing supply chain is faced with a challenge of survival of the fittest that influences ownership. Organisations change their ownership by either becoming CMT manufacturers, are absorbed within the larger organisations, or operate under illegal conditions (Edwards, 2001).

4.6.2 TURNOVER

The organisations' turnover varied from approximately 500 thousand Rand to 100 million Rand. Organisations are reluctant to divulge any actual turnover values. The listed organisations' financial statements reveal a turnover in excess of R 100 million per annum. These financial statements reveal the turnover of the group, and not of individual subsidiaries. The profitability of an organisation is dependent on its ability to survive competition through the effective maintenance of improvement strategies, which are prevalent in the larger organisations. The smaller CMT organisations are bearing the brunt of being squeezed from both the retailers and the larger manufacturers. But, should the smaller CMT manufacturers strategise their focus towards the implementation of the process improvement framework discussed in chapter 5, there is a possibility that they could out-perform the larger organisations.

4.6.3 AGE

Of the 146 organisations, 60% are over 20 years old, 25% are over 10 years, and the remaining 15 % organisations are between 2 and 9 years. The age of organisations ranged from 2 years to 50 years. The age of the organisation is important because the older organisations that failed to improve their profitability were eventually liquidated while other organisations that re-invested in technology and human resources were able to maintain their status.

4.6.4 CAPITAL SOURCE

The source of capital of 38% of the sample organisations is provided by the holding company while owners of the remaining 62% of organisations finance their own companies through savings or financial institutions. 35% of the owners of the CMT (cut, make, trim) organisations were retrenched from the larger organisations and set up their own businesses through pension payouts. The investment potential into an organisation is dependent on the output performance (table 4.6) and profit potential (table 4.14) of the organisation.

4.6.5 CUT, MAKE, TRIM (CMT) PRODUCTION

Of the 146 organisations visited, 58% concentrate on cut/make/trim production, and 42% focus on the design and development of fashion trends in the industry. Some of the cut/make/trim organisations manufacture their own “brand” of products. Many organisations had a drive to increase their operations but are faced with financial obstacles as competition drained their reserves.

Cut/make/trim organisations are inclined to be sole proprietors, while other organisations are usually a part of a larger organisation. The majority of the organisations are inclined to manage their own risk factors. The cut/make/trim industry is in a situation to outsource some of its operations to other organisations, such as embroidery. The outsourcing of production is considered as an effective means of evading the issues of labour and the elimination of overhead expenses. The CMT operations predominantly use the bundle system methodology (production systems 4.6.8) and have satisfactory to poor working conditions (appendix 3 no. 17). The profitability of CMT manufacturers (as indicated by personnel) correlates with the output performance (4.6.12) and the profit margin (4.6.21).

4.6.6 PRODUCT RANGE

The organisations in the investigation are focused on a varied of products namely, men's and ladies fashion underwear and outerwear, children's wear, surf-wear, knitwear and a variety of other assortments.

Table 4.3 Types of garments manufactured

| Type of garments | No of companies | Sample size | Percentage |
|------------------|-----------------|-------------|------------|
| Trousers | 29 | 146 | 20 |
| Ladies outerwear | 58 | 146 | 40 |
| Formal wear | 40 | 146 | 28 |
| Leisure wear | 17 | 146 | 12 |

The organisations that focus on in-house production are fairly specialised and pursued fashion trends. This led to the development of niche markets for example ladies blouses. Organisations that manufacture their own products had a designer on their team. Designers often travel abroad to source new fabric and ideas, focusing on fashion trends. The situation in the clothing industry is such that a manufacturer may specialise in trousers, but the demand may change overnight to ladies-wear. This is the type of flexibility that manufacturers implement on a regular basis.

For organisations manufacturing standard production, i.e. men's outerwear, work-wear, there is minimal emphasis on designer output. On the other hand, fashion-wear requires designers to travel around the world to obtain "fresh" ideas in the fashion world. The product profile of the sample is varied. The research reveals that men's' and boys' trousers account for 20% of the sample. This is followed by ladies outerwear 40%. Formal wear account for 28% and the remaining 12% is leisurewear and sportswear. Due to the uniqueness of the industry and the regular changes to the product line, it is difficult to assume that these organisations still manufacture these products. The type of product is linked to the size of production runs (4.6.7) in that

staple products would have longer production runs while fashion items would have shorter production runs.

4.6.7 SIZE OF PRODUCTION RUNS

The size of production runs varied from 50 to 10000 units per order and is changing on a day to day basis over all organisations. It is found that the CMT manufacturers are the ones that received the orders that ranged from 50 to 500 units and are pressurized for price and delivery dates. Production runs are dictated by retailers that find exceptional performance of the market on a particular style. Also, staple production, for example lounge shirts do not have style variations and are normally allocated to the “larger organisations.” This has an influence on output performance (4.6.12) and changeover times (4.6.9). The size of production runs and staple production determine the use of production systems (4.6.8). Four organisations implemented the rail system due to staple production. But due to the changing nature of production, one organisation had to scrap the system and implement the bundle system. With smaller production units, the modular manufacturing system (chapter 7) could be implemented especially for CMT manufacture.

4.6.8 PRODUCTION SYSTEMS

Four organisations (3%) use the overhead rail system for production manufacture. Units move from operator to operator for completion of the respective operation. The bundle production system is used in 97% of the organisations. One organisation was forced to abandon the overhead system as their product profile changed. Line balancing is of vital importance in the rail system as individual units moved through the system. Although the bundle system is a prominent feature of the clothing industry, manufacturers use it as a “buffer feeder” and fail to implement process improvement techniques to enhance production flow. Bundles of work-in-progress are found at workstations and sub-assemblies. Production systems correlate with the size of production runs (4.6.7), performance output (4.6.12) and profit margin (4.6.21).

4.6.9 CHANGE-OVER TIME

Organisations mentioned that their changeover time between product types is approximately 30 minutes. This is approximately the standard in the industry. Where there are similar product types, the changeover time is approximately 15 minutes, with minor adjustments to the layout of the production line. 25% of the sample experienced an improvement in machine changeover times. 7% of the sample claim that machine changeover times worsened, and a further 68% replied that changeover times remained largely unchanged. Change-over time correlates with the type of production system being used in the organisation (4.6.8) production systems and the size of production runs (4.6.7) this has an impact on output performance (4.6.12). With a reduction in change-over time, production time is increased and thus the profitability of the organisation. This could be a challenge either way, with CMT organisations being pressurised to be flexible and change their product output to suit the customer while the larger organisations have the benefit of more staple production.

4.6.10 INPUT SOURCES

Table 4.4 Input Sources

| Input sources | No of companies | Percentage | Sample size |
|-----------------|-----------------|------------|-------------|
| Local | 109 | 75 | 146 |
| Imported | 37 | 25 | 146 |
| Own label | 10 | 7 | 146 |
| Retailer labels | 136 | 93 | 146 |

As indicated in table 4.4 and appendix 1, 75% of the organisations use local production inputs while the remaining 25% use imported materials. It all depends on the lead time (4.6.25) and supplier links (4.6.13) that an organisation has. With a longer lead time, an organisation has the ability to source fabrics through its supplier links anywhere in the world. This is more favourable to the larger organisations that have the ability to create

relationships. The “smaller CMT” manufacturers bear the brunt of this as time is a limiting factor. Also, often CMT manufacturers are provided with the fabric that goes in the manufacture of the garment. All organisations complained that the clothing industry is a “cut throat” business and experience problems with price and delivery times. Management, especially in CMT manufacture did everything possible to reduce costs with a failure to implement fundamental process improvement strategies (4.6.5). 7% of the organisations have their own brand labels while the remaining 93% manufactured for their respective retailers. Input sources influence the price of the product and the profitability of the organisation (4.6.21).

4.6.11 EXPORTS

The mainstream production of manufacturers is concentrated on the domestic market. 71% of the sample indicated that they did not export their products. These clothing organisations use the local textile industry as a source of their fabric inputs, thus increasing the price of their products. The organisations that exported their merchandise, 14% of the organisations mentioned that their export markets improved in the years between 1999-2005, while 15% mentioned that their export markets were steadily being depleted.

The latest information is that 8 organisations (5%) stopped exports due to a lack of demand, and the rand/dollar exchange rate. The destination of exports was primarily the United States and the European Union.

The table 4.5 provides a holistic view of the changes in the imports and exports for the years 2002-2005. In 2003 exports grew strongly but fell in the face of a dramatically stronger rand, constraints in textile supply and uncertainty about continuing government support.

Table 4.5 Change in imports and exports for 1999-2004 (R's)
(www.statssa.gov.za)

| | 1999 | 2003 | 2004 | Growth 99-04 | Growth 03-04 |
|-----------------|--------|--------|--------|--------------|--------------|
| Garment Exports | 229577 | 341094 | 285448 | 24% | -16% |
| Garment Imports | 230394 | 364990 | 627811 | 172% | 72% |

Some of the large organisations of the sample chose to move their facilities to locations outside SA in order to remain competitive focusing on labour costs. One of the organisations established ties with China and India where their products are completed and shipped to South Africa. The SA manufacturer stored the products in a warehouse awaiting shipment to the local retailer. Many organisations (5%) sustained their competitive advantage through subcontracting their production. The value-adding phenomena grew in the industry with a focus on high-quality products. The creation of export niche markets enabled organisations to maintain their competitive position in the market (4.6.21).

4.6.12 OUTPUT PERFORMANCE

Table 4.6 Output performance

| Output Perform | No of companies | Percentage | Sample size |
|----------------|-----------------|------------|-------------|
| Steady | 63 | 43 | 146 |
| Deterioration | 83 | 57 | 146 |

The international labour organisation (2006) reported that “SA output dropped by 32.4 per cent over the 1999 to 2005 period, the outputs of Asia and the USA increased by 97.7 per cent and 76.3 per cent respectively. Figures show that SA's share of world output fell from 53 per cent in 1980 to 29 per cent in 1995” (ILO 2006). 43% of the organisations reported that during the period

1999 and 2005 the clothing output performance was steady, and the remaining organisations (57%) complained that output levels deteriorated. Output performance determines the profitability of an organisation (4.6.21) and while 43% of the organisation (especially the larger manufacturers) maintained their position, the smaller manufacturers (especially the CMT manufacturers) are the ones that failed to implement process improvement strategies to improve their competitive status.

4.6.13 SUPPLIER LINKS

Table 4.7 Supplier links

| Supplier links | No of companies | Percentage | Sample size |
|------------------------|-----------------|------------|-------------|
| CMT networks | 117 | 80 | 146 |
| Retailer relationships | 117 | 80 | 146 |
| Textile relationship | 15 | 10 | 146 |
| Own label | 7 | 5 | 146 |

A handful of clothing organisations (about 10%) managed to establish supplier links with the textile industry. One established example is Ninian and Lester which manufactures its own fabric for supply to manufacturers. A percentage, (approximately 80%) of the large and medium formal economy clothing organisations distributed production to the CMT industries. The larger CMT manufacturers (10%) were in a fortunate position and provided orders to the smaller CMT manufacturers. There is a case where an established manufacturer provided orders to CMT informal establishments, in order to overcome the price pressure.

SA textile mills are required to focus on smaller volumes with a quick turnaround time to gain their share on the domestic market. SA textile organisations hope that their location would provide an advantage with competition. Unfortunately, this is not the case as clothing manufacturers are

evaluating the international market for fabric inputs. Many manufacturers have succumbed to the pressures of the retail industry as they have a limited voice in the pipeline (Basdeo, 2006). Most clothing firms (80%) established relationships with the local retailers.

The relationship within the supply chain is a matter of concern, as organisations do not understand processes of fabric and clothing manufacture. Clothing manufacturers are often “squeezed” by retailers and often dictated prices of garments.

There is a major imbalance of power when clothing manufacture and retailing are considered. The return on investment for clothing manufacturers is approximately 4% while retailers earn in the region of 150 to 210 percent. Retailers controlled the consumer market by controlling the clothing manufacturers. 70% of total clothing sales in the country are controlled by the five largest retailers in the country (Basdeo, 2006).

Due to these circumstances, retailers dominate clothing manufacture in South Africa, as clothing manufacturers are inescapably dependant on the retail sector. The retail sector regulates the issues of quality specifications and delivery to clothing manufacturers. Some clothing manufacturers (5%) established themselves as retailers and marketed their own brand labels.

With reference to chapter two, the supply chain, for example, in the European Union, is closer in terms of sharing information and research and development in the clothing and textile industry. The value chain is linked by ownership and internal competition is limited.

Clothing manufacturers (especially the CMT operations) argue that the clothing retail sector is in the process of destroying the domestic markets as it imports a major range of its products. The challenge for the local clothing manufacturing industry is to implement measures that would enable them to survive competition, with the production of seasonal, high value-added production that would be able to compete with foreign production. The

establishment of relationships assist in the sharing of knowledge of the production process, the determination of prices and the ability to maintain output performance (4.6.12).

Table 4.8 Reduction in consumer prices expressed as a percentage: Clothing and footwear (SARS Quarterly Bulletin – annual 2005).

| | | | | | | | | | |
|------|------|------|------|------|------|-------|-------|------|-------|
| 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| 4.9% | 3.9% | 3.2% | 1.0% | 1.0% | 0.9% | -0.5% | -1.3% | 1.6% | -3.8% |

Regarding consumer prices, table 4.8 indicates price reduction in both the clothing and footwear industries due to increased sales of imported clothing and footwear, with the most significant decrease from 1997-1998 onwards, also the year when the trade balance with China in clothing products swung to the negative.

4.6.14 LABOUR



Labour is an important asset in an organisation and need to be treated as such. Larger firms mention that labour costs are between 20 percent and 50 percent of total cost, while smaller, predominantly CMT operations estimate labour costs at between 60 percent and 80 percent of total costs. It is therefore not surprising that smaller firms have a higher tendency to retrench employees. All the labour (machinists) is sourced from the nearby areas. Skilled labour is recruited through advertisements and sometimes relocated close to the factory. Many travel for 100-200 kilometres to get to work which impacts the productivity levels of employees.

The general trend is that organisations prefer to work short-time rather than retrench workers. 89% of the sampled organisations retrenched and recruited in 2005. There is a very strong sense of duty on the part of small employers, conscious of the fact that many of their employees (89% women) are sole breadwinners in their homes (Palmi,2007). Few of the bigger firms (3%)

retrenched, but they were also the ones who could afford to relocate to outlying areas if necessary. A few small organisations (5%) indicated that if conditions in the sector did not improve, they are considering going underground and operating illegally, but still remaining in the central urban area. The cost of labour determines the performance (4.6.12) and profitability of the organisation (4.6.21).

Table 4.9 Job losses in the clothing industry (www.statssa.2005)

| Year | Clothing |
|---------|----------|
| 1996 | 149 219 |
| 1997 | 136 433 |
| 1998 | 113 577 |
| 1999 | 122 380 |
| 2000 | 125 237 |
| 2001 | 122 513 |
| 2002 | 122 531 |
| 2003 | 103 935 |
| 09/2004 | 101 234 |



Basdeo (2006) mentioned that workers who were retrenched (table 4.7) by textile and clothing firms encountered great difficulties in finding other employment. Many are being plunged into extreme poverty. The retrenched workforce used this as an opportunity to venture into setting up their own businesses, while others resorted to the unemployment insurance fund for assistance.

Employment levels in the industry fluctuated in the past 16 years since the implementation of free trade agreements between nations (3.7.1). The majority of the sample (73%) complained about the decline in employment levels during the 1999-2005 periods. The information elucidates that the clothing industry was experiencing loss of employment over the last 5 years prior to 2005.

StatsSA reported that the formal clothing industry in SA employed in the region of 124037 people (www.statsa, 2005). However, their figure is disputed by the union as employment, retrenchments, closing down of companies, opening of informal clothing manufacturers occur on a regular basis (Bell, 2006).

4.6.15 WAGE RATES

Wage rates are determined through negotiations in the National Bargaining Council (BC) for the industry in SA. All employers in the clothing sector are required to be registered with the bargaining council, which was established through a consolidation of the regional bargaining councils in 2002. Even if a manufacturer is not party to agreements on wage rates and conditions of employment concluded in the bargaining council, such agreements are extended through a ministerial order to non-parties. The only employers who are exempted from paying the agreed-upon wage rate are those with five or less employees (Bennet, 2003).

The clothing industry's wage structure in SA differed according to geographic location. Cape Town workers receive the "metro rate", which is between 40 and 50 percent higher than the official rate of the "non-metro" areas where the majority of clothing workers in Kwa-Zulu Natal work. "Metro wages" also include benefits such as medical aid and provident fund which is not part of "non-metro" wages. In 2005, trained, experienced clothing workers earned R611 per week in Cape Town, compared with R463 in Kwa-Zulu Natal. 91% of the sampled organisations paid wages according to the bargaining council rate. All organisations (100%) used temporary labour as required.

Table 4.10 Comparison between hourly wage rates for 2005 in dollars
(Ramdass, 2005)

| SA non metro min wage | SA informal sector rate | SA formal sector | China | India | Bangladesh | Kenya | Mauritius | China entry level |
|-----------------------|-------------------------|------------------|--------|--------|------------|--------|-----------|-------------------|
| \$0.59 | \$1.26 | \$1.59 | \$0.78 | \$0.44 | \$0.46 | \$0.44 | \$1.44 | \$0.29 |

Table 4.10 shows the different hourly wage rates in South Africa compared with its main competitors in the global clothing market in 2005. The formal rate in SA is about five times greater than the entry level rate in China. The average rand dollar exchange rate used for 2005 was R6.38. The minimum hourly rate paid at factories in rural Kwa-Zulu Natal and elsewhere is lower than urban rates, as per the bargaining council approved rates. Lower wages in rural areas correspond with the lower skills levels of workers producing lower-value garments aimed at the mass market. Thus, organisations that established themselves in rural areas over the past 20 to 30 years are reaping the benefit of low labour costs with acceptable quality.

Seven CMT/full house operations that moved to Qwa-Qwa and Isithebe are finding it extremely difficult to produce the required quality specifications, thus making operations extremely difficult. In addition to this, there is a major language barrier, making communication virtually impossible (Ramdass, 2005).

Andre Kriel, the deputy general secretary for the Southern African Clothing and Textile Workers' Union mentioned that the minimum wage in the non-metro areas is already low. "Before the new wage increase comes into effect, the minimum weekly wage for an (entry level) general worker is about R475.00 and for an (entry level) machinist about R500.00. "We find it disappointing that non-metro employers tried to block this increase on an already very low minimum wage for workers in the poorest parts of the country" (Inggs, 2006).

However, John Lingenfelder, the spokesperson for the associations, said that there would be massive retrenchments and company closures starting from February 2005 if non-parties were forced to pay NBC rates, as each factory would have to pay at least R250000 including back-pay. The clothing industry lost more than 14 000 jobs in 2005 (Inggs, 2006).

Solly Zaidal, the chairman of the Northern Decentralised Clothing Manufacturers' Association and owner of Soviet Jeanswear Company, said that if employers were forced to pay NBC rates, many more workers would lose their jobs. "I don't think there is a single employer who won't have to consider retrenching workers if forced to pay higher wages," he said. "If the cost of merchandise changes, employers will have to consider whether they can continue manufacturing and still make it viable or whether they should look at other markets such as imports."

Zaidal said that a lot of people had already turned to importing as it was a lot easier. "However, it doesn't, unfortunately, create employment." He said Soviet, which employs 350 people, would continue to manufacture but could introduce a manufacturing/importing business mix (Mangxamba 2007).

Constance Madondo, a supervisor who worked at Soviet's factory for 26 years, said the R20.80 increase would be "really great", but it would be better for no one to get it rather than for some people to lose their jobs as a result. "Some people are really poor and they depend on the job for survival so for them to lose their jobs would make it very difficult," she said.

With respect to short time and retrenchment, 95% of the sampled organisations worked both short time and overtime in 2005. The larger organisations were less affected than the average and smaller organisations as they were more stable due to their market share (Mangxamba, 2007). The competitive wage rates in the industry determine the profitability of the organisation (4.6.12) and the performance (4.6.21) as this influences the morale of the clothing industry workforce.

4.6.16 TRAINING AND DEVELOPMENT

Many organisations (87%) utilise in-house training initiatives (appendix 3 for table) especially the larger organisations. The larger organisations seem to maintain their competitive status through training initiatives. Although there are training initiatives, it was difficult to differentiate the focus of training initiatives and the impact of training. The larger firms (>200) employees mentioned that they are not satisfied with the content of training materials as it is too theoretical. Employers experienced “poaching” of trained labour. There is a possibility that the training that is done may not be the correct training although training may be mentioned as an activity in the organisation.

Table 4.11 Training and development

| Training and development | No of companies | Percentage | Sample size |
|--------------------------|-----------------|------------|-------------|
| In-house training | 133 | 87 | 146 |
| Own training department | 13 | 10 | 146 |
| Multi-skilling | 7 | 5 | 146 |
| Increased investment | 47 | 32 | 146 |
| Reduced investment | 41 | 28 | 146 |
| Unaffected | 42 | 29 | 146 |
| Unaffordable | 31 | 21 | 146 |
| Declined R&D | 61 | 42 | 146 |
| Eliminated R&D | 85 | 58 | 146 |

The larger (10%) organisations that had a training department focused in the following training themes which seemed to have a positive impact on the output performance of these organisations (4.6.12) and profitability (4.6.21):

- HIV Aids
- Financial Planning
- Motivation
- Work-study
- Life skills
- Multi-skilling
- World-Class Manufacturing

Clothing and textile industry stakeholders are involved in discussions regarding the improvement of skill levels. The union suggested the multi-skilling of operators, i.e. enabling operators to become proficient in multiple tasks.

Although many organisations understood the concept only (5%) made any attempts to implement the initiative. One organisation tried the concept, where operators are empowered to manage the production process without supervision. The various operations are rotated regularly, thus enabling operators to become proficient in the different tasks. The team approach gave the workers a sense of belonging and accomplishment as they are empowered to totally manage the production process.

Many organisations (32%) reported that they increased their investment in human resource development (HRD) while 28% reduced HRD investment and 29% mentioned that their HRD investment was unaffected. A considerable 21% of the sample mentioned that they could not afford any investment in HRD. Many organisations (55%) were involved with CTFL SETA initiatives for learnerships and short courses. In Johannesburg, for example, the department of fashion in the Faculty of Arts, Design and Architecture (FADA) at the University of Johannesburg and the CTFL SETA are developing a memorandum of understanding for the provision of short courses in production, work-study and quality management for the industry. There seems to be a correlation between training initiatives (4.6.16) and output performance

(4.6.12) as these (larger organisations) maintained their position in the market.

With major financial constraints, 42% of the sampled organisations claimed that research and development expenditure declined during the 1999-2005 while the remaining 58% claimed that all research and development initiatives were eliminated due to a lack of funds. Training is important for the development of the industry, but if the morale of the workforce is low, the impact of the training would impact the output performance of the organisation.

4.6.17 INCENTIVE SCHEMES

Many organisations (68%) indicate that incentive schemes would improve performance while only 22% had some sort of incentive scheme while the remaining 10% are not interested in any incentive schemes. Incentive schemes that are managed effectively contributed to the maintenance of stable production output (4.6.12). Organisations complained about the cost and complexity of managing such schemes.

One organisation was considering a group incentive instead of individual incentive but was met with resistance from employees. Three organisations are moving towards implementing BEE initiatives. One organisation conducted a pilot project and mentioned that it was successful and management would drive the initiative in 2006 but this organisation was sold in 2007.

4.6.18 WORKING CONDITIONS

There is a general consensus that the working conditions of workers are poor. According to the sample 38% of organisations mentioned that the working conditions are good, which correlates with the larger organisations, 42% mentioned that working conditions are satisfactory, which is in the medium-

sized organisations, while 20% mentioned that working conditions are poor, which is in the small and micro CMT organisations.

Table 4.12 Working conditions

| Working conditions | No of companies | Percentage | Sample size |
|------------------------|-----------------|------------|-------------|
| Good | 55 | 38 | 146 |
| Satisfactory | 61 | 42 | 146 |
| Poor | 30 | 20 | 146 |
| Contravened conditions | 15 | 10 | 146 |

Working conditions correlate with the ownership (4.6.1) as the larger organisations have better conditions than their smaller counterparts. This also impacts output performance (4.6.12) and profitability (4.6.21). The health and safety Act (OHSAS 14000) promulgates that organisations meet the requirements of creating an environment that acknowledges employee well-being. 10% of organisations contravened this and were issued with fines by the Department of Labour inspectorate.

Generally, clothing facilities are constructed within a steel structure with a lack of windows. Therefore it is a “dark environment” with artificial light and air-conditioning consisting of industrial fans and air ducts. The smaller CMT organisations use industrial fans that circulate air but fail to bring in oxygenated air that would enhance worker well-being and performance. These organisations also have “dark corners” that inhibit worker performance.

4.6.19 MACHINERY

Organisations financed their machinery through hire-purchase arrangement or through a cash payment. Organisations, especially the smaller ones, are unwilling to commit to bank loans. Machines range from three to twenty years

old. It was interesting to find out that the smaller organisations were inclined to have newer machinery than the larger organisations.

There is a possible explanation for the newer machinery. CMT manufacturers' are required to diversify in their product range so as to satisfy customer demands. Therefore these organisations purchased new machines to stay in business. For example, an organisation that normally produced shirts was required to produce jeans, and purchased new machinery.

All manufacturers are confident that the latest technological machinery would improve labour productivity by automating service level jobs thus improving multifactor productivity. All organisations desired capital investment but mentioned that they could not afford it. They are confident that sophisticated machinery would increase productivity and improve their competitiveness. Machinery impacts the performance of the organisation (4.6.21) as newer machinery is inclined to experience fewer breakdowns and improve production output (4.6.12). However, this cannot be seen in the performance indices of organisations as the smaller (CMT) manufacturers failed to implement performance management in the organisations, therefore it is imperative that these organisations consider the framework provided in chapter 5.

4.6.20 PRODUCTION INPUT

Table 4.13 Production input

| Production Input | No of companies | Percentage | Sample size |
|--------------------|-----------------|------------|-------------|
| Preferred imported | 110 | 75 | 146 |
| Purchased seconds | 15 | 10 | 146 |
| Imported | 6 | 4 | 146 |
| Used local | 140 | 96 | 146 |

Production input is obtained from both national and international producers. The majority of respondents (75%) reported that they favoured imported material input as it was considered high quality. Those manufacturers that favoured the domestic production of input materials indicated that import tariffs are exorbitant while the process of importation was not worth considering. Some organisations (10%) indicated that they purchased fabric seconds from the local textile manufacturers to remain cost effective.

CMT manufacturers (38%) that produced their own brand labels are in a favourable position to mark up their products while other CMT manufacturers are governed by retailer prices. Many organisations mentioned that they are content with the local demand and are not ready to compete in the international market. Also, they mentioned that they do not have the expertise to compete as Chinese products dominated the markets. The cost of production input correlates with the profit margin (4.6.21) of an organisation as well as supplier relationships (4.6.13) as input at a low cost from reliable sources could be used as a competitive advantage of an organisation.

4.6.21 PROFIT MARGIN

Table 4.14 Profit Margin

| Profit margin | No of companies | Percentage | Sample size |
|---------------|-----------------|------------|-------------|
| Improved | 37 | 25 | 146 |
| Unchanged | 20 | 14 | 146 |
| Declined | 89 | 61 | 146 |

25% of the respondents mentioned that their profit margin improved in the past few years prior to 2005 and this was found in the larger organisations. 14% of the respondents mentioned that their profits remained unchanged. 61% mentioned that their profits declined and this is a cause of concern. This aligns to the fact that 61% mentioned that their output performance (4.6.12) deteriorated in the same time period. All organisations forbid the examination of financial data as they felt that information may be leaked to other

organisations. Financial information could affect the organisation's position during wage negotiations. Profit margin correlates with the size of the organisation as a larger manufacturer with an established structure and the respective service departments would be inclined to out-perform the smaller (CMT) manufacturer. The CMT manufacturers operate with an informal structure and lack the fundamental process improvement strategies such as the framework discussed in chapter 5 which is especially focussed at manufacturers that do not effectively and efficiently manage their operations.

4.6.22 INFORMATION TECHNOLOGY

The clothing and textile industry sample assessed generally operated with a low level of sophistication as far as information technology is concerned. A few organisations (7%) of the sample implemented real-time technologies on their production floor. This provides data on labour efficiencies and corrective action is conducted timeously. The effective use of information management enhances communication and exchange of data, enhancing the control of production. There is a lack of communication within the supply chain that could speed up the processing of orders. Real time information management technologies that provide data on the progress of production was lacking in the major part of the sample. The implementation of technology based information sharing in the organisation could improve output performance (4.6.12) and the profitability of the organisation (4.6.21).

4.6.23 STOCK LEVELS

The clothing and textile industry generally operates with stock levels of raw materials, work-in-process and finished goods due to their forward planning and seasonality of demand. This is money tied up for long periods of time. With the implementation of information technology (4.6.22) the principles of just-in-time manufacture could be implemented, thus reducing inventory levels and creating more space for the organisation of production. This could also prevent unnecessary stock and improve the bottom line (4.6.21). The CMT operations (60%) reported that their stock levels are maintained but due to the

inconsistent demand and change in fashion, organisations find it difficult to meet the demands of retailers.

4.6.24 DEFECT RATES

An evaluation on defect rates demonstrated that 46% of the sample had an improvement in their defect rates. 11% of sample indicated that their defect rates deteriorated, while 43% of the sample mentioned that their defect rates remained unchanged within the 1999 to 2005 period. 35% of the CMT manufacturers performed final inspection only. The average defect rate is in the region of 3%. Thus orders are cancelled because of non-compliance to customer requests and the costs are borne by manufacturers. Defects create an unnecessary burden of rework and reject that impact negatively on the profitability (4.6.21) of the organisation.

4.6.25 PRODUCTION LEAD TIMES

Organisations mentioned that retailers are constantly pressurizing them for on time delivery. Should they not meet the delivery time; the retailers threaten them with cancellation of the order, and lowering the price of the garment. With the competition and the urgency of orders placed, all organisations complain that they are experiencing difficulties in delivering on time as absenteeism (4.6.26), breakdown of machinery (4.6.19), missing components and workforce morale impacted negatively on the production outputs.

4.6.26 ABSENTEEISM

Table 4.15 Absenteeism

| Absenteeism | No of companies | Percentage | Sample size |
|-------------------------|-----------------|------------|-------------|
| Affected by absenteeism | 146 | 100 | 146 |

All organisations complained of the soaring rates of absenteeism. The basic conditions of employment Act of 1997 provide ten days of paid sick leave (Nel, 2006). Unfortunately, workers deem this as a “must take” and ensured that they take their sick leave during the course of the year. All organisations are plagued with absenteeism issues.

Absenteeism causes a loss of production time where operators are paid as they produce medical certificates which result in a loss of productivity. Uncompleted garments are completed by other operators, thus reducing the quality level of the product. Manufacturers are burdened with the situation of absenteeism as it affects the entire production process as machinists are moved around to overcome the situation.

Most of the clothing machinists are female (approximately 89%), and are burdened with the maintenance of the home, children, husband and not forgetting household chores. Machinists often go on sick leave to handle these issues. Organisations (50%) of the sample are considering an incentive scheme linked to attendance rates. They would provide between 1 and 3 weeks of pay for workers who were absent for less than 3 days per annum. This offer indicated the strain placed on organisations through high levels of absenteeism.

The general concern of organisations is “how to manage the scheme.” One production manager mentioned that such an incentive has to be “attractive and worth the effort.”

Some organisations (10%) introduced an annual bonus that is based on performance appraisals, attendance, and length of service. Incentive schemes that are implemented focus on operator efficiency. Machinists find it difficult to maintain their bonus levels with frequent style changes, difficult constructions and small batch of orders. Absenteeism affects the output performance (4.6.12) and the profitability (4.6.21) of the organisation.

4.6.27 FASHION DESIGN SKILLS

Manufacturers mentioned that there is a lack of design skills which could be improved. Organisations decided to recruit “new blood” from the centres of excellence based at the Durban University of Technology, Cape Peninsula University of Technology and the University of Johannesburg. Fashion design skills in niche areas of the market maintain the competitive status of the clothing manufacturer.

4.6.28 PERFORMANCE MANAGEMENT

Management of all organisations claimed that they had the skills that would improve their production levels. An amazing fact is that 100% of the organisations sampled did not measure their productivity levels, as they focus on labour efficiency. “We do not need training and development,” was mentioned by (5%) of the sampled organisations’ management. The fundamental aspects of work-study, production management and quality management are implemented by 45% of the manufacturers. Thus, it can be presumed that output performance (4.6.12) could be improved by approximately 30% (chapter 2) by 55% of the organisations.

Table 4.16 Performance Management

| Performance Man | No of companies | Percentage | Sample size |
|--------------------------------------|-----------------|------------|-------------|
| Lack of productivity measurement | 146 | 100 | 146 |
| Labour efficiency/quality/operations | 66 | 45 | 146 |
| No garment costing | 66 | 45 | 146 |

4.6.29 GARMENT COST BREAKDOWN

45% of the industry did not break down costs of the garment from a manufacturing and financial perspective. This is prevalent in the smaller (CMT) manufacturers (4.6.5). Garment costing provides information such as labour cost, the number of machinists required, line balancing requirements and production output. With a structured costing system and the estimation of production costs, the organisation would be able to determine delivery times, output performance (4.6.12) and profitability of the organisation (4.6.21).

4.6.30 LEADERSHIP QUALITIES

The workforce of the majority of the organisations sampled complained that management did not treat them as “assets” of the organisation (4.6.14). They claimed that they are often treated poorly and management would not consider their views on issues. Labour relations are considered “sub-standard” as management regard workers as another “input” for production. Workers mentioned that all management is concerned about is production, and didn’t care how it is achieved. The portrayal of an authoritative management style is common in the clothing industry due to its labour intensity. But the ability to improve the morale through the philosophy of total management could have a positive impact on the output performance (4.6.12) of the industry.

4.6.31 CHANGE MANAGEMENT

Many manufacturers (80%) are grappling with the frequent changes in the industry. Organisations spoke about the depletion of the domestic markets, the import of illegal garments, competition and “other” factors. 75% of organisations in the sample reported that there is a threat to the domestic market and they are struggling to survive.

The changes in the clothing industry occurred in the context of South Africa’s accession to the WTO Agreement on Textiles and Clothing (ATC). The DTI

submission to parliament explains: “The South African government had always been clear in its policies that the country could not afford to artificially sustain uncompetitive industries through import substitution or protectionist measures. Based on this, the government committed itself to support this sector through a range of initiatives with the understanding that, in its current form, the industry is neither competitive nor sustainable and needs to change” (DTI, 2003). The implementation of leadership qualities (4.6.30) that are participative in nature would create a flow of information on either side, thereby improving the profitability of the organisation (4.6.21).

4.7 GOVERNMENT SUPPORT

The government encourages export through the Duty Credit Certificate Scheme (DCCS). It is an incentive programme launched in 1993 and aimed at boosting manufacturers’ export production through providing customs duty rebates on imported inputs to such manufacturers. Originally, it contained conditions aimed at ensuring training and the improvement of productivity. Government support is abused by manufacturers who “sell” their certificates to retailers that import clothing and textiles (DTI, 2003).

The latest development is an agreement that was reached between the South African and Chinese governments to limit Chinese imports into SA (Le Roux, 2007).

The DTI also found that organisations that are able to compete as exporters are up to speed with training and measures to improve productivity. Unfortunately, these are only a handful of companies (13%). Exporter clothing manufacturers claimed that their activities are doomed without government support. The Department of Trade and Industry planned to modify the scheme to bring it in line with World Trade Organisation (WTO) rules. The DCCS is to be replaced with an Interim Clothing Industry Development Scheme while a new scheme would be devised as part of the government’s Customised Sector Plan (CSP) (Le Roux, 2007).

However, by end October 2005 the interim plan was not instituted, despite another assurance from the DTI (DTI, 2005). The uncertainty hindered exporters' business planning, as orders in the international markets work on six-month cycles. Exporters had to decide by the second half of 2005 whether to agree to orders for 2006 while not having information on whether the minister of Trade and Industry would approve an interim scheme, or what such a scheme would entail (Le Roux, 2007).

The uncertainty aggravated the threat of losing long-standing relationships and market space, which would take a long time to re-establish. Respondents (13% exporters) from the industry again criticised the DTI for taking a long time to agree to the new scheme. Respondents also expressed concern over Alec Erwin's successor as minister, Mandisi Mpahlwa, not interacting with the industry as much as Erwin did (Le Roux, 2007).

Both the department of Trade and Industry and Science and Technology identified the clothing industry as a priority sector to be supported for the purpose of cost-effective job creation (Ralis, 2004). A customised sector programme (CSP) was developed and agreed upon by stakeholders. The agreed-upon, pre-revision CSP contained the following actions:

- The government to engage with multilateral forums to prevent dumping;
- Customs to be improved to prevent under-invoicing and illegal imports;
- A partnership to be established to ensure consistency in policy;
- The maintenance of tariffs;
- The monitoring of the DCCS replacement;
- The exploration of export opportunities to the rest of Africa (Ralis, 2004).

The subsequent revisions rendered the customised sector programme less biased towards business, and included an emphasis on black economic empowerment, while excising mention of the interim scheme to replace the DCCS.

The DTI encourages the export of SA finished products, which stimulates economic growth and development. The attainment of material inputs at competitive world prices is seen as a boost for SA exports. The SA government facilitated this under the Customs and Excise Act of 1997 (Ralis, 2004). Government support is required to bolster the competitive status of clothing manufacture in South Africa (recommendations chapter 8)

4.8 FUTURE OPTIONS

The survival of the South African clothing industry hangs in the balance, which is a matter of concern, given its labour-intensiveness and potential for job creation. Stakeholders need to focus on rejuvenation strategies, while further international pressure looms. World Trade Organisation negotiations on Non-Agricultural Market Access (NAMA) included eliminating tariff peaks in order to level tariff structures internationally. This may affect clothing in particular, given that it is one of the categories of goods with the highest tariffs in South Africa. This pressure is set to increase further, as the US and EU indicated their willingness to altogether scrap their tariffs on clothing by 2015 (www.da.org.za).

Short-term options to protect the industry include activating safeguards in terms of China's accession protocol to the WTO until 2008, while other limited safeguard measures are available until 2013. The plan by ex-minister of trade and industry Alec Erwin and SACTWU general secretary Ebrahim Patel to save the industry included using WTO safeguard regulations to prevent Chinese dumping (Inggs, 2007).

Black Economic Empowerment (BEE) is included in the revised customised sector programme CSP, and could attract new capital into the industry. BEE deals in which workers gain ownership in clothing companies would assist in removing "barriers" within the industry (Urbach, 2006).

4.9 CONCLUSION

Organisations are positive about their future in the industry and adopted an attitude of “survival of the fittest.” Managers are reluctant to believe that the implementation of process improvement methodologies within the production environment would enhance productivity levels.

Organisations realised the benefits of work-study principles, 45% complained that they did not have the capacity to apply the process improvement principles. Finally, the implementation of innovative practices with regards to production techniques, design and development of production, manufacturing processes, supply chain management and labour relations should enable clothing manufacturers to maintain and grow within the industry. The multitude and magnitude of challenges facing the SA clothing and textile industry are clear from the information presented. Both the domestic and international markets are demanding and require a new operating framework that could assist in the survival of the industry.

The lack of the application of fundamental process improvement methodologies in a manufacturing environment (especially the smaller CMT operations) prompted the researcher to create an engineering management framework that, if applied effectively, could change the current status of clothing manufacturers (Rasool, 2004). The role of industrial and engineering management in the improvement of productivity is imperative for the clothing industry. This leads to chapter five which provides an engineering management framework for successful clothing manufacture.

CHAPTER 5 AN ENGINEERING MANAGEMENT FRAMEWORK FOR CLOTHING PRODUCTION

5.1 INTRODUCTION

The clothing and textile industries around the world have continued to make a significant contribution to the world economy. The South African clothing and textile industry could become “the” major contributor to economic growth if the industry retains its employment rate through improvement initiatives. With multi-fibre agreements and the continuous changes the industry is witnessing growing competition from various areas. International organisations are infiltrating the domestic markets of developing nations in order to establish their export markets (Inggs, 2007).

The clothing industry in SA requires changes in terms of its productivity levels, technological applications and quality management in order to survive the competition it faces. This led to development of the process improvement framework with a view to improve productivity. Exposure to the global economy enforced the application of "manufacturing excellence."

Retailers measure the manufacturer's performance by their ability to meet delivery deadlines, quality of products and the price of production (Basdeo, 2006). This chapter describes a framework that manufacturers could implement to improve their competitive position. If the framework is implemented through dedicated leadership, it should improve the level of productivity, improve the delivery time of production, reduce the cost of manufacturing through the application of improvement techniques and enhance garment quality by means of a systemic and practical approach.

Chapter 6 describes the implementation of parts of the framework (performance management) which proved successful. The outcome of the implementation of part of the framework resulted in a significant improvement in productivity described in chapter 6, thereby meeting delivery, cost and quality targets.

The objective of this framework was to prevent job losses in the clothing industry through the promotion of production excellence and the efficient and effective exploitation of resources. The aim was the promotion of the use of process improvement methodologies that would improve the performance of the industry, thereby improving the standard of living of employees in the industry. This should assist South African clothing manufacturers to embark on a strategy of continuous improvement, thereby addressing their profit potential (4.6.21).

5.2 CLOTHING INDUSTRY SCENARIO

The British Institute of Management Foundation (BIM, 1976), defines the term productivity as the “productiveness of the factors of production, labour and capital, in the creation of wealth. Productivity is linked with productiveness as well as efficiency and hence it is concerned with the utilisation of resources to produce a given output rather than simply the rate at which input generates output.”

Productivity is measured in terms of the ratio of output to input. With a multitude of factors involved in the production of output, the input and output is converted into monetary terms. The International Labour Organisation (ILO) action manual “Improving Working Conditions and Productivity in the Garment Industry” (Hiba, 1998) mentions that at plant level partial measures are usually used to establish productivity, as they are easy to understand and use. For convenience the researcher focused on labour productivity.

The clothing industry in countries like France, Germany, the UK, USA performed exceptionally well in comparison to developing nations like South Africa (ILO, 2006). The NEDO report on “Attainable Production Targets” (National Economic Development Office, 1999 in SA) recommended standard minute values in the assembly of a jacket, trouser, and shirt production. The values are indicated in the table 5.1.

Table 5.1. Recommended minute values for shirt production (NEDO report, 1999 - www.tx.ncsu.edu)

| | |
|----------------------|------------|
| HIGH FASHION SHIRT | 25 minutes |
| MEDIUM FASHION SHIRT | 20 minutes |
| LOW FASHION SHIRT | 17 minutes |

The information provided by the international labour organisation (ILO, 2006) indicated that the productivity level in SA could improve by approximately 30 percent without major investment.

This coincides with the information provided by the trade and industrial policy research in South Africa (TIPS) which establishes a productivity gap between the garment industry in SA and the rest of world. Research by the international labour organisation indicated that the productivity level of SA clothing manufacturers was among the lowest in the world. Trade and industrial policy research (TIPS) indicated that the labour productivity performance index was in the region of 67% from the period 1999 to 2003 (Barnes, 2005). SA was about 30% below the standard in comparison to other developing countries (Kaplin, 2003).

Ralis (2004) highlighted areas of concern that affected productivity levels in the South African clothing industry. Some the factors affecting productivity in the SA clothing industry include, among others (reference to chapter 4):

- Communication barriers between the different levels and departments the organisation;
- level of technology employed in the organisation;
- product design, price of product, and production output volume;
- training and development of all levels in the organisation;
- low motivation levels;
- repairs and non-conformance;
- Absenteeism levels and labour turnover;
- Lack of performance and productivity measurement;

- Pressure on delivery times;
- Lack of garment costing;
- Lack of the application of process improvement strategies.

These fundamental issues, if addressed accordingly by manufacturers could improve the current plight of the clothing and textile industry in South Africa. The framework for successful clothing manufacture is developed from aspects in operations management, quality management and work-study and begins with leadership that drives improvement initiatives.

5.3 LEADERSHIP (4.6.30 LEADERSHIP QUALITIES)

Change is initiated by leadership with strategic vision for the success of an organisation. The vision and mission comes from the organisation's leadership (Stevenson, 2007). Visionary leadership drives the organisation towards the attainment of organisational objectives through the transfer of decision-making ability to the workforce. Thus the efficiency in the utilisation of resources is improved through the creation of trust (figure 5.1).

Visionary leaders create and articulate a realistic, credible, and attractive vision of the future that grows out of and improves upon the present. Visionary leaders have three skills: ability to explain the vision, ability to express the vision, and ability to extend the vision. The leader needs to be proactive and use the current threat as an opportunity towards the creation of a competitive industry. The barriers in communication should be eliminated through the application of communication skills and the respect for others (Deming, 1982). The sharing and learning in the workplace develops an increase in morale and the exposure of employee capabilities (Robins and Decenzo, 2006).

Leadership has the key to changing the organisation around through the effective implementation of fundamental methodology that would improve the clothing and textile industry.

Argenti (2000) mentioned that he lays the blame for business failure squarely at the feet of the often autocratic chief executive. The researcher agrees with Argenti as this is experienced in the SA clothing industry. He mentions two issues; firstly that the leader does not accept the need to change the current operation, and secondly, the leader is overambitious and considers that he/she is flawless.

Brown (1996) mentions that there are three distinct areas of weakness: leadership, finance and competitive failings. This is often linked to marketing inadequacies, particularly concerning developments and improvements at an appropriate time. He also highlights the danger of overambitious major projects and acquisitions which either cost too much or fails to deliver the hoped-for synergies.

Trust is an important ingredient of leadership and some of the aspects that enhance trust in leadership are the following: (Robins and Decenzo, 2006)

- Trust appears to be a primary attribute associated with leadership.
- Part of the leader's task has been, and continues to be, working with people to find and solve problems, but whether leaders gain access to the knowledge and creative thinking they need to solve problems depends on how much people trust them.
- When followers trust a leader, they are willing to be vulnerable to the leader's actions.
- Honesty consistently ranks at the top of most people's list of characteristics they admire in their leaders.
- In times of change and instability, people turn to personal relationships for guidance, and the quality of these relationships is largely determined by level of trust (Oakland, 2003).

Thus the researcher would like to stress that without leadership that embraces change and process improvement initiatives, the organisation would remain stagnant.

5.4 PERFORMANCE IMPROVEMENT STRATEGY (4.6.28 PERFORMANCE MANAGEMENT AND APPENDIX 1)

Performance management includes numerous methodologies. The focus in this situation is the implementation of fundamental productivity improvement initiatives. The recommendations for productivity improvement according to Rajesh et al (2003) are summarised as follows:

- The application of work-study principles. Work study and industrial engineering practices are important in labour intensive operations. Manufacturers tend to apply estimated time standards which are often incorrect. There is a crucial need to apply scientific work measurement and methods development methodologies. Manufacturers should move towards establishing a work-study department or alternatively train supervisors in the use of such tools.
- Apply training initiatives for all stakeholders (4.6.16 Training and development). The productivity levels in the clothing industry indicate the need for training and development initiatives. Improvement initiatives would only be successful if supervision and management understood the concepts and implemented the changes. There is a vast range of education and training providers that are available for the delivery of clothing management related programmes. Organisations could sponsor staff to attend training programmes or conduct in-house training in both specialised and non-specialised skills. Thus scientific principles of line balancing, workflow layout, ergonomics and so forth could be implemented.
- Develop machinist training cells. Machinist training cells provide skills in the manipulation of fabrics, developed work ethics and create a learning curve for new employees towards the attainment of world-class performance.
- Develop quality management systems (4.6.24 Defect rates). The sample reported that the defect rate was approximately 3%. A quality

system would monitor and reduce the levels of defects which would save the organisations production costs.

- Technological improvement (4.6.22 Information Technology). Organisations need to upgrade their machinery at various stages in clothing manufacture. Computerised laying and cutting of fabric in the cutting room, automated sewing machines, and automated finishing are some of the areas of innovative machinery. Strategic investments should be made that would improve return on investment and productivity.
- Introduce productivity measurement systems (4.6.28 Introduce performance management). This would enable the recording of data at process points in real time, thus enabling effective decision making regarding the status of processes.
- Develop planning and scheduling of production (4.6.25 Production lead times). The aim of this would be the meeting of delivery dates as well as maximisation of resources. Organisations should look at software applications.
- Introduce incentive schemes (4.6.17 Incentive schemes). Productivity gains should be shared with the workforce in the form of incentives. This sharing would encourage labour efficiency and would assist in stimulating the morale of people.
- Black economic empowerment (BEE) initiatives (4.6.31 Change management). When management and workers are totally involved in the operation of the organisation and there is transparency of operation, the entire organisation takes ownership of profit/loss of the organisation.
- Style types. (4.6.6 Product range) The fashion industry is overwhelmed by style changes. Style changes have both a positive and a negative connotation. On a positive note, industry is able to remain competitive by meeting fashion trends, while it causes frequent changes in set-up on the production line.
- When there is a change in the product style, the floor manager is involved with the adjustment of the production line to ease the flow

between operations, machinists are required to adjust to new operations and machines require recalibration. This process causes a loss of time, thus increasing the cost of production.

- Production systems (4.6.7 Production systems). There are three different production systems used in the clothing industry. They are modular manufacturing, the bundle system and the overhead conveyor system, predominantly known as the “Eton” system. The focus in the clothing industry is on the machining floor where garments are sewn.

Currently, virtually every manufacturer in SA clothing industry operates on the principle of the bundle system. The Bundle System (BS) is a system that uses bundles of cut components that are tied together in a bundle. These bundles travel from operator to operator until the garment is fully assembled. The operators' work station is specialised to handle the different types of sewing operations involved in the construction of the garment. The machinists specialise in the different operations to achieve labour efficiency. The Bundle System is as old as the clothing industry and organisations still practice this method of assembly around the world (Lin et al,1995).

The framework covers the points discussed in greater detail in the sub-headings that follow.

5.5 BUNDLE SYSTEM METHODOLOGY (4.6.8)

Work is passed to sewing machines in bundles of cut pieces. The number of cut parts in the bundle may vary according to weight or the complexity of operations required, but the principle remains the same: the operator unties the bundles, sews the cut parts together, re-ties the bundle, processes the work ticket and places the bundle into a bin or on a transporter system (a U shaped manual conveyor).The bundle then goes to another machinist who repeats a similar sequence; a bundle may be tied and untied several times before it completes its lengthy journey (Basdeo, 2006).

There are a few (3) clothing organisations in the sample using the “chain system” where parts of the garment move on an overhead chain suspended on a track. This system is part of the bundle system as component parts of the bundle flow in sequence to prevent mis-match of the garment. At the end of the chain is a clip that holds pieces together. The system of production in the industry has evolved over a period of time into modular and the conveyor system.

The teamwork based production system is known as the modular system. Operators work on one garment at a time. The components of a garment move between operations for completion. Different machines are set up in a “U” shaped cell. Parts of the garment move within the cell and follow the principles of Kanban. Operators are multi-skilled and empowered to make decisions regarding the production system (Christopher, 2004).

In the modular system there is an emphasis on teamwork (chapter 6), quality management and a focus on improvement initiatives. This enhances the morale of the group as there is open communication among the members. The reject level is zero based as machinists take responsibility for the process. Self-directed work teams are a participative management approach that encourages workers to take on many roles formerly held only by managers. Teams are empowered to make certain changes in their work processes. Teams also have a vested personal interest in the implementation of the changes members may suggest (Castro et al, 2005).

Self-directed teams are successful in many situations because the workers performing the functions are indeed in the best position to make the most effective changes to improve the process. However, when self-directed teams were employed, the managers felt threatened because of the power given to the self-directed teams. Hence, the strained relationship between the self-directed team and the managers hamper the success of the project. In addition, if appropriate level of control is not exercised over a self-directed team, they may make decisions or perform functions not congruent with the overall goals and objectives of the organisation. It is recommended to start

such as project as a trial run to understand the dynamics of teamwork (Castro et al, 2005)

5.6 COMPETITIVE ADVANTAGES OF MODULAR MANUFACTURING

Modular manufacturing brings the following benefits in the organisation (chapter 6):

- Modular manufacturing reduces production costs through a multi-skilled team effort, reduces work in progress between operations and encourages labour efficiency. This results in meeting customer requirements in terms of delivery dates.
- Quality improvement because of self-managed team effort with a reduction in defect rates and time for repairs.
- Effective utilisation of floor space with concentrated cells and the reduction of time and labour during movement of products.
- Team effort promotes communication and reduces barriers between operations, thus indirectly addressing absenteeism and creating a better work climate (Castro et al, 2005).

5.7 BENCHMARKING

Benchmark the clothing industry across entire value chain: The sharing of information with regards to prices (4.6.13), quality management systems, production systems (4.6.8) and the levels of service can be obtained by benchmarking. This would assist manufacturers to implement the latest trends practiced by the industry, enabling the organisations to compete against international players. Research and development into problematic areas would lead to improving the production process. Thus, industry with the support of government initiatives could improve the status of clothing manufacturers (Ahmed, 1996).

Benchmarking is a technique that allows an organisation to compare its current performance both within the organisation and outside the organisation.

This requires in-depth scrutiny of issues such as operator performance, waste levels, inventory levels, operational costs and staff turnover. This in turn is used as an input for the improvement of performance and to achieve continuous improvement. This enables a company to be competitive by lowering operational costs.

5.8 CHANGE INITIATIVES (4.6.31)

The quality of work life (QWL) enables the collaboration of management and the workforce in decision making regarding the job at hand. The concept was introduced in Japan, India, North America, and Australia, and Japan and proved to be successful. The objective of the concept is to remove barriers between management and employees and enforce relations that would promote discussions and resolve problems encountered in the workplace (5.3) In practice, quality of work life (QWL) programmes take many forms. The focus of the initiative is on the workers' well-being inclusive of work effectiveness (4.6.12) and (4.6.21) (Roufaiel and Messner, 1995)

5.9 WORK EFFECTIVENESS (5.8)

The researcher quotes from Roufaiel and Meissner (1995) that “work effectiveness is a summary term employed to capture both the quality and quantity aspects of work performance. It is expected to be higher for enriched jobs than for more specialised or simplified and routine jobs. According to Herzberg's theory of motivation, characteristics of enriched jobs fall into two separate and distinct categories, motivator and hygiene factors.” Job enlargement involves assigning a larger portion of a task to a worker (i.e., horizontal loading). Job enrichment involves an increase in the level of responsibility for planning and coordinating tasks. Both job enlargement and job enrichment are intended to motivate workers and improve morale by making work more interesting and challenging to workers, and helping them to feel that they have an important part in the work system (Roufaiel, and Meissner, 1995).

5.10 TOTAL QUALITY MANAGEMENT

TQM is an organisation-wide strategy which has its primary focus on customer satisfaction. TQM is an approach that views quality improvement as a never-ending quest to improve the conversion process so that the level of customer satisfaction continually rises. Since the Japanese have been so successful in continuously improving the quality of their products and services, Kaizen, or continuous improvement, has become an extremely popular and widely accepted managerial approach to improve quality on a daily basis. An appropriate transformation terminology today would be “just because it ain’t broke doesn’t mean it can’t be improved” (Evans, 2005).

TQM is a never ending pursuit of quality that involves everyone in the organisation. It emphasizes the customer, customer defined quality, employee empowerment, and continuous improvement of the processes. If implemented correctly, it will lead to significant improvements in quality of products or services and productivity of the firm’s operations (Oakland, 2003).

Quality management emphasizes preventing mistakes or correcting them after they occur. There is a direct trade-off between investment in quality programs and investment in failure costs. If the quality is poor, the failure costs would be high. Injuries could also occur because of neglected machinery and defective output (internal failure costs). Increase in warranty costs, service costs, repair costs, discount costs and payments to customers to offset the inferior quality are examples of external failure costs. The emphasis on quality can lead to a significant reduction of both internal and external failure costs (4.6.24), thereby reducing production costs for the company. The prevention of defects would improve the productivity level in an organisation (Ramdass, 2005).

The Union of Japanese Scientists and Engineers (JUSE) views Total Quality Management as a management approach that strives for the following in any business environment:

- Under strong top-management leadership, establish clear mid- and long-term vision and strategies.
- Properly utilise the concepts, values, and scientific methods of TQM,
- Regard human resources and information as vital organisational infrastructures,
- Under an appropriate management system, effectively operate a quality assurance system and other cross-functional management systems such as cost, delivery, environment and safety.
- Supported by fundamental organisational powers, such as core technology, speed and vitality, ensure sound relationships with customers, employees, society, suppliers and stock holders.
- Continuously realise corporate objectives in the form of achieving an organisation's mission, building an organisation with a respectable presence and continuously securing profits (Evans, 2005).

The 2000 version of the International Organisation for Standards (ISO) is based on eight Quality Management Principles that are an excellent guide to modern thinking on quality. The principles are:

- Customer focused organisation. It is customers, not the organisation that defines quality, so look outward rather than inward. Survival ultimately depends upon understanding customer needs.
- Leadership - is necessary to drive the organisation to meet customer needs and to improve.
- Involvement of people. It is the people in the organisation that makes for high quality products and services.
- Process approach. It is linked (horizontal) processes, transforming inputs into outputs, which produce the requirements of customers. It is not functional departments or (vertical) 'silos'. (This is perhaps the most fundamental change to the previous standard which emphasised the responsibilities of functions). The continuous improvement process involves establishing objectives (a management responsibility), resource management, realising the product or service, and

measurement and analysis.

- Systems approach: The organisation is a system: it has inputs, outputs, information flows, goals, controls, and interactions. Processes come together to form purposeful systems.
- Continual improvement - is necessary for survival. Everyone needs to participate. (This links with Kaizen)
- Fact-based approach. As Deming said, 'In God we trust; all others must bring data.'
- Supplier relationships (4.6.13). A well known and valid saying is that "companies don't compete, supply chains compete." Ultimately quality depends upon the company and its suppliers (Stevenson, 2006).

5.11 LOCATION OF FACILITIES

Facility location refers to the location of the manufacturing facility with respect to customers, suppliers and other existing facilities such that it allows the company to gain a competitive edge. In the decision making process, both tangible costs such as the cost of operation, land, labour, taxes, utilities and the cost of inbound and outbound transport logistics, and intangible costs such as availability of qualified labour, and labour climate should be considered (Stevenson, 2007).

Since the location decision usually involves making a large capital investment, it not only impacts the organisation's ability to compete but also has long-term strategic implications. Therefore in making the location decision, the organisation should consider issues related to marketing, production, transportation and other relevant costs as well as the strategy of the organisation. The importance of various factors in relation to the location decision would vary between service and manufacturing organisations but also from industry to industry. Location plays a major role in the output performance (4.6.12) and the profitability (4.6.21) of the organisation. Location decisions can have an impact on access to markets, costs (including

materials, labour, rent, construction, and transportation), quality of work life (e.g., community-related factors), and growth potential.

5.12 QUALITY CIRCLES

The methodology is practiced in a handful of the larger organisations (10) that maintain their competitive status. The practice of quality circles was observed at 10 organisations from the sample that performed exceptionally well with regards to problem resolution that impacted on output performance and profitability. A quality circle involves the creation of a group of employees from the workforce, preferably from different departments that meet from time to time to discuss problems encountered in the production process (Stevenson, 2007). The group brainstorms the problem and recommends ideas for the solution of the problem. The philosophy originated in the 1950's in Japan but was based on teachings of American Gurus such as Deming, Juran and Crosby. The notion focused the affiliation of the workforce, promoting quality management among the workforce. There are four basic steps in the plan-do-study-act cycle:

- **Plan.** Plan is not just about planning what to do, but about communication, "scoping", discussion, consensus gaining and deployment. The process starts with the customer - seek to understand customer requirements. It is about setting the time plan. It is claimed that leading Japanese companies take much longer to plan, but then implement far faster and more smoothly. Deming taught that one should think about change and improvement like a scientific experiment - predicting, setting up a hypothesis, observing, and explaining deviations. The goals need to be clear with a focused direction on how to get there. Brainstorming would assist in identifying constraints, therefore force field analysis would be an appropriate technique. Determine the root causes by using the 5W concept (who, what, why, when, where). Training may be required as the process unfolds.

- **Do.** An easy stage if planning was done well. It is about carrying out the improvement, often in a test phase.
- **Check.** The learning stage, but too frequently an opportunity lost. Is it working as predicted? Did it work out as planned? If not, why not, and what can one learn for next time? Time needs to be set aside to check. For example, at the end of a meeting, or after completion of a set number of cycles. Once again ask about root causes. Also check if there are any outstanding issues.
- **Act (or Standardise).** As Juran says, "Hold the gains". A standard reflects the current best and safest known way, but is not fixed in stone forever. Without this step all previous steps are wasted. It is a vital, but frequently neglected step in the PDCA cycle. It should be thought of as moving from standard to improved standard. A deviation from standard procedures indicates that something is amiss. Consider if the new way can be incorporated elsewhere. Communicate the requirements to everyone concerned - this includes people experiencing the problem. Give some thought to recurrence prevention - can both the people and the processes be made more capable? Finally prepare for the next round of the cycle by identifying any necessary further improvements.

DMAIC (or Define Measure Analyse Improve Control) is a variation of PDCA used in the Six Sigma methodology (Stevenson, 2007). It involves the following fundamental steps:

- **Define.** Define the problem. Sub-stages are identifying opportunities and scope of the project. Choosing the right project also means not doing an alternative project. An organisation or improvement team has limited time so should select the problem carefully. Use the Pareto principle by evaluating which project would provide maximum returns for effort and use the SMART principle (simple, measurable, agreed-to, realistic, and time-based). Six Sigma is strong on financial returns, so a savings estimate should be made. Scoping the project is critical -

where are the problem boundaries and what would be considered outside and inside? Of course, the "project" would be found within a process, not necessarily a department. So, "systems thinking" is crucial in defining the scope of the project.

- **Measure.** Six Sigma places strong emphasis on measurement. Determine a suitable measurement strategy preferably related to the process customer or output. Six Sigma prefers to use quantitative rather than qualitative data. Think in terms of defects per million opportunities. Are current measures appropriate? Define the measure clearly, the sources of the data, the sampling plan. For example evaluate appropriate defect classification - for instance record the total number of complaints from a clothing retailer, or by type, by location, by customer? Evaluate the consistency in the way defects are recorded. Also, be clear on the boundary of the process.
- **Analyse.** What's wrong? The sub-stage is to do with getting onto root causes. Use all process re-engineering tools as appropriate to determine the root cause for example the "7 tools" of process mapping, Creative thinking, Benchmarking, Quality function deployment, Value Analysis, Design of Experiments, are but a few of the possibilities. Six Sigma places emphasis on statistical validation of results using tests.
- **Improve.** Fix what is wrong. Sub-stages include prioritization and refinement. Determine if the goal of the project was met and the root cause of the problem defined. If this was achieved, the implementation phase is ready for action. The improvement action plan could be implemented using a project approach while involving all stakeholders concerned to obtain maximum results (Evans, 2005)
- **Control.** If the process is performing at a desired and predictable level, it is put under control. This last step is the sustaining portion of Six Sigma methodology. The process is monitored to ensure no

unexpected changes occur. The focus is on the prevention of product variation in the process. Quality is improved through process investigation and the re-evaluation of the value added status of many elements (Evans, 2005).

5W2H approach is a method of asking questions about the process where five of the questions begin with the letter “w” (what, why, where, when, who) and two of the questions begin with the letter “h” (how, and how much) (Stevenson, 2005).

5.13 SUMMARY OF STRATEGIC “TO DO” ACTIVITIES

The following elements provide a strategic summary of activities that supplement the framework, referred to as “to do” activities. These elements of the framework are strategic in nature and summarised to enforce its importance. The elements could be used to address experiences discussed in chapter 4.

5.13.1 STRATEGIC FOCUS FOR MANUFACTURING EXCELLENCE

The objective of this strategy is on the improvement of quality production, cost and delivery through the application of seven elements. Ng and Hung (2001) defines “quality as the development of customer closeness where the workforce understands customer requirements and aims to fulfil these requirements. The researcher concurs with Ng and Hung and considers their approach valuable for the development of the engineering management framework for the clothing industry.

5.13.1.1 MANAGEMENT APPROACH

- Development of an organisational culture that practices an open and participative management style that supports innovation

- Set achievable goals for the organisation and measure against set standards.
- Understand the production processes and capabilities thoroughly.
- Remove barriers between departments so that processes are seamless to achieve optimal customer satisfaction.
- Manage processes across functional boundaries.
- Managers are to be seen regularly on the production line, engineers in the proximity of the process and there should be regular face to face communication

5.13.1.2 MANUFACTURING STRATEGY

- Institute a clear vision and mission of the organization with a long term plan that is understood by everyone;
- Ensure continuous improvement of manufacturing operations.
- Understand globalisation and the impact on the organisation. Develop an understanding of competitive forces.
- Create a plan of action through the involvement of stakeholders in the decision making process.
- All employees should participate in understanding and sharing the strategic intent of the organisation.
- Examine strategies on a regular basis to maintain its applicability.
- Keep abreast with the latest developments that may affect the organisation.

5.13.1.3 ORGANISATION

- Flatter structures enable effective communication.
- Eliminate “silos” and encourage team-work between departments.
- Create relationships with strategic stakeholders, suppliers and customers (and even competitors).

5.13.1.4 MANUFACTURING CAPABILITIES

- Adopt quality management principles in product, delivery and service in all operations.
- Create operations that are adaptable to customer needs.
- Engineer operations towards the elimination of non-conformances.
- Eliminate harm to the environment by determining the impact of processes

5.13.1.5 PERFORMANCE MEASUREMENT

- Measure customer satisfaction.
- Create measurement systems that enhance productivity.
- Apply business management principles.
- Align the performance measurement system to the organisation's strategic objectives.

5.13.1.6 HUMAN ASSETS

- Empower employees to strive for the accomplishment of the organizations the goals.
- Supervision should be removed and coaching and mentoring should be implemented.
- Coaches should promote team development, team problem solving and team performance rewards.
- Create an enabling environment where change is embraced.
- Initiate comprehensive programmes of learning and development for continuous improvement.
- Treat the workforce as assets of the organisation and encourage loyalty among employees.

5.13.1.7 TECHNOLOGY

- Strategize towards technological advancement.
- Understand the competitive status and implement technology accordingly
- Align upgrades with infrastructure
- Implement software solutions that provide on time information (Ng and Hung, 2001)

5.14 FUNDAMENTAL METHODOLOGY FOR PROCESS MEASUREMENT

The issues discussed relate to work-study practices that are imperative for process measurement and improvement in the clothing and textile industry especially for the 45% of the sample that do not practice this methodology (4.16).

5.14.1 WORK MEASUREMENT AND METHOD STUDY (4.16)

Work measurement is concerned with the length of time it should take a person to complete a task. These are vital inputs for workforce planning, estimating labour costs, scheduling, budgeting, operator efficiency, line balancing, incentive schemes and so forth. A standard time is the amount of time it should take a qualified worker to complete a task, under normal working conditions, with the correct tools and equipment and material inputs, in an ergonomically designed workplace. Time standards can be developed in a number of ways, that is, (a) stopwatch time study, (b) historical times, (c) predetermined times – general sewing data (GSD), stamp system (d) work sampling (Stevenson, 2006).

The need for methods analysis can come from changes in tools and equipment, changes in product or service design, the introduction of new products, changes in methods or procedures, and from changes in government regulations or contractual agreements. Methods analysis involves

studying a job with the objective of improving the way it is done. To the extent that this leads to increases in output and/or decreases in input, productivity would be increased. If the focus is too narrow, the result may be an improvement in efficiency more than productivity (which is usually a more global concept).

5.14.2 STOPWATCH TIME STUDY

The most common methodology used in clothing manufacture is stopwatch time study. It is based on observations of one worker taken over a number of cycles. It can be applied to other workers performing the same task. The basic steps are:

- Define the task to be studied and communicate with worker, supervisor, and management.
- Determine the number of cycles to observe.
- Break the task into elements, example, pick up 2 pieces and align, sew pieces, place aside – try to separate handling from machining.
- Time the elements of the task and rate the worker's performance.
- Compute the standard time taking into consideration the performance rating and the allowances.
- The requirements to conduct the study include the following:
 - A clip board is required to hold the time study sheet in position for recording data.
 - A time study sheet is developed to record information and stop-watch readings on the operation
 - A stopwatch, analogue or digital based on centi-minutes is used to read the time for each element of the operation.

5.14.3 METHOD STUDY

Method study, which is the second branch of Work Study, is concerned with finding easier ways of doing things, and eliminating wasted effort and unnecessary work (Stevenson, 2006). The following steps are followed:

- Decide priorities – look at the benefits and whether it is worthwhile. It may be a bottleneck operation, or a critical operation that, if evaluated could improve line balancing.
- Analyse existing method – use symbols and codes to describe every movement in detail.
- Develop better method – on analysing the method, a work-study officer would often find better ways of doing the task. When the new method has been established, it should be communicated to the operator and supervision.
- Test and confirm – the new method should be tested with all human factors in mind.
- Implement new method – the new method needs to be implemented with the support of all stakeholders, that is, the operator, supervisor and management.

5.14.4 FOLLOW-UP

On implementation, the new method needs to be followed up to determine whether any problems may arise. If successful, the work-study officer should determine the benefits of the new method in terms of time and money.

5.14.5 METHOD IMPROVEMENT (4.6.29)

Garment Engineering – the operation itself must be questioned: is it necessary at all? Can it be eliminated by a pattern change? Can it be eliminated by changing the seam type? These questions form the basis of garment engineering, which achieves improvements in efficiency by changing the construction of the garment (Basdeo, 2006).

5.14.6 EQUIPMENT SELECTION (4.6.19)

Once it has been established that the particular operation or seam is necessary and cannot be simplified, the next step would be to decide on the

best equipment to achieve the desired result. This means considering specialised machines as well as the wide range of attachments such as folders, stackers and so forth which are available (Basdeo, 2006).

5.14.7 MOTION ECONOMY

When the machine and attachments have been selected, it becomes necessary to develop the most efficient motion pattern for the operator. This includes how the operator brings in the work, how the pieces of garment need to be aligned, how the sewing procedure needs to take place, how the garment is disposed. This requires the principles of ergonomics (Basdeo, 2006).

- The clothing machinist normally sits in one position the entire day. The hands and feet operate the machine during the sewing procedure. The layout of the components of work need to be strategically positioned to create a smooth flow and become rhythmic. Prevent reaching out for components, tools and machine operation for an extended period where fatigue can set in.
- Work surfaces should be adjustable to worker anthropometry.
- In general, work should be organized within the person reach without stretching.
- All controls of the machine should be placed within the normal working area.
- Use both hands during operation in symmetrical and opposite directions to reduce fatigue.
- Design operations so that all fingers are used to avoid overload
- Try to use gravity in the operation.
- Working in normal posture. Try not to bend parts of the body into awkward positions.
- Change posture when necessary.
- Locate all working tools in position.

- Have a place for everything and everything in its place. Use easily accessible bins for small parts.
- Provide training in the handling of equipment (Kanawathy, 1995)

5.14.8 THROUGHPUT TIME

Garments passing through a factory from one operation to another can be considered as a “pipeline” (Basdeo, 2006). The total time garments take to pass through the pipeline is called the “throughput time.” The total number of garments in the pipeline at any one time is called the “work-in-progress.” Work-in progress and throughput time are related to each other quite simply, via the rate of production.

$$\frac{\text{Work-in-progress}}{\text{Production rate}} = \text{Throughput time} \quad (\text{equation 5.1})$$

Production rate

As an example, if there are 8000 unfinished garments on the factory floor and the average production rate is 200 per hour, the throughput time would be $8000 \div 200 = 40$ hours, or almost a week.

Work-in-progress is essential particularly in the clothing industry due to style changes on a frequent basis, machine breakdown which is very common, difficult fabrics and so on. To obtain this protection, the manager should ensure that the work in progress is distributed evenly throughout the factory.

5.14.9 ACTIVITY SAMPLING

Activity sampling has been used to study factory work for more than forty years (Kanawathy, 1995). It is based on a principle of finding out how an operator spends her working time. The study is conducted by obtaining information by frequent short glimpses and recording what the operator does at a specific point in time. The number of operators that can be studied simultaneously range from 1 to 20. Thus if an operator spends 20% of her time waiting for work, then an observer who makes 100 random glimpses at her should see her working on 80 of those occasions, and waiting on the other 20 occasions.

5.14.10 TECHNIQUE OF ACTIVITY SAMPLING

The observer should decide what activities he is interested in and in what area he is conducting the study. He should determine what the frequent activities of the operator are. This technique provides information on working and non-working (handling) activities that machinists are involved with. Example of a sewing room:

Table 5.2 ACTIVITY SAMPLING EXAMPLE

| Date: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Tot Obs | % Obs | Target |
|------------------------------|---|---|---|---|---|---|---|---|---|----|------------|----------|--------|
| Study No. | | | | | | | | | | | | | |
| Section | | | | | | | | | | | | | |
| 1. Sewing (needle moving) | | | | | | | | | | | | | 30 |
| 2. Handling | | | | | | | | | | | | | |
| 3. Bundle admin | | | | | | | | | | | | | |
| A. Sub-total | | | | | | | | | | | | | 85 |
| 4. Wait | | | | | | | | | | | | | |
| 5. Fetch work | | | | | | | | | | | | | |
| 6. Talk | | | | | | | | | | | | | |
| 7. Thread Break | | | | | | | | | | | | | |
| 8. Change Bobbin | | | | | | | | | | | | | |
| 9. Change colour | | | | | | | | | | | | | |
| 10. M/C Trouble | | | | | | | | | | | | | |
| 11. Unpick | | | | | | | | | | | | | |
| 12. Other repair | | | | | | | | | | | | | |
| B. Sub Total | | | | | | | | | | | | | 10 |
| 13. Personal | | | | | | | | | | | | | |
| 14. Absent from m/c | | | | | | | | | | | | | |
| C. Sub-total | | | | | | | | | | | | | 5 |
| Grand Total | | | | | | | | | | | | | 100 |

5.14.11 THE M/A RATIO

The measured time-achieved time ratio (M/A Ratio) provides a simple and convenient method for assessing the overall effectiveness of a production line. It is defined as a ratio between the measured time per garment and the actual achieved time.

$$\text{M/A Ratio} = \frac{\text{Measured}}{\text{Achieved}} \quad (\text{equation 5.2})$$

The measured time is obtained by timing every operation in the section, to determine the average cycle time for each operation. These values are added to give the total measured time per garment.

The achieved time is defined as the total clock minutes worked by the operators in a typical day, divided by the average output of the line, in units. The higher the ratio, the more consistent and effective is the line.

5.14.12 OPERATOR CAPACITY

A time study can be used to determine an operator's individual production capacity or to establish a standard time for the operation (Stevenson, 2006). An operator's daily output may be influenced by a variety of factors, including work supply, bundle size, machine trouble, line balancing and so forth. It is sufficient to make a short study of less than 10 cycles to establish an average cycle time. The potential output can be calculated by adding 33% to the observed time and dividing into the number of minutes in the day. For example, if the average cycle time is 0.42 minutes per garment, the operator should be able to produce in an 8.5 hour day the following number of units:

$$\frac{8.5 \times 60}{0.42 \times 1.33} = 913 \text{ garments} \quad (\text{equation 5.3})$$

The allowance of 33% is intended to provide for tea breaks, personal and fatigue, and any disturbances. It is an approximate figure obtained from experience.

5.14.13 THE PRODUCTION STUDY (4.6.29)

From time to time the work study engineer would find a problem with an operator whom he knows should be able to reach the required standard or output, but who does not do so. The work study engineer is then called in to perform a production study to determine the cause of poor performance. The procedure involves recording every cycle with a stopwatch for an hour or more as required. This would lead to finding the root cause of the problem.

5.14.14 LINE BALANCING (4.6.29)

An assembly line is defined as a set of distinct tasks which is assigned to a set of workstations linked together by a transport mechanism under detailed assembling sequences specifying how the assembling process flows from one station to another. Balancing a line means that each operator should have an equal amount of time to complete a task. Since this is not so, a theoretical calculation is done using the following formulae:

$$\frac{\text{No of operators on the line} \times 60}{\text{Total standard minute value of the garment}} \quad \text{equation 5.4}$$

example $\frac{25 \times 60}{15}$

15

Therefore the output rate of the line would be 100 units per hour. The operations on the line then need to be balanced at 0.60 standard minute value per hour.

5.14.15 GARMENT COSTING (4.6.29)

Profits are essential for the survival and growth of any business (Weitz, 2006). Profits must be planned and strategies established to achieve the profits desired. This means measuring, controlling, and managing the investment in

materials and labour required to produce the products. Costing is the process of estimating in advance what the manufacturing cost of a garment would be so that the correct selling price can be determined. It is a very critical process as it will determine the organisations profitability (Edwards et al, 2002).

Manufacturing costs include all the direct costs and expenses that are incurred in production of the product. Accurate costing of the investment in a specific product provides a basis of cost management, pricing and evaluation of the market and profit potential. Organisations may use direct costing, absorption costing, or activity based costing to determine the cost of individual styles. Costing is done at various stages of product development and production. Budgets and performance reports are used to monitor and control costs (Hughes, 2005).

5.15 ENVIRONMENTAL CONDITIONS (4.6.18)

Environmental conditions are a cause for concern especially in clothing manufacture. Manufacturers need to be aware of the conditions and strain that machine operator's experience. This aspect of the framework covers environmental conditions.

This section comes under the banner of occupational hygiene. The joint committee of the International Labour Organisation and the World Health Organisation defines occupational health as follows "the promotion and maintenance of the highest degree of physical, mental and social well-being of the workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological equipment, and to summarise: the adaptation of work to man and each man to his work." It is clear that this is a wide field of study and is related to the field of ergonomics (Schoeman and Schroder, 1994).

The researcher will not go into detail in this subject, but would like to emphasise that the environmental conditions need to be acceptable for the satisfactory performance of work.

5.15.1 TEMPERATURE (4.6.18)

Literature has shown that poor ventilation, too high or too low temperatures result in loss of efficiency, discontent and increase the rate of accidents and sickness (Galer, 1995). In this case four factors need to be considered.

- air temperature
- radiant temperature
- air humidity
- rate of air movement.

Of these, air temperature is usually the most important. However people differ considerably in their judgement of a comfortable air temperature, which makes it difficult to define an optimum level of air temperature for a given task. As the construction of the factories is generally enclosed with limited ventilation, it makes the air circulation within the building difficult. There is a strain on the workforce during the winter and the summer as 85% of the factories do not have air-conditioning. Temperatures range from 23 to 33° Celsius in summer and 16 to 25° Celsius in winter. January is the hottest month with an average temperature of about 32°C.

(www.sa-venues.com/weather/kwazulunatal)

5.15.2 AIR TEMPERATURE (4.6.18)

From observations in the clothing industry and the temperatures in South Africa, the temperature should be in the region of 20°C in winter and 30°C in summer in the Durban region. The temperature varies according to the geographical location of the factory (Basdeo, 2006). High temperatures of 35° and low temperatures of 10°C affect the performance of machinists. Factories with a constant air temperature through air conditioning maintain their

performance but the majority of factories (75%) do not have air-conditioning. In addition to this problem, fabric attracts dust, polluting the air. Also, machines give off heat, which rises the temperature of the surrounding area.

5.15.3 RADIANT TEMPERATURE (4.6.18)

This is heat generated by machinery around the operator. It is not considered a problem in the clothing manufacturing industry except for people working in the pressing department where heat is generated by pressing machinery. In this case the temperature in the pressing department should be monitored to prevent hazardous conditions of work. The comfort zone is between 16.7°C to 20°C (Schoeman and Schroder, 1994).

5.15.4 AIR HUMIDITY (4.6.18)

Humidity has relatively little effect on thermal comfort at temperatures around 20°C. Humidity is usually measured as a percentage of the moisture content in the air. This issue is of concern in the summer months especially in the coastal areas. The relative humidity should not exceed 70% (Galer, 1995).

5.15.5 RATE OF AIR MOVEMENT (4.6.18)

Provided the air and radiant temperatures are correct, the ideal level of air movement is around 0.15 metres per second (Galer, 1995). Clothing manufacturing organisations that have the financial capital available install air conditioning that takes care of the above factors. Otherwise, organisations normally use fans that provide some comfort in the summer days. Some organisations (especially the CMT manufacturers) perform without controlled temperature and the operator is under pressure to produce the required "quota." (Basdeo, 2006)

5.15.6 NOISE AND VIBRATION (4.6.18)

Noise and vibration is not of major concern in the clothing industry as machines are small and do not cause hearing problems. In addition, soft background music is installed to sooth the ear. The researcher has found that it influences and reduces boredom and fatigue that often accompanies repetitive work. Thus music may influence not only attention and vigilance but feelings of well-being and job satisfaction, and these effects could be reflected by reductions in absenteeism, bad timekeeping and labour turnover which are likely to increase overall productivity (Osborne, 1991).

5.15.7 LIGHTING (4.6.18)

The amount of light necessary for good task performance depends on the nature of the task, the sharpness of the task performer's vision, and the environment in which the task is carried out. In the South African context, the building is normally enclosed with high windows and very little or no natural light. Due to the clothing industry being repetitive with fine manual work the recommended lighting requirements is in the region of between 750 and 1000 lux (OHSAS 14000). It is also advisable to install a light on the machine directed towards the needle threading area. Operators with poor vision can thus be accommodated. Create an environment that is free from glare that may cause discomfort. It occurs when some parts of the field of view are excessively bright in relation to general levels of brightness.

5.15.8 ENVIRONMENTALLY FRIENDLY BUILDINGS (4.6.18)

There is much current debate about the way to create more environmentally-friendly buildings, and varied opinions about how cost-effective those improvements can be. Reducing energy consumption, and therefore expenditure, is one of the most obvious contributions that building designers or occupiers can make, yet there is still great reluctance to invest in the more highly specialised products which can make these savings a reality (Sommerich, 1997).

It is self-evident that reducing energy consumption is environmentally friendly. Coupled with the fact that monetary savings will result in the medium or longer term, it seems perverse that more consideration is not given to specification choices available from the outset.

5.15.9 ENERGY SAVINGS (4.6.18)

In the case of lighting, more sophisticated luminaries certainly require a larger capital outlay which management may find difficult to justify when cheaper luminaries look much the same and claim similar light output. Pressley, 2007 reports that the eThekweni municipality proposed a 10% surcharge on electricity which would amount to R132 million income while an additional 10% on rates would yield R174 million. Durban's clothing and textile industry is rejecting the proposal. Frame group managing director and world textile federation president Walter Simeoni says the manufacturers are asking the eThekweni municipality for water and electricity relief but had no response. Simeoni said "we are being ignored and I find this unacceptable because this industry is under enormous pressure. We are being forced out of the greater Durban area because the environment is not conducive" (Pressley, 2007).

To increase the dilemma of the industry there are power cuts by Eskom. Eskom would like industry to reduce their power consumption and this is a national problem. Energy saving luminaries has been manufactured, but industry is finding it difficult to change all luminaries at once. A move towards in energy saving has been observed (Pressley, 2007).

5.15.10 ELIMINATE FLICKER (4.6.18)

In a highly intricate and manipulative operation with a focus on the movement of the needle during sewing, the flickering of light causes a strain on the eye. Thus organisations need to firstly create natural lighting that would improve the vision of the machinist, while totally eliminating the flicker of lights.

5.16 LEAN MANUFACTURING

The remaining issues focus on aspects that are considered vital in clothing manufacture and an important part of the process improvement framework.

Lean production refers to the elimination of waste in all forms. This includes defects requiring rework, unnecessary process steps, and unnecessary movement of people and materials, waiting time, excess inventory and over production. It focuses on the identification of non-value-added activities with a view of elimination. A simple definition is “getting more from less.”(Evans, 2005)

Lean production is facilitated by a focus on measurement of activities and continuous improvement of processes, multi-skilled team of workers, mechanisation and automation, efficient flow of materials, rapid setup and changeover, just-in-time delivery and scheduling, worker empowerment to act as required, supplier partnerships and preventive maintenance.

5.16.1 KEY TOOLS FOR LEAN PRODUCTION

The 5's principles – seiri (sort), seiton (set in order), seiso (shine), seiketsu (standardise), shitsuke (sustain) was derived by the Japanese. They define a system for workplace organisation and standardisation. Sort refers that each item in the workplace should be in its proper place “a place for everything and everything in its place.” Set in order refers to arrange materials and equipment so that it is easily found. Shine refers to a clean work area where problems with machinery can be identified. Standardise means to create formal procedures and practices in all processes and ensure that steps are performed correctly. Finally, sustain means to keep the process going through effective skills development, communication, and organisational structures.

Visual controls are indicators for tools, parts, production, that are strategically placed in sight for everyone to understand the status of the system at a glance.

Effective layout and standardised work - the layout of machinery and processes is designed for best operational sequence and flow of materials. Standardising the tasks by specifying proper methods of operation reduces human effort and energy.

Pull production – also referred to as Kanban or just-in-time, where the customer controls the system through orders placed. Total productive maintenance – is designed to ensure that equipment is operational and available when required. Source inspection enables process operators to produce products that meet specifications.

Continuous improvement provides a link to six sigma and all other improvement related procedures. Identify the root cause of problems and permanently remove them (Evans, 2005).

5.17 OPTIMISE TEAM EFFORTS (4.6.30)

Team-work can be found throughout the organisation, in manufacturing cells, quality circles, problem solving teams', self managed teams, project teams and so forth. This creates an internal customer relationship which breaks down barriers between departments. The focus is on the fulfilment of customer requirements and optimisation of processes. Teamwork is an important means of achieving organisational goals (Leung, 2003).

5.18 JIT PRODUCTION AND DELIVERY (4.6.23)

The just-in-time philosophy implies the delivery of any part in the necessary quantity, at the right time to the right place. Just-in-time delivery is a key element in the development of lean production in many companies (Stevenson, 2007).

A few important changes are necessary to reach this degree of flexibility. For example, set-up time reduction also contributes to the reduction of lead times (Gilmore and Smith, 1996). One of the implications of just-in-time production

and delivery is the reduction of lot sizes because it contributes to the reduction of inventories and lead times.

5.19 INTEGRATION OF SUPPLIERS (4.6.13)

Dyer (1996) mentioned that clothing manufacturers can derive benefits from buyer-supplier relationships. One of the eight principles of the ISO 9001 quality management systems standard is to develop supplier relationships that would improve the competitiveness of the clothing industry by reducing input material costs.

The suppliers can play a significant role in the customer's components design. The main advantage to the customer from the supplier's involvement in component design is that it may help to shorten prototype development times, and therefore to reduce costs and gain competitive advantage in the market.

Finally, another result of supplier involvement is the reduction in the number of suppliers and the increase in length-contracts for the main components; this greater stability in the contracts allows the suppliers to reduce lot production sizes and to increase the frequency of deliveries (Adewole, 2005).

5.20 FLEXIBLE INFORMATION SYSTEMS (4.6.22)

Lean production implies a decentralisation of responsibilities to production line workers and a decrease of the hierarchic levels of the company. The efficient operation of a lean organisation requires the diffusion of information to all levels (Womack and Jones, 1996). The aim is to deliver timely and useful information down to the production line.

The content of that information should be as much strategic as operational. The strategic information type deals, for example, with the company's production plans or sales forecast, while the operational information may be related to the factory's productivity or quality performance. In the same way, the production information system should allow the operation of the different

factory sections or groups of machines to integrate between them and with the production planning department (Adewole, 2005).

5.21 QUALITY MANAGEMENT (4.6.24)

Quality is the perceived value of the product. Two different aspects of quality is identified in order to manage quality: (1) perception of quality of a product relative to other similar products offered in the market, and (2) conformance of a product to an organisation quality standard. In the first context, retail buyers and consumers evaluate quality of goods offered in the market. In the second instance products are judged as acceptable or unacceptable according to defined quality standards.

Product variation is normal but should be controlled to fall within product tolerances. One hundred percent inspection is the norm in the clothing industry. Organisations need to continuously upgrade their quality control procedures to be more competitive in the market (Evans, 2005).

5.22 LINK PRODUCTIVITY TO PAY (4.6.12)

Unions can make a positive contribution to productivity improvement by understanding the problems faced by the industry. By carefully analysing what the risks are and how these could be managed and protected in more innovative ways, greater flexibility would allow firms to become much more globally competitive. Both workers and organisations would be better off, both in earnings and ability to survive for longer. Unions and organisations should learn to collaborate better on areas of common interest (Ralis, 2004).

5.23 ELIMINATE RESTRICTIONS ON SMALL BUSINESSES

This would immediately allow much greater success factors for small businesses and would stop them from “hiding” from industry associations. They would then be able to legitimately access support services and mature faster. More successful small businesses would create more employment.

More BEE entrants would grow to maturity and progress into medium size businesses (Ralis, 2004).

5.24 ESTABLISHING A DIRECTORY OF SUPPORT INSTITUTIONS (4.6.13)

Due to the rivalry within the industry, there is a lack of support among organisations. The benefit of developing a directory would be the sharing of scarce resources that can be used by the industry to solve technical, factory, production and marketing problems.

5.25 ESTABLISH A RESEARCH AND DEVELOPMENT/INNOVATION FORUM ACROSS THE VALUE CHAIN

Joint research and development across the value chain identifies new opportunities, access greater funding from government and result in improved competitiveness.

Review the Duty Credit Certificate (DCCS) Scheme as it is being abused by organisations which has a less negative impact on total pipeline competitiveness (Ralis, 2004).

5.26 FACILITATE THE FORMATION OF INDUSTRY CLUSTERS (4.5.1.12)

Industry would gain by working together on issues of mutual interest in areas such as:

- The sharing of facilities and equipment that may be deemed expensive or difficult to obtain.
- Bulk purchasing of material inputs from SA textile mills that would decrease the cost of inputs (joint negotiations).

- The development of joint marketing drives that would attract customer interest.
- The strategic development of joint education and training initiatives that would enhance skills development.
- The sharing of large orders and their fulfilment which would reduce delivery time.
- The initiation of joint research and development initiatives that would enhance the competitive position of the organisation
- The sharing of services such as work-study officers, mechanics, accountants, and any other overhead services that could add value to organisations and reduce overhead costs.
- The creation of market power by working together on the building of infrastructure, regulations, and so forth (Ralis, 2004).

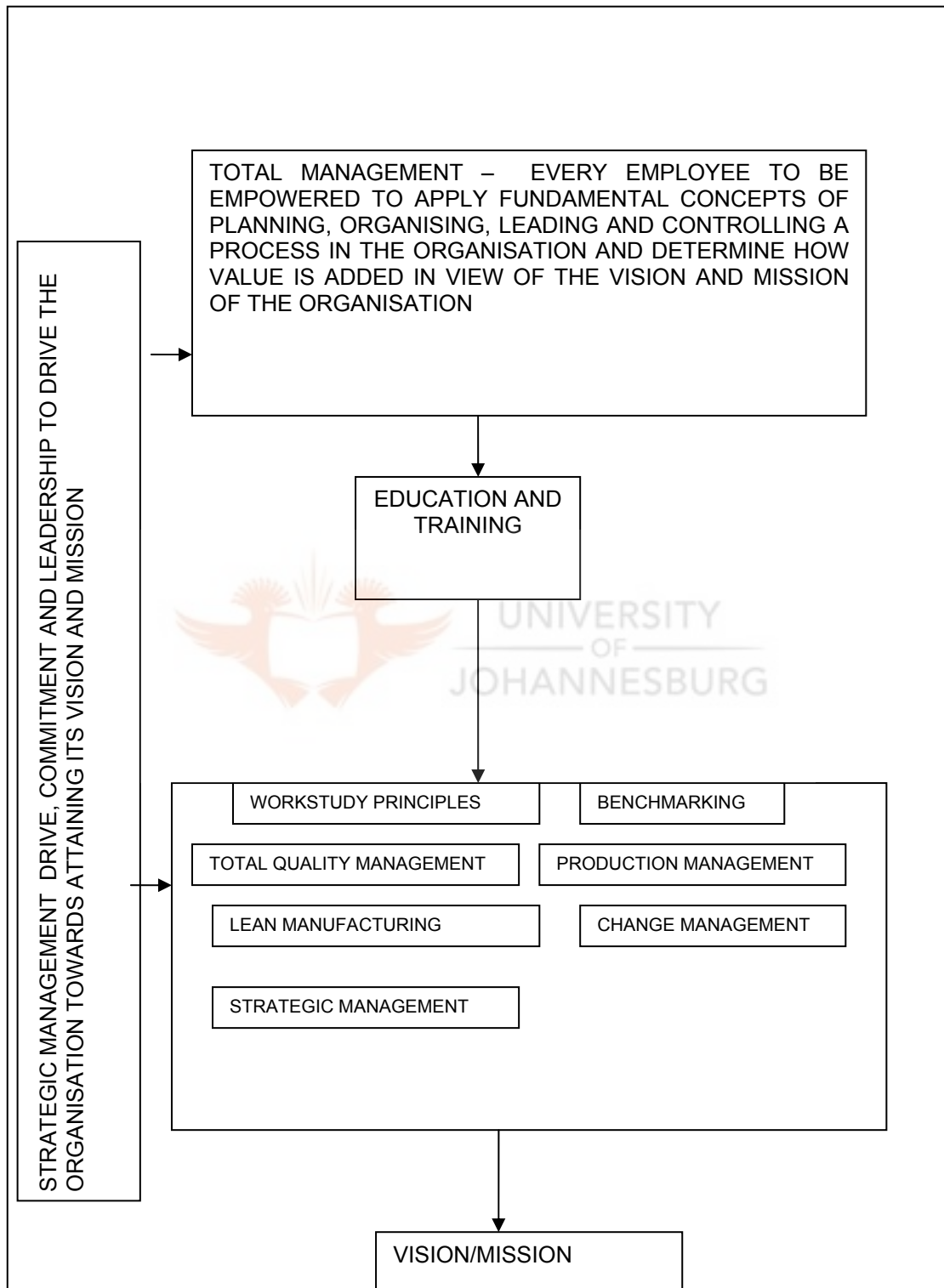
5.27 CONCLUSION

In order to survive in the clothing and textile industry in South Africa and achieve manufacturing excellence, the proposed framework moves from a visionary perspective through a number of supporting elements to establish a strategic process improvement framework that would provide impetus in gaining competitive advantage.

The creation of this framework would provide the clothing industry in South Africa with a “survival toolkit.” The framework provides a practical approach that can be implemented without major financial implications and is strongly recommended for implementation. The case study that follows in chapter 7 illustrates the process in action on certain aspects only, due to time constraints.

Performance figures indicate that the companies that implemented work-study principles have approximately doubled their output performance and significantly differentiated itself from its competitors by key improvements in quality, cost and delivery.

Figure 5.1 – The framework for developing a competitive clothing and textile industry developed by Ramdass



The philosophy of total management empowers all employees to manage their processes with a view to accomplish organisational mission and vision through education and training and the adoption of process improvement

techniques of work-study, total quality management and so forth. A strategic management drive with commitment from the leadership to encapsulate the adoption of improvement techniques with a focus on gaining competitive advantage. The framework in figure 5.1 summarises the strategic drive and commitment that leadership needs to acknowledge in the implementation of improvement initiatives in the clothing industry. This could be accomplished through education and training and the empowerment of employees to manage their processes thereby initiating the concept of total management. Table 5.3 provides a checklist of improvement initiatives in a summarised form related to the framework discussed.

Table 5.3 A checklist of improvement initiatives in clothing and textiles

| POINT NUMBER | YES | NO |
|--|-----|----|
| 1. Is there management commitment for change? | | |
| 2. Does the organisation have a vision and mission statement? | | |
| 3. Do all employees understand the vision and mission? | | |
| 4. Is there effective training and development for all employees? | | |
| 5. Does the company apply work-study principles? | | |
| 6. Does the company apply production management principles? | | |
| 7. Does the company apply quality management principles? | | |
| 8. Does the company apply lean manufacturing principles? | | |
| 9. Are all employees empowered to manage their processes? | | |
| 10. Are there strategic supplier relationships? | | |
| 11. Does the company understand customer requirements? | | |
| 12. Is the company benchmarked against competitors? | | |
| 13. Are improvement initiatives used? | | |
| 14. Is there an effective information dissemination strategy base on information technology? | | |
| 15. Is there teamwork among operators? | | |
| 16. Does the company apply ergonomic principles? | | |
| 17. Does the company perform product costing and engineering? | | |
| 18. Does the company address the improvement of working | | |

| | | |
|---|--|--|
| conditions? | | |
| 19. Does the organisation provide financial information to the employees? | | |
| 20. Is there BEE initiatives in the company? | | |
| 21. Is the company using the latest technology? | | |
| 22. Are there incentives linked to performance? | | |
| 23. Is there effective communication between employees and management? | | |
| 25. Is the company using the bundle system of production? | | |
| 26. Is the manufacturing capability of the company measured? | | |
| 27. Does the company measure its financial status on a monthly basis? | | |
| 28. Is the relationship of labour and management good? | | |
| 29. Is the relationship of management and unions good? | | |
| 30. Are people treated as human assets? | | |



CHAPTER 6 – MODEL IMPLEMENTATION

6.1 INTRODUCTION

Once convinced of the value of the framework (6.2.2) for the improvement of manufacturing practices in the clothing industry, the question then becomes how to design and implement an effective programme of improvement practices? The framework indicates various focus areas of improvement and needs to be implemented through a project management approach. Due to time constraints the researcher decided to implement two aspects of the framework, namely work-study principles, and cellular/modular manufacturing. Work-study principles were applied in 4 organisations. The implementation of work-study principles is discussed in this chapter while cellular/modular manufacturing is discussed as a case study in chapter 7. The terms cellular, modular and team-working are used interchangeably.

The most important factor for any change in an organisation is the commitment to change the organisation on the part of senior leadership (management) (Evans, 2005). Process improvement (5.13) should be recognised as being more than just a project or programme but a platform for continuous improvement. It is a complex and ongoing process that should be an integral part of both corporate strategy and culture. Organisations that have adopted a continual improvement philosophy are well positioned to embrace the framework and continue to adjust the framework according to their needs.

6.2 IMPLEMENTATION PLAN

6.2.1 MANAGEMENT COMMITMENT (5.3)

The implementation of any project requires change and therefore the acceptance from all major stakeholders, namely management and the workforce. To start the project, the researcher conducted discussions with the workforce and management, the objective of which was to enlighten

employees on the change that needed to come about. Discussions revolved around the current status, the framework of process improvement practices and the way forward. With support from the workforce, it became easy to proceed with the project.

Management commitment, both in terms of support for the project and in the allocation of resources, is essential for success. The information sharing process inspired the operators to accept the change that impacted on them.

The framework implementation plan required the involvement of employees as they were the ones most affected by the changes in operation. The employees' acceptance of the implementation process was that the project be done on a trial basis to determine the impact to the organisation. Employees were comfortable in highlighting areas of concern during the course of the implementation phase. The identification of problems in a process is an easy task, but to find solutions was challenging.

It was amazing to discover that employees came up with the best ideas in the process, but were seldom taken heed of. A resolution team, normally comprising engineering, operations, quality, meet on a regular basis to determine the impact of problems in the organisation.

Financial implications are normally discussed at management level and vary according to circumstance. Problems can be resolved with minimal cost and this route was chosen in this circumstance. The major resource that was used in this instance was time.

Senior leadership should take the responsibility and accountability for implementing and maintaining improvements in an organisation. In many larger organisations, in-house work-study specialists direct the process. With 58% of the organisations being CMT operations, there was a lack of the application of work-study principles.

An essential component of a continual process improvement strategy is education and training. The following training was done during the project:

- Basic work study applications
- Production management applications
- Quality applications
- Business principles
- Human relations and communication
- HIV and Aids
- The fundamentals of the framework of improvement strategy

Attitude and behaviour can enhance work ethics and improve the productivity of the clothing and textile industry in South Africa. Education is required to inculcate changes in attitude and behaviour. Often employees have a notion that work-study is applied to reduce the staff complement of the organisation. On the other hand, supervisors feel that an employee that brings an issue to their attention is a “whiner.” Both of these attitudes can have negative repercussions on an organisation.

Management and the researcher decided to focus on the fundamental aspects that would add value in a short span of time and show results in process improvement.

6.2.2 IMPLEMENTATION SITE

The implementation of the framework of process improvement took place at four different clothing manufacturing plants in Durban.

6.2.2.1 ORGANISATION A

This organisation employed 150 people. One line (25) operators were chosen on the manufacture of blouses. The researcher evaluated the current status with the production of 75 units per hour. The researcher performed work measurement through the performance of time studies on all operations.

Methods of operation and the layout of the workplace were evaluated to improve the handling of garments on all 25 operations. The operations were balanced to minimise time between operations. The layout was adjusted to improve the flow of products to improve work flow between operations. Over a period of two weeks the production rate improved to 120 units per hour. This was an efficiency improvement of 62.5%. Thus, through fundamental work-study practices (5.14) the output of the line improved by approximately 63%.

6.2.2.2 ORGANISATION B

This organisation employed 350 people and manufactures men's trousers. One line of 45 operators was chosen. The researcher evaluated the current status of the production line and observed the following:

- lack of performance standards;
- lack of line balancing;
- inefficient flow of materials;
- machinists waiting for work;
- Inefficient work layout and ergonomics.

The output averaged 80 units per hour. The researcher spoke to management and the machinists to inform them of the current status. With the application of work-study principles discussed in section 5.14 the researcher changed the following:

- changed the method of handling the garment with ergonomics in mind
- improved the flow of work
- balanced the operations
- eliminated wastage in the form of time, unnecessary movement of materials and non-value adding activities
- set time standards for each operation

The production output performance improved to an average of 145 units per hour. This was an efficiency improvement of 57% within 3 weeks.

6.2.2.3 ORGANISATION C

This organisation employed 100 people for the manufacture of shoulder pads as trims for the clothing industry. The managing director requested an evaluation of the plant and the researcher was willing to conduct the evaluation. The organisation produced 80 pairs of shoulder pads per hour.

The researcher found the following inefficiencies:

- lack of time standards
- lack of performance management
- poor work methods
- inefficient flow of materials
- poor work organization
- lack of space and inventory stored “all over the place”
- lack of motivation and poor leadership
- lack of line balancing
- poor environmental conditions with insufficient lighting and poor air circulation

The researcher addressed the above issues through the application of work-study principles and achieved an output of 150 pairs of shoulder pads per hour.

The researcher is confident that with the application of the framework of process improvement, the clothing industry could improve labour efficiency by approximately 30%. Management needs to take the initiative of getting in the required skills to implement these changes, which could almost double their current profitability. The implementation of modular manufacturing in a case study format is discussed in chapter 7.

6.3 STRATEGY FOR PRODUCTIVITY IMPROVEMENT

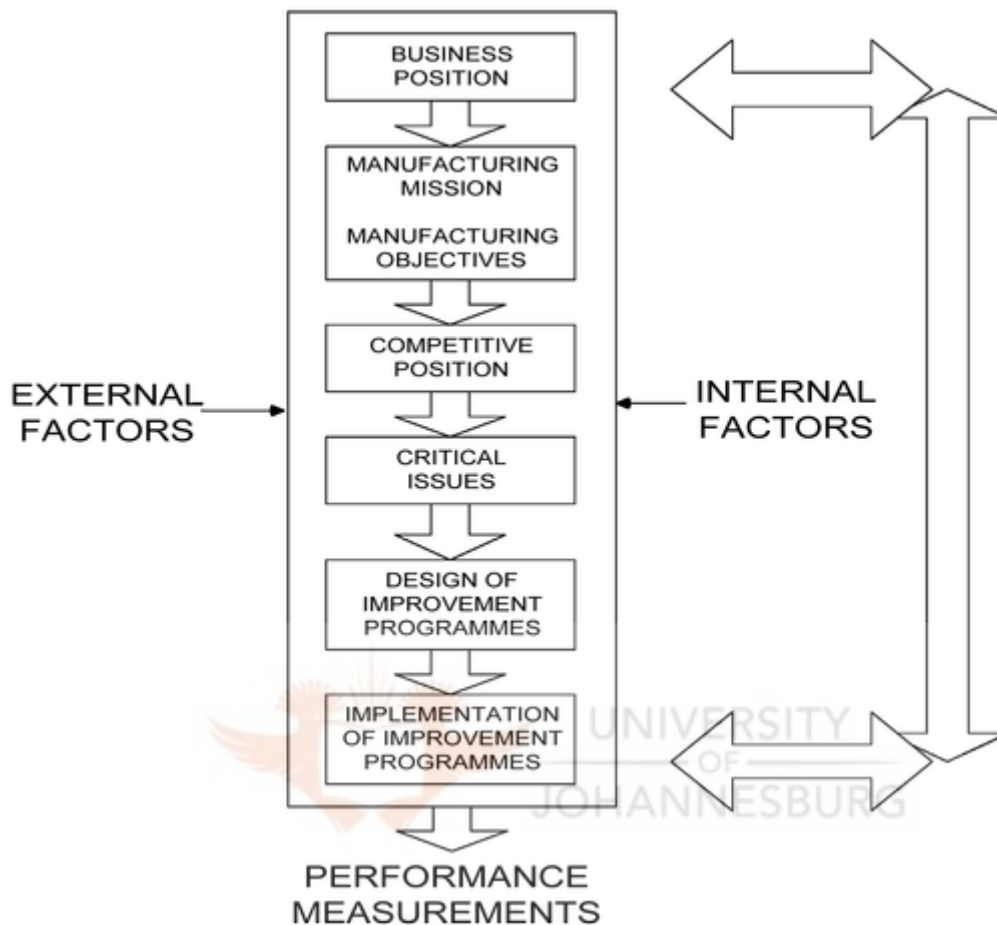
Thus, fundamental process improvement strategies can be applied to improve productivity in the clothing and textile industry. The researcher would like to reiterate the strategy for productivity improvement discussed in section 5.4.

- The application of work-study principles. Work study and industrial engineering practices are important in labour intensive operations. Manufacturers tended to apply estimated time standards which were often incorrect. There was a crucial need to apply scientific work measurement and methods development methodologies. Manufacturers should move towards establishing a work-study department or alternatively train supervisors in the use of such tools.
- Apply training initiatives for all stakeholders (4.6.16 Training and development). The productivity levels in the clothing industry indicated the need for training and development initiatives. Improvement initiatives would only be successful if supervision and management understood the concepts and implemented the changes. There was a vast range of education and training providers that were available for the delivery of clothing management related programmes. Organisations could sponsor staff to attend or negotiate in-house training in both specialised and non-specialised skills. Thus scientific principles of line balancing, workflow layout, ergonomics and so forth could be implemented.
- Develop machinist training cells. Machinist training cells provided skills in the manipulation of fabrics, developed work ethics and created a learning curve for new employees towards the attainment of world-class performance.
- Develop quality management systems (4.6.24 Defect rates). The sample reported that the defect rate was approximately 3%. A quality

system would monitor and reduce the levels of defects which would save the organisations production costs.

- Technological improvement (4.6.22 Information Technology). Organisations need to upgrade their machinery at various stages in clothing manufacture. Computerised laying and cutting of fabric in the cutting room, automated sewing machines, and automated finishing are some of the areas of innovative machinery. Strategic investments should be made that would improve return on investment and productivity.
- Introduce productivity measurement systems (4.6.28 Introduce performance management). This would enable the recording of data at process points in real time, thus enabling effective decision making and the prompt action of inefficiencies as well as rewarding performers.
- Develop planning and scheduling of production (4.6.25 Production lead times). The aim of this would be the meeting of delivery dates as well as maximisation of resources. Organisations should look at software applications.
- Introduce incentive schemes (4.6.17 Incentive schemes). Productivity gains should be shared with the workforce in the form of incentives. This sharing would encourage labour efficiency and would assist in stimulating the morale of people (Ramesh, et al.2003).
- Black economic empowerment (BEE) initiatives (4.6.31 Change management). When management and workers are totally involved in the operation of the organisation and there is transparency of operation, the entire organisation takes ownership of profit/loss of the organisation.

Figure 6.1 A systematic and practical approach to framework implementation



The figure 6.1 developed by Ng and Hung (2001) provides a systematic approach to the implementation of the framework discussed in chapter 5.

6.4 THE IMPACT OF STYLE CHANGES IN CLOTHING PRODUCTION (4.6.9)

The following issues are limitations experienced in the clothing industry that impact on labour productivity. Due to the fashion orientation of the industry, the production manager grapples with these issues.

Constant style changes became a reality for clothing manufacturers. Even small changes (e.g. a different fabric, additional trim items, or a colour variation) force the production line to face a new set of challenges. Each

change affected costs and productivity. The introduction of dedicated equipment in an attempt to improve output complicates the situation. A change in the length of a collar point or the shape of a pocket meant several hours of downtime to reset a specialized machine (Basdeo, 2006).

Style variations produce changes in the degree of operator skill required. Style variations, without changes in production methods, were inversely related to volume of production. To illustrate this problem, the following example is given. Production line A produces 10,000 units of one style compared with production line B which produces 10,000 units of four styles. Production line A is mass production and line B is more fashion-orientated. Production line A will generally have higher productivity than production line B.

Sewing-machine operators on production line A would spend less time, on average, to produce the 10,000 units than will the production line B sewing-machine operators. The more products produced per style, the more time is saved. If the two production lines use the same methods and equipment, the line with the higher number of style changes would have reduced productivity.

6.5 MULTI-SKILLING (4.6.8)

The challenge for a clothing production manager is to minimize input for an improved output while remaining flexible and meeting customer demands. A reduced ratio of number of workers to number of machines could achieve labour savings and increased productivity. One could achieve increased productivity for human activity through multitask operations (i.e. cross-training operators) and other methods of doing the same amount of work in less time. New sewing systems (i.e. modular manufacturing systems) should meet these requirements. In modular manufacturing, the need for labour (i.e. number of workers) is reduced with a corresponding rise in productivity and savings (Basdeo, 2006).

6.5 SEWING SYSTEMS (4.6.8)

Sewing systems are a blend of workers, machines, and handling devices. Characteristics of such systems involve the number of sewing-machine operators, number of sewing-machines, number of assistant operators, ratio of sewing-machines to sewing-machine operators and number of quality inspectors. The characteristics may also be examined in total to include the overall type of system used for production. With industry demands and time constraints, managers are not considering any change in sewing systems.

6.6 AUTOMATION

The escalating labour overheads and prices of garments impacted the profit levels of organisations, which in turn enforced clothing manufacturers to consider automation of processes. Approximately 30% of organisations had machines that are automated in processes such as cuff and pocket setting and plaquet setters.

The clothing industry has developed further in terms of automated machinery: computer guided laser cutting machines; computerised pattern making and grading; ultrasonic sewing machines; and modules (grouping of equipment into larger mechanised production units). The machinery is extremely expensive and organisations need to gain stability before investing in such machinery. Manufacturers could utilize such machinery through subcontracting, or lease (Kilduff, 2000).

6.7 PRODUCTION VOLUME AND PRODUCTIVITY (4.6.12)

Production volume and productivity are measures of efficiency for clothing manufacturers and are concerns when selecting new sewing systems. Lower production volume tends to correspond with lower productivity and this is the trend in industry. Therefore, the researcher decided to perform a “trial” on modular manufacturing.

6.8 IMPACT OF STYLE CHANGE AND PRODUCTIVITY (4.6.9)

The industry is needs to be flexible to accommodate frequent style changes to remain competitive which impacts on productivity. Plants with basic product lines (i.e. less frequent style changes) tend to have higher productivity (Solinger,1998).

Plants producing high fashion items for example two style changes per day had the lowest levels of productivity, while plants with staple production (less than one style change per season) had the highest level of productivity. The less productive plants, as measured in units per hour per operator, tended to be plants that produced more fashion-oriented products. These findings show the need to find ways to increase productivity while responding to consumer demands for frequent style changes (Kaplan, 2003).

6.9 SEWING SYSTEM AND PRODUCTIVITY (4.6.8)

The bundle system is being used by 97% of manufacturers due to its simplicity and flexibility. Line balancing had a major impact in the sewing system and determined the productivity levels of the organisation.

6.10 COMPETITIVE POSITION ANALYSIS

The following information was obtained during the investigation:

- a competitive climate with an atmosphere of dislike among clothing manufacturers;
- manufacturers threatened by new entrants into the market;
- fear of new and substitute products;
- bargaining power of suppliers and buyers.

SA clothing manufacturers face market pressure from both the domestic and the international marketplace in terms of material inputs, garment costs, technology and machinery. New manufacturers entering the current domestic

markets through both legal and illegal means and the dumping of imports are increasing the pressure in the industry.

While these issues have an impact on the organisation, other factors such as environmental impact, socio-economic factors and government rules and regulations have also impacted on the industry.

6.10.1 A COMPETITIVE CLIMATE AMONG MANUFACTURERS

With a growing number of clothing manufacturers in the domestic markets, the shrinking of larger manufacturers/the relocation of parts of larger organisations to non-metropolitan areas, the climate in the clothing industry in SA is very sensitive. The situation worsened due to non-communication among the supply chain. Retailers and manufacturers only sub-contract orders to local manufacturers with whom they have built relationships. The CMT organisations are dependant on the main (larger) organisations for work. There is a struggle among manufacturers to obtain work from their suppliers as price competition is the determining factor (Christopher, 2004).

6.10.2 THE THREAT OF NEW MANUFACTURERS

The clothing industry is susceptible to new entrants setting up facilities on an ongoing basis. This is because start up capital investment is low and it can be operated from residential premises. Although the garment production industry is easily accessible it is not attractive because of the low rate of pay.

However, with employment and retrenchment on a regular basis, manufacturers tend to exploit the workforce. Machinists are placed in situations where there is no choice as machining garments is the only skill they have.

The cost of production, the domination of the established larger organisations and the demand of retailers demoralize the clothing manufacturing industry.

The education level of employees in the industry is low and this shows the lack of concern towards improvement in the industry.

6.10.3 THE THREAT OF SUBSTITUTE PRODUCTS

Garment imports are a threat to the domestic market as consumers substitute the domestic product with the import product as it meets the needs of the consumer. The imported product is considered more favourable in terms of cost factor. The retailing industry (example Mr Price) is moving away from SA products and thus sources the majority of its products from overseas. The SA clothing manufacturers are experiencing low production output and diminishing profit levels as they find it difficult to compete with the cost of imported garments. The latest development is that there is an agreement between China and SA to prevent Chinese imports into SA (Inggs, 2007).

6.10.4 THE BARGAINING POWER OF BUYERS AND SUPPLIERS

Retailers are supply chain leaders in the clothing industry. The voice of the clothing manufacturers are suppressed through bargaining power and multiple sourcing approaches of retailers. Christopher (2004) mentions that the SA markets changed considerably and thus increased the purchasing power of customers. Retailers are focusing their attention on quality of products, reliability in service delivery, and cost of products as criteria to reduce the number of suppliers.

Retailers are using the “play off” tactic against manufacturers to become cost competitive. Demand is volatile and is one of the major problems faced by the clothing industry. This threatens the existence of manufacturers (Adewole, 2005).

Retailers focus their strategy towards quick response in an attempt to improve customer satisfaction. There are a limited number of manufacturers who use process improvement strategies in order to meet the demands of the market. Clothing manufacturers and designers who differentiate themselves through

the application of strategies in process improvement, cost leadership and design development are able to stay ahead of the competition (Jang et al., 2005).

Textile manufacturers that supply the clothing manufacturers are inconsistent in terms of price, quality and delivery. Although most textile mills are situated in close proximity to manufacturers, their fulfilment of orders is poor, which in turn cause a delay in the entire supply chain. A few manufacturers (4%) of the sample are sourcing their fabric and other trim materials from China, India, Pakistan and Hong Kong to the detriment of local textile manufacturers (Barnes, 2004).

6.10.5 UNCERTAINTY IN THE CLOTHING BUSINESS

There is uncertainty in the entire value chain of clothing manufacture. If a delay is encountered in one area, the entire supply chain is affected. The scheduling of production orders is a complex task and has to be done accurately, using software technology. Understanding the complexity of clothing production enables an organisation to schedule orders accurately, thus determining capacity utilisation.

The garment manufacturer should be able to determine the complexity of the order through the application of work-study principles, so that bottlenecks could be avoided. This would improve the utilisation of resources and improve the productivity of the organisation. It is therefore necessary to use the appropriate methodology for the evaluation of job complexity in clothing production in order to meet the demands of the market.

The problems faced by clothing producers are summarised below:

- “Throughput time per unit: The time to complete one unit of production vs. the time to complete the order.
- Inventory between processes: used as buffer stock, machine breakdowns, line balancing. It may extend completion time.

- Critical paths: need to be arranged in parallel or in serial. This could affect the production process.
- Bottleneck operations: need identification for action.
- Plant utilisation: estimates effective use of resources.
- Minimum order size: affects the production process in terms of set-up costs and has a bearing on cost per unit.
- Change-over/setup: the loss of production when there is a style change.
- Rejects and repairs: evaluates capacity lost through repairs and costs lost through rejects” (Adewole, 2005).

The critical issues in clothing production scheduling are bottlenecks, line balancing, set-ups during changeover and capacity utilisation. These factors require in-depth evaluation when scheduling the production process.

The production planner in the clothing industry is faced with a task of scheduling production bearing in mind the complexity of styles and fashion. The clothing industry is always grappling with bottleneck operations, critical operations, changeovers and the work-study personnel could assist in correcting these problems.

The industry does not have software applications to address these issues and relies on experienced personnel in the organisation. Future research could evaluate this and assist in developing such a package that would reduce the impact on the production of garments (Adewole, 2005).

6.10.6 SUPPLY CHAIN TIME REDUCTION

The sharing of information between the processes (fabric manufacture, fashion design and manufacture, and retailer) in the supply chain would assist in the reduction of time between processes.

Research and development in the design of fashion garments going back into textile production and forward into the retailing industry would enable the projection of orders to be simplified. Thus, effective communication within the supply chain and the sharing of information could stimulate the entire value chain, thus addressing problems, understanding the various value-adding operations and creating an industry that could be more forceful towards external competition (Forza and Vinelli, 2000).

6.10.7 THROUGHPUT TIME COMPRESSION

The application of automated machinery in the laying of fabric, and computerized cutting enables a reduction in labour, thus reducing the cost of the cutting operation and enhancing cutting room performance and productivity (Forza and Vinelli, 2000).

If there is communication through computer aided technology between design and cutting, this would further enhance the operation in the cutting room. Automation in the cutting room could assist in the reduction of problems experienced with striped or checked fabric and of eliminating imperfections in the in the fabric (Forza and Vinelli, 2000).

One of the issues that the automation of the cutting process experiences is that the laying procedure does not identify non-conformances in the fabric. This could be addressed and rectified by the textile manufacturers during the weaving process. If this is not feasible, the remaining processes in textile manufacture, namely the washing/printing phase, the dyeing process and finally inspection using special machinery such as a photo-spectrometer would assist in identifying fabric flaws which could be rectified.

Process improvements could also be made in the machining and pressing departments in clothing manufacture. There are advanced machine technologies that are programmable, fully automated machinery, could assist in reducing the time of the machining process. The latest technological

developments have machinery that could perform a number of sewing operations with minimal human interference (Brown and Bessant, 2003).

There is advanced technology in the ironing department as well. There are automated pressers that reduce the number of operations, thus reducing the time of pressing.

Thus the entire supply chain could use machinery that would be able to reduce the time of production of garments but need to apply the latest technology, not forgetting the fundamental methodology of process improvements. The improvement process improves the quality of production, reduces the risk of accidents by reducing fatigue of operators, and improves the competitive position of organisations (Adewole, 2005).

6.10.8 RESEARCH AND DEVELOPMENT IN CLOTHING MANUFACTURE

Research and development is not a priority in 80% of the organisations that were sampled. The technology centre at Cape Peninsula University of Technology and Durban University of Technology was being used to pilot research and development initiatives in the clothing industry in SA. Research was done by design houses in industry and higher education institutions to support industry in current style trends. Research and development did not play a major role in this investigation, but is imperative to keep abreast of the latest trends (Rails, 2004).

6.10.9 QUALITY (4.6.24)

In the clothing industry, the designer sets the quality specifications of the garment. The customer (the distributor/retailer) in conjunction with design specifications and fashion trends orders the manufacture of garments. The consumer then determines whether the garment suits their needs (Crosby, 1972).

In the process of clothing manufacture, specifications are drawn up and measured against production at various stages, cutting, machining and pressing. Overall, garment production conformed to customer specifications. In cases where there are defective garments, it is repaired and allocated to the good lots. There is also a possibility of over-producing or under-producing garments. In the case of overproduction, garments are sold to employees or moved to the factory shop.

6.11 CONCLUSION

Due to the different advancement levels of clothing manufacture in the different countries, the productivity levels vary radically. If the SA clothing industry does not embark on improvement initiatives, global competition would totally consume the domestic market. The study shows that the industry has considerable potential for the improvement of its productivity levels. The factors that could turn the industry around are established and needs the support of management.

The proposed productivity measurement system and the strategy for productivity improvement could be used by the clothing manufacturing industry to draw up an improvement programme. Clothing manufacturers should be able to address rapidly changing consumer needs. The consumer focus for clothing manufacturers requires a shortened product life cycle and increased diversification of fashion. The industry in the changing market should obtain the capability to produce many different types of products in small quantities in shorter lead times.

The right sewing system is important for the achievement of high productivity rates. The actual technology and systems of production is an important element of the productivity improvement process. Product type was highly related to productivity. Manufacturers managed to achieve labour performance with different types of systems. The interaction between sewing system type, production level, style changes and specific product mix should be further investigated.

Other factors should be tested for their impact on productivity. Beyond the number of style changes, one should also investigate merchandise classifications and product mixes. It is important to note the workforce is an important asset in a labour intense environment and plays a major role in the success or failure of an organisation. Education and motivation of the workforce as well as the worker's orientation to the specific sewing system could improve the productivity levels of the clothing industry.

Of the managers who indicated that they are considering change, 10% indicated that they would try modular manufacturing. With the preliminary findings from this study about the productivity rates of traditional systems, a manager should evaluate carefully the factors that may accompany a change in systems. Without more detailed analysis, managers should not change just to get a new system of manufacturing (Brown and Besant, 2003). Chapter 7 explicitly describes the experiences and opinion of personnel in an organisational setting regarding the implementation of modular manufacturing through qualitative research using a case study.

CHAPTER 7 - IMPLEMENTING MODULAR MANUFACTURING

7.1 CONCEPT OF MODULAR MANUFACTURING

Modular manufacturing was the “buzzword” during the early 2000’s and the latest technology that could improve performance in the clothing industry, especially for short production runs of fashion items. Another aspect of the methodology is that operators could sit/stand during the sewing operation, thereby enhancing teamwork, quality and output. It is based on self- managed teams in the production of garments. Production is organised in a synchronized manner that eases the flow of production through the various processes. To accomplish efficient performance, standard times are determined using work-study principles for all operations. Workloads are distributed such that each activity has an approximate equal amount of work to balance the line of production efficiently.

The most important aspect of modular manufacturing is team members’ culture and attitude, with a high focus of understanding of improvement techniques applied in the industry. This allows operators to work as a “family” to attain high performance and productivity levels (Castro et al, 2005).

The concept requires the commitment of top management and an understanding of the dynamics of the concept. Without an understanding, the project could lead to failure. Finally, the choice of participants of the trial implementation of cellular manufacturing is a critical factor that would determine the success or failure of the operation. It is advisable to start such a process with in-depth planning and a trial run to determine the strengths and weaknesses of modular manufacturing. This chapter examines the prerequisites for the implementation of successful modular manufacturing and discusses, through a case study methodology, the experiences of employees in the various stages of modular manufacturing implementation. The concepts of team-working, cellular/modular manufacturing are used interchangeably. The concept enforces the principles of team effort (5.17), performance improvement (5.4) total quality management (5.10) and JIT production (5.18)

as discussed in the engineering management framework in chapter five. The concept further creates an atmosphere of belonging and a spirit of working together towards the achievement of organisational objectives.

7.2 PREREQUISITES FOR MODULAR MANUFACTURING

The planning stage of modular manufacturing implementation is of utmost importance as it is a dynamic change from the normal line operation. The planning should be done in stages so that information is gathered on the feasibility of the change.

- Stage 1 Business planning
- Questions asked when planning the change to modular manufacturing are listed as follows:
 - What are the goals of the organisation? – to produce quality clothing at a low price.
 - Where are we now and where do we want to be? – currently struggling to survive but we want to strive to be the best producer of fashion wear.
 - What are the reasons of going modular? – improve quality, efficiency and meet customer deadlines.
- Stage 2 Project planning
 - Set up project team
 - Initial project team (management) training
- Stage 3 Develop plans
 - Layout and size of teams? Sitting or standing? How to cover for absence?
 - Levels of WIP? Single piece VS bundle? Size of bundle?
 - Machinery? Special Machines? Spare machines? How to handle repairs? Role of mechanics?
 - Suppliers (all trims)? Can they meet tighter schedules?
 - Production control? What changes to your system are required? Will production control staff require training?

- Payment system? Individual or group incentive, or flat rate? What about indirect labour?
- Pay for first quality only? Pay for meetings? Training and multi-skilling?
- Selecting the team? Volunteers, grouping by efficiency/skill level? Ethnic mix? How to handle operatives with high earnings? Pay during start up?
- How to handle people who want to leave the group? How to handle people when the team/management wants them out of the group?
- How much multi-skilling?
- What, if any provision for part-timers?
- Supervision? Selection, responsibilities.
- Stage 4 Training needs analysis (develop a training plan)
 - Managerial and supervisory training
 - Operative training – team-working, technical training, multi-skilling, (Who does the training – in-house or outside specialists? Do team members teach other team members?)
- Stage 5 Communication
 - Discuss objectives and plans with union and employees (large or small meetings)
- Stage 6 Develop pilot team(s)
 - One group or two (to compete with each other)
 - How are they selected?
 - Training, development and coaching
- Stage 7 Review
 - What was learned from the pilots? What should be kept? What should be changed?
 - Strategy for further groups? Timetable?
- Stage 8 Develop further teams
 - Review continuously? Be flexible.

7.2.1 RECRUITMENT OF TEAM MEMBERS

The recruitment of team members is a crucial stage in the development of a module. Members of the team are generally recruited within the organisation from areas such as the training school or from within the production line. Management needs to select members of the team that work effectively together. In general this sort of recruitment is regarded as desirable once a modular system is firmly established.

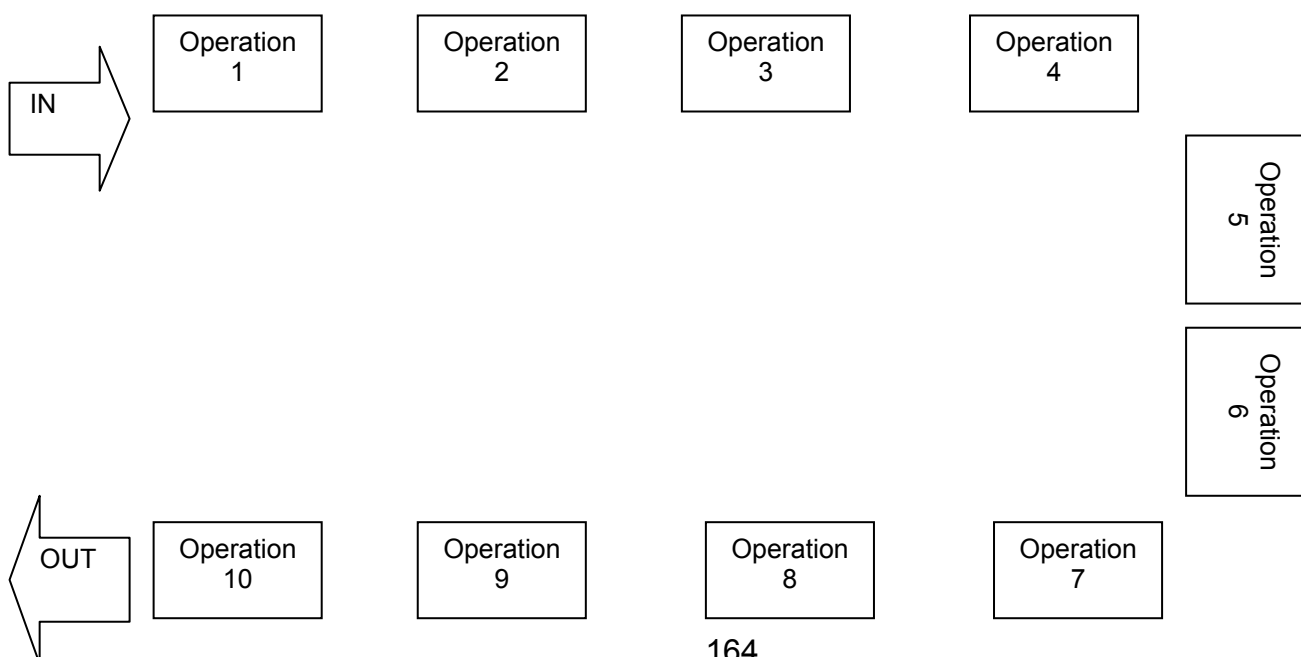
7.2.2 HOW MUCH PARTICIPATION SHOULD BE PERMITTED?

In modular manufacturing, teams are generally self directed and have a degree of autonomy (Castro, et al., 2005). For example, when a new style is introduced the company would provide the operations in sequence, but if the team suggests a better way of constructing the garment, they are allowed to put their ideas into practice. Where suggestions are made and implemented, it enables people to take ownership and pride in their work.

7.2.3 PLANNING FOR MODULAR MANUFACTURING

Successful implementation demands careful planning (Castro, et al., 2005). The 8-stage plan presented previously can provide a guideline for organisations considering modular manufacturing.

Figure 7.1 The layout of cellular/modular manufacturing



The Figure 7.1 shows the layout of a cell for modular manufacturing. Inputs into the process start at operation 1(IN) and move within the cell until the garment is complete (OUT).

Table 7.1 Skills Matrix

| Operative Operation | A | B | C | D | E | F | G | H |
|---------------------|---|---|---|---|---|---|---|---|
| 1 | | | | | | | ■ | |
| 2 | ■ | | | | | | | |
| 3 | ■ | ■ | | | | | | |
| 4 | | ■ | ■ | ■ | | | | |
| 5 | | ■ | ■ | ■ | ■ | | | |
| 6 | | | ■ | ■ | ■ | ■ | | |
| 7 | | | | | ■ | ■ | | |
| 8 | | | | | | ■ | | |
| 9 | | | | | | ■ | ■ | ■ |
| 10 | | | | | | | | ■ |

The matrix in Table 7.1 provided a guide as to the allocation of tasks to the various operators and helps to provide a balance in the content of the tasks allocated. The operations are listed horizontally and allocated to operators vertically. As an example, operator A would perform operation 2 and 3. This is where multi-skilling is important as operators need to be versatile in more than one operation on a garment.

7.3 PLANT HISTORY AND CONTEXT

A qualitative approach using a case study is used in the implementation of modular manufacturing in this section to verify elements of the Engineering Management Framework presented in chapter 5. This production facility manufactures men's and ladies fashion wear and operates in a small town in Kwa-Zulu Natal. Currently, approximately 300 people work in the plant. The

factory opened in 1970 and implemented modern technology. The facility had 16 supervisors and a plant manager.

The plant manager agreed to perform a pilot project on team-based manufacturing as orders of 100 units were received. The sewing department reverted to the bundle system due to larger orders. Due to the inconsistency in the order sizes the organisation abandoned the Eton system (overhead rail system) and reverted to the bundle system of manufacture.

The plant followed conventional management practices before the 1980's but started changing as new management came on board. There was very little interaction among employees and management and there was an autocratic style of management.

Before the year 2000 the production facility was accustomed to lot sizes of between 2000 and 10000 units per order. Currently, there are lot sizes of approximately 100 units per order. The garments were not as complex in construction as the ones received currently. The factory was "flooded" with high lots of work-in-process throughout the plant. Employees who were loyal and employed for the last 30 years said that the environment in which they worked was hostile and they did the same operation for several years.

7.4 RESULTS AND DISCUSSION (NAMES HAVE BEEN CHANGED TO PROTECT CONFIDENTIALITY)

This is a qualitative discussion of the experiences of the people involved in the implementation of modular manufacturing as the research methodology was exploratory at this stage and aimed at making people feel comfortable with the pilot and not daunted by completing exhaustive questionnaires at this stage. They felt that management commitment and education/training is the most important aspect of any initiative in an organisation.

7.4.1 MANAGEMENT COMMITMENT

Any change in the organisation stems from top management. Commitment from management drives the process of change and nothing can be achieved if management does not support the initiative. Once management gives their approval any change is possible, but employees need to understand and support the changes for it to be successful.

Management realised that in order to counteract the threat of imports they would try out the team-working concept although employees wished for “the good old days.” They could not afford huge piles of inventory on the machine floor.

Employees were delighted that the plant manager supported the initiative and frequently visited to find out how they were performing. An employee of the team briefly summarized how he felt and mentioned that any project has to have the support of management and the acceptance from employees for it to be successful. The managing director of the organisation initiated the process of change as funding in terms of labour is involved. Support from management, especially in terms of funding is important for a project of this nature.

The planning, organising, leading and controlling of the project are important as it would benefit the organisation over a period of time. The clothing industry is in need of radical change that would be able to counteract the competition faced. Employees were thankful that they had commitment and the necessary expertise from the management team.

7.4.2 EDUCATION AND TRAINING

A number of training sessions were held with the team of employees to provide orientation with the objectives of the project. Employees held discussions regarding their concerns so that everybody understood their role in the project. The researcher explained that this was a pilot project for the

purpose of adding value to the organisation and if it did not work, they would go back to the assembly line system using the bundle system methodology.

The organisation invested in training and development of employees on an ongoing basis. It was mentioned that training of employees in the latest developments would enhance employee skills and workers would embrace changes in future. Another employee's experiences was that people would be willing to change if they knew what the change was all about and how it would impact on their work. Mention was made that employee involvement from the very outset would clear any negativity that may be spread through the grapevine within the organisation. It was said that management discussions behind closed doors regarding changes are unhealthy for an organisation. Open communication and the building of trust among the people are extremely important.

An employee mentioned that learning can only take place by change in attitude and behaviour. She mentioned that training makes employees aware of the current occurrences, what employees should expect and the manner in which barriers could be reduced. This is a great motivator for the workforce.

Employees were enlightened on the benefits of team-work and how it could change the entire organisation. An employee mentioned that training made them understand the current status in the clothing industry and how they could rise above the competition. It was mentioned that they are setting an example for the industry to follow and they could be the best manufacturer in the clothing industry. The advantages they experienced created team-spirit and they found that they were responsible for the making this project a success.

Another employee mentioned that the concept would be ineffective and that government intervention was the only way that the industry could be saved. The researcher interacted with the individual and convinced him of the way forward.

The employee admitted that he was sceptical and did not want change, but since there was communication with management and training of workers, he would “go with the flow.” The comments suggest that a project such as this needs education, training, communication and management support.

Open communication is important in a project. The sharing of information between management and employees enhances the success of the project. It was mentioned that the dissemination of too much information and the interpretation of the information could cause problems within the work environment. The “grapevine” misinterprets information and employees become despondent. It was mentioned that 15 years ago operators were not allowed to speak and at present communication is encouraged in team-work.

An employee mentioned that this was quite a change for “them.” It was mentioned that approximately 15 years ago the floor manager had an elevated office at a centralised point on the machine floor where there was a clear view of all employees. “Management by walk about” (MBWA) has become a prominent feature in the clothing industry. It was mentioned that the manager should be a part of the team on the production floor, know the employees by name and understand the problems experienced. Much could be achieved if team-work is implemented throughout the organisation and all employees strive to achieve the mission and vision of the organisation. Human assets need to be appreciated to enhance their motivational level. Working together could “change a mountain into a molehill,” mentioned an employee.

It was mentioned that employees were often ignored and management made all the decisions. Issues such as product quality, customer expectations, productivity were never disclosed to employees. A motivated workforce can achieve labour efficiency without the pressure from management. It was explained that communication among the employees and management improved quality of production and an empowered employee could definitely add value to the organisation, no matter what problems were faced.

It was mentioned that customer focus and expectations, together with quality and on time delivery is an organisational problem, and not only the responsibility of the floor manager's. The team effort created a change in the working climate with information sharing that enables employees to better understand the operational aspects of an organisation.

The implementation process outcome indicates that active employee participation with knowledge sharing could improve the performance of the organisation. Sharing information about the costs that go into production and the financial position of the organisation makes employees understand the importance of "right the first time, every time." With work-study officers involved in the process, all work measurement and method study evaluations were done with the team that shared ideas on methods and ergonomics. With the adoption of transparency in all activities employees understood their situation and that of the organisation.

7.4.3 BENEFITS OF THE NEW SYSTEM

Encouraging results were achieved with a participative management style. On a general note, the sharing of information created a positive atmosphere. Due to the fact that this was a learning curve for the purposes of the research some of the benefits did not materialize. The multi-skilling of the employees helped overcome the effects of absenteeism. Employees, who normally sat at their machines for the entire day with one task, were now given the opportunity to teach and learn from others to resolve problems and become efficient team players. This was a challenging task.

The organisation benefited overall as the productivity of the line improved by 10%, while labour efficiency improved by 15% and the morale of the employees improved with education, training, open communication and above all, being treated with dignity. Absenteeism had minimal effect on the cell, and employees going on a personal break were supported by the team.

The changing of jobs created better efficiency as operators became attuned to multi-tasking with a reduction in boredom as operators normally performed the same task for many years. It was, in a sense, a revival of energy that was experienced during the project.

It was mentioned that modular manufacturing produced the garment quicker, with no work in progress. There was an improvement in the visibility of tasks and operators, as there was minimal work in progress (approximately two units per operator). The team approach seemed to push the garments faster. It enabled operators to respond to customer requirements much quicker. Work in progress has reduced from a week to a day. People were taking responsibility for their processes as there were no rejects as the team ensured quality at each stage. Education and training improved that morale of the team with an improved output performance. Indirect labour was eliminated as members performed both direct and indirect operations. Supervision among team players was reduced as each member took ownership of the performance of the group.

7.5 COMPLAINTS ABOUT THE NEW SYSTEM

There were many challenges for the new system. Two employees complained and seemed to be negative about the system saying that they did not like moving around and were used to sitting in one place and working and did not like change. The concerns revolved around the following issues:

- multi-skilling, education and training;
- team-understanding and formation; and
- payment systems.

7.5.1 MULTI-SKILLING, EDUCATION AND TRAINING

This was a drastic change from the norm as employees never experienced change for a decade and preferred remaining in a comfort zone. Therefore ongoing training on innovative business processes is imperative for an

organisation. The concept of team-work (modular/cell manufacturing) was developed over 50 years ago, and operators in this plant were never exposed to it.

It was mentioned that in order for employees to accept change, there needs to be open communication among employees with the required education and training.

7.5.2 TEAM UNDERSTANDING AND FORMATION

The composition of the team is of the utmost importance. Members need to understand each other especially with regards to diversity. Therefore, team-members need to be thoroughly interviewed to determine whether they fit into teams. A series on education and training sessions are required to create an understanding of the dynamics of team-work. Personality clashes should be avoided, and should there be a problem, it needs to be addressed immediately.



7.5.3 PAYMENT SYSTEMS

The rate of pay of machinists is a contentious issue. Employees were willing to go through the training but wanted a higher rate of pay. Team members felt that they were not rewarded for their input.

7.6 CONCLUSION

Although not perfect, the team approach was perceived by most of the employees interviewed in this case study as being superior to the traditional bundle system. This new management approach may not work for all companies, but for many it has proved feasible. Using the case study approach, this research provides insight about key components in the transition to a team system. One of the keys to success in this plant was having upper level managers committed to the team system because it takes

a great deal of time and financial resources in the beginning and it does not happen without careful planning.

In addition, employees attributed the success of the transition to the plant manager. The manager not only harnessed the potential of the skills of the team, but empowered them to manage themselves. A successful organisation harnesses the potential of its workforce through open communication and the breakdown of barriers that prevent effective performance.

The results from this case study indicate that aspects of the engineering management framework developed in this thesis had a positive contribution in a qualitative sense in the implementation of modular manufacturing in the South African clothing industry. Key elements to note are management commitment, education and training and leadership that drive the organisation towards the attainment of organisational goals. Appendix 4 provides an indicative analysis of the interview transcripts of positive and negative variables in modular manufacturing developed with assistance of Professor Leon Pretorius. This attempt at a qualitative text analysis of the interviews concurs with the positive views on the team system expressed in this chapter. This leads to the recommendations and conclusion of this thesis, chapter 8.

CHAPTER 8 - RECOMMENDATIONS AND CONCLUSION

8.1 INTRODUCTION

The research illustrated the status of the clothing industry in SA and aimed to improve the performance of the industry through the creation of an engineering management framework of process improvement methodologies. Continuous improvement methodologies should become part of the organisational culture. However, a holistic approach with the application of techniques is imperative for the improvement of productivity levels.

8.2 RECOMMENDATION FOR THE SURVIVAL OF THE INDUSTRY

The investigation highlighted the experiences of organisations and pointed out that process improvement methodologies are imperative for the survival of the industry. Through a detailed examination of the main elements characterising the organisations' experiences, some considerations about the rationale for a framework of improvement practices are possible.

The framework gives a good indication of what areas the management of organisations should concentrate on during the intervention for constructive input for improvement. The implementation of any change requires the inclusion of the workforce in order to achieve improvement. However, exclusion of the workforce would limit the success of the project. The strategies mentioned in the framework of improvement techniques are imperative for the survival of the industry.

Elimination of barriers through horizontal communication and the creation of a win-win philosophy through the commitment from all spheres of an organisation are imperative for a successful organisation. The research indicates that a number of organisations that participated in the study are considering moving to low-cost wage areas as the labour costs are reducing profit margins considerably.

This would definitely have a major impact on the South African economy. In order to remain economically viable, training from the very beginning should encompass the principles of quality management and performance measurement, because wherever work is done, it should be done with a view of cost reduction and value adding.

Given that the clothing industry remains labour intensive the viability of relocation offered by low-wage countries are still strong. Organisations try to combine their traditional competitive factors, to assure relevant cost savings. High-quality clothes for example, need specialised labour from design to finished garment including the cost of all raw material inputs. Low-wage areas are limited with specialised labour skills. With the escalation of energy costs, such as petroleum and electricity, logistical arrangements within the supply chain has reduced the advantage of a low wage rate, thus providing local centralised manufacturers with an advantage.

The researcher found through investigations that there is a clear link between current practices and the performance of the industry (chapter 4 and 5). The conclusion that can be derived from the research is that quality; cost and service delivery of products can only be achieved through the implementation of the framework of process improvement techniques or parts thereof.

Variables that affect human performance, variables that affect quality, and variables that affect cost should be considered systematically in such investigations. The research demonstrated that South African manufacturers should be able to compete with the global manufacturers if the framework is implemented systematically. It requires employee involvement and management commitment.

8.3 IMPLEMENTATION OF AIMS AND OBJECTIVES

The main aim of this research was to improve the productivity level of the clothing industry with the prevention of job losses through the implementation of process improvement methodologies through the framework (chapter 5). The study clearly shows that in order to improve the productivity levels of the clothing industry it is essential to apply the framework improvement strategies.

It was the researcher's observation that there is a need for ongoing research and technological developments that would enhance the viability of the sewing operation in order to achieve maximum efficiency and productivity. Further, in order for the South African clothing industry to survive global competition, manufacturing systems with a focus on training and development of human assets, customer service and delivery and quality management principles need to be implemented.

Based on the research, a process improvement framework was designed that contains the requirements for a continuous improvement programme. The framework emphasises the fact that information sharing through technological improvements in the workplace, together with commitment to eliminate non-value adding activities through investment are imperative in a globally competitive market.

The study concluded that the clothing manufacturing industry in South Africa presents significant challenges for management. A large percentage (75%) of organisations is experiencing marginal profitability and could not afford skills that would enhance productivity. For these organisations, either government support in terms of funding work-study officers or the sharing of work-study officers would definitely make a change in the status of manufacturing. Motivated managers are able to develop inexpensive and ingenious solutions to many of the problems that are brought to their attention.

The study reveals that many plants still operate under an unenlightened management philosophy that rejects the application of process improvement

practices. Managers fear that the introduction of such practices would “plant seeds of suspicion” in the minds of the workforce that may lead to unhealthy relations.

The researcher is of the opinion that one of the most important roles that the work-study officer can play is in the area of educating the management, supervisors and workforce on process improvement practices that could improve productivity. Managers should be made aware of the importance (for both humanitarian and cost reasons) of a continuous program of surveillance aimed at measuring performance levels in the organisation.

The research shows that the arguments that support process improvement methodologies are imperative for the clothing industry in South Africa. Organisations that wish to have a competitive edge in today's marketplace, with its emphasis on quality and excellence, should embrace fundamental methodology that has the ability to reduce costs, improve quality and performance, and enhance productivity (Altman, 1994).

8.4 RECOMMENDATION

The successful implementation of the engineering management framework of process improvement methodologies is wholly dependent on commitment by all the spheres of an organisation. The research indicated that a number of organisations that participated in the study are considering combating the considerable reduction in profit margins caused by increasing labour costs by moving to low-cost wage areas. In order to remain economically viable, the framework discussed in chapter 5 should form part of all training from the very beginning, and wherever work is done, it should be done with due consideration of improvement.

8.5 CONCLUSION

The challenge for a clothing production manager is to minimise input costs while achieving improved productivity and remaining flexible and meeting

customer demands. Labour savings and increased productivity could be achieved by reducing the ratio of number of workers to number of machines. Increased productivity for human activity could be achieved through multitask operations (i.e. cross-training operators) and other methods that would allow the same amount of work to be done in less time.

In the South African clothing industry, management commitment in supporting improvement initiatives, the management of a diversified workplace and the allocation of resources are essential for performance improvement. Through simple, innovative and creative thinking, the current status of the industry could be improved through the application of the process improvement tools and techniques. The researcher would like to conclude by emphasising that process improvement methodologies need to be implemented through a structured plan of action.

Lastly, support from government in a “value adding” scenario through subsidies, the creation of a centre of clothing excellence which would be funded by government and that would be of a consultative nature would assist organisations in improving their competitive status.

8.6 RECOMMENDATIONS FOR FURTHER RESEARCH

Planning and scheduling of production orders seem to be a major stumbling block in clothing manufacture. It is recommended that further investigation be done on the planning and scheduling in the industry with a view of developing a software package that would assist the industry in this respect.

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10. APPENDIX 1 - QUESTIONNAIRE TOPICS

1. OWNERSHIP (who owned the company)
2. TURNOVER (what was the annual turnover)
3. AGE (how old was the organization)
4. CAPITAL SOURCE (who provided the capital)
5. CUT, MAKE, TRIM (CMT) PRODUCTION (how much of CMT production was involved)
6. PRODUCT RANGE (what was the range of products made)
7. PRODUCTION SYSTEMS (what production systems were used)
8. CHANGE-OVER TIME (how long was the changeover time)
9. INPUT SOURCES (where was the inputs from)
10. EXPORTS (was the organization involved with exports)
11. OUTPUT PERFORMANCE (what was the output performance)
12. SUPPLIER LINKS (did the organization develop supplier links)
13. LABOUR (costs, employment)
14. WAGE RATES (structure, rates)
15. TRAINING AND DEVELOPMENT (of employees)
16. INCENTIVE SCHEMES (was there incentive schemes)
17. WORKING CONDITIONS (feeling about the working conditions)
18. MACHINERY (old/new)
19. PRODUCTION INPUT (costs, where was it from)
20. PROFIT MARGIN (where they profitable)
21. INFORMATION TECHNOLOGY (did they use)
22. STOCK LEVELS (what were the stock levels)
23. DEFECT RATES (what were the defect rates)
24. PRODUCTION LEAD TIMES (was the lead time sufficient)
25. ABSENTEEISM (effect)
26. FASHION DESIGN SKILLS (lack of)
27. PERFORMANCE MANAGEMENT (was it in place)
28. GARMENT COST BREAKDOWN (was it done)
29. LEADERSHIP QUALITIES (type of leadership experienced)
30. CHANGE MANAGEMENT (cope with change)

11. APPENDIX 2 – RAW DATA EXAMPLE

Descriptive Age: What is the age of the organisation? We are approximately 20 years old.

Who provides the capital to start the business? Provided by the owner (CMT). We are a part of a large organization.

What was the original market segment and products that were made? The clothing industry is dynamic. Sometimes we make men's trousers and sometimes ladies blouses. So the market changes regularly.

Briefly describe the form of ownership. The owner is the manager.

Location of production? We produce garments in this facility but we also give out CMT, depending on demand. We are planning to establish production facilities in Swaziland and Qwa-Qwa.

Size in sales and employees? Our current orders range 500 units. But this is variable. We can produce from 100 units to 1000 000 units. It all depends on the order. Our staff complement is 300 machinists, but this may vary with demand as well.

CMT use. Yes we use CMT. / No we do not use CMT.

Recent growth of output and employment. Yes/No there has been growth/no growth. The employment for the next year would be 300 but if there is a change in the business, we would employ more/ reduce employment.

Production - main three products. There is no such thing as main three products. We would produce according to market demands. But currently we produce trousers, shirts and blouses.

Market niche of main product. We are currently focusing on trousers.

Length of time to change production line – between 15 and 30 minutes depending on style of garment.

Sources of non-labor inputs. We get our materials locally at present.

Problems with non-labor inputs. There are frequent delays in delivery as our inputs vary. The producers do not communicate with us.

Exports: Production exported and main destinations of exports. We export to US and EU. But this is diminishing due to the rand value exchange, new products and cost of manufacture.

Outsourcing to foreign apparel manufacturers/retailers: We are currently negotiating with China and India.

Use of government incentives to export: This process is cumbersome and often not worth the effort.

Recent export growth: yes/no there was growth/no growth/ no change

Expected future export growth and destination: Well, China is taking over our markets, so I do not see growth.

Method of financing exports: We use the government initiatives/ we are not going to export.

Labour Wages and benefits: we pay union/non-union rates

Unionization - yes

Use of temporary and/or informal labour - yes

Skill composition of work force – we have the skills to operate

Multi-skilling – busy with a programme/ not interested

Training requirements and procedures – I feel that we are well trained – we do not have a budget/ We are focusing on training the workforce

Source of labour - local

Productivity level and standards – average labour efficiency is about 85%. We do not measure productivity.

Worker participation – no

Problems with workers – yes pressure for output

Source and age of new machinery – local suppliers/machinery is about 20 years old.

Method of financing new machinery – cash/loan

Methods of maintaining machines – hire a mechanic/have a mechanic/do not have a preventive maintenance programme. Check machines at shutdown in December

Adaptation or modification of machines: Our machines are modified for certain operations.

Re-skilling with new machines: we do not have the time to train operators on new machines. We train as required.

Basis of competitiveness: quality/delivery/price

Labor relations: not a healthy relationship

Relations with industry associations: no relations

Sources of information regarding new technology, markets and products: fashion magazines, word of mouth

Job ladders and internal mobility: lack of promotion and total instability
Problems with managerial personnel: Autocratic management. Lack of leadership skills.

Costs Breakdown: No/yes

Transportation costs: to local distributor

Taxes: yes



12. APPENDIX 3. SUMMARY OF DATA IN TABLE FORM

1. OWNERSHIP (who owned the company)

| Ownership | No of companies | Sample size | Percentage |
|-------------------------------|-----------------|-------------|------------|
| Subsidiary of SA company | 52 | 146 | 36 |
| Subsidiary of foreign company | 3 | 146 | 2 |
| Privately owned | 61 | 146 | 42 |
| Owner Managed | 26 | 146 | 18 |
| Joint ventures | 3 | 146 | 2 |
| No change in ownership | 125 | 146 | 86 |

2. TURNOVER (what was the annual turnover)

| Turnover | No of companies | Sample size | Percentage |
|---|-----------------|-------------|------------|
| Varied between R500 000 and Subsidiary of SA company R100 million | 146 | 146 | 100 |

3. AGE (how old was the organisation)

| Age | No of organisations | Percentage | Total |
|-----------------|---------------------|------------|-------|
| 20 and above | 88 | 60 | 146 |
| 10 and above | 36 | 25 | 146 |
| Between 2 and 9 | 22 | 15 | 146 |

4. CAPITAL SOURCE (who provided the capital)

| Source of capital | Number of organisations | Percentage | Total |
|-------------------|-------------------------|------------|-------|
|-------------------|-------------------------|------------|-------|

| | | | |
|-----------------|----|----|-----|
| Holding company | 55 | 38 | 146 |
| Own capital | 91 | 62 | 146 |

5. CUT, MAKE, TRIM (CMT) PRODUCTION (how much of CMT production was involved)

| Production | No of companies | Percentage | Total |
|-------------|-----------------|------------|-------|
| CMT | 85 | 58 | 146 |
| Own designs | 61 | 42 | 146 |

6. PRODUCT RANGE (what was the range of products made)

| Type of garments | No of companies | Percentage | Sample size |
|------------------|-----------------|------------|-------------|
| Trousers | 29 | 20 | 146 |
| Ladies outerwear | 58 | 40 | 146 |
| Formal wear | 41 | 28 | 146 |
| Leisure wear | 18 | 12 | 146 |

7. PRODUCTION SYSTEMS (what production systems were used)

| Production system | No of companies | Percentage | Sample size |
|-------------------|-----------------|------------|-------------|
| Overhead rail | 4 | 3 | 146 |
| Bundle system | 144 | 97 | 146 |

8. CHANGE-OVER TIME (how long was the changeover time)

| Change-over time | No of companies | Percentage | Sample size |
|------------------|-----------------|------------|-------------|
| Improvement | 37 | 25 | 146 |
| Deteriorated | 10 | 7 | 146 |
| Same | 99 | 68 | 146 |

9. INPUT SOURCES (where was the inputs from)

| Input sources | No of companies | Percentage | Sample size |
|-----------------|-----------------|------------|-------------|
| Local | 109 | 75 | 146 |
| Imported | 37 | 25 | 146 |
| Own label | 10 | 7 | 146 |
| Retailer labels | 136 | 93 | 146 |

10. EXPORTS (was the organisation involved with exports)

| Exports | No of companies | Percentage | Sample size |
|------------------|-----------------|------------|-------------|
| No exports | 104 | 71 | 146 |
| Exported product | 20 | 14 | 146 |
| Exports reducing | 22 | 15 | 146 |

| | 1999 | 2003 | 2004 | Growth 99-04 | Growth 03-04 |
|-----------------|--------|--------|--------|--------------|--------------|
| Garment Exports | 229577 | 341094 | 285448 | 24% | -16% |
| Garment Imports | 230394 | 364990 | 627811 | 172% | 72% |

11. OUTPUT PERFORMANCE (what was the output performance)

| Output Perform | No of companies | Percentage | Sample size |
|----------------|-----------------|------------|-------------|
| Steady | 63 | 43 | 146 |
| Deterioration | 83 | 57 | 146 |

12. SUPPLIER LINKS (did the organisation develop supplier links)

| Supplier links | No of companies | Percentage | Sample size |
|----------------|-----------------|------------|-------------|
|----------------|-----------------|------------|-------------|

| | | | |
|------------------------|-----|----|-----|
| CMT networks | 117 | 80 | 146 |
| Retailer relationships | 117 | 80 | 146 |
| Textile relationship | 15 | 10 | 146 |
| Own label | 7 | 5 | 146 |

13. LABOUR

| Labour employment | No of companies | Percentage | Sample size |
|----------------------------|-----------------|------------|-------------|
| Employed and retrenched | 130 | 89 | 146 |
| Did not employ or retrench | 16 | 11 | 146 |

14. WAGE RATES (structure, rates)



| Wage rates | No of companies | Percentage | Sample size |
|-------------------------|-----------------|------------|-------------|
| Bargaining Council rate | 133 | 91 | 146 |
| Own rate | 13 | 9 | 146 |

15. TRAINING AND DEVELOPMENT (of employees)

| Training and development | No of companies | Percentage | Sample size |
|--------------------------|-----------------|------------|-------------|
| In-house training | 133 | 87 | 146 |
| Own training department | 13 | 10 | 146 |
| Multi-skilling | 7 | 5 | 146 |
| Increased investment | 47 | 32 | 146 |

| | | | |
|--------------------|----|----|-----|
| Reduced investment | 41 | 28 | 146 |
| Unaffected | 42 | 29 | 146 |
| Unaffordable | 31 | 21 | 146 |
| Declined R&D | 61 | 42 | 146 |
| Eliminated R&D | 85 | 58 | 146 |

16. INCENTIVE SCHEMES (were there incentive schemes)

| Incentive scheme | No of companies | Percentage | Sample size |
|--|-----------------|------------|-------------|
| Agreed that incentives would improve performance | 99 | 68 | 146 |
| Implemented incentives | 32 | 22 | 146 |
| Not interested | 15 | 10 | 146 |

17. WORKING CONDITIONS (feeling about the working conditions)

| Working conditions | No of companies | Percentage | Sample size |
|------------------------|-----------------|------------|-------------|
| Good | 55 | 38 | 146 |
| Satisfactory | 61 | 42 | 146 |
| Poor | 30 | 20 | 146 |
| Contravened conditions | 15 | 10 | 146 |

18. MACHINERY (old/new)

| Machinery | No of companies | Percentage | Sample size |
|-------------------------|-----------------|------------|-------------|
| Ranged from 3 to 20 yrs | 146 | 100 | 146 |

19. PRODUCTION INPUT (costs, where was it from)

| Production Input | No of companies | Percentage | Sample size |
|--------------------|-----------------|------------|-------------|
| Preferred imported | 110 | 75 | 146 |
| Purchased seconds | 15 | 10 | 146 |
| Imported | 6 | 4 | 146 |
| Used local | 140 | 96 | 146 |

20. PROFIT MARGIN (where they profitable)

| Profit margin | No of companies | Percentage | Sample size |
|---------------|-----------------|------------|-------------|
| Improved | 37 | 25 | 146 |
| Unchanged | 20 | 14 | 146 |
| Declined | 89 | 61 | 146 |

21. INFORMATION TECHNOLOGY (did they use)

| IT application | No of companies | Percentage | Sample size |
|----------------|-----------------|------------|-------------|
| Implemented | 10 | 7 | 146 |
| No IT | 136 | 93 | 146 |

22. STOCK LEVELS (what were the stock levels)

| Stock levels | No of companies | Percentage | Sample size |
|--------------|-----------------|------------|-------------|
| Maintained | 88 | 60 | 146 |

23. DEFECT RATES (what were the defect rates)

| Defect rates | No of companies | Percentage | Sample size |
|-------------------|-----------------|------------|-------------|
| Improved | 67 | 46 | 146 |
| Deteriorated | 16 | 11 | 146 |
| Unchanged | 63 | 43 | 146 |
| No Quality system | 51 | 35 | 146 |

24. PRODUCTION LEAD TIMES (was the lead time sufficient)

| Lead times | No of companies | Percentage | Sample size |
|------------------------|-----------------|------------|-------------|
| Affected by lead times | 146 | 100 | 146 |

25. ABSENTEEISM (effect)

| Absenteeism | No of companies | Percentage | Sample size |
|-------------------------|-----------------|------------|-------------|
| Affected by absenteeism | 146 | 100 | 146 |

27. PERFORMANCE MANAGEMENT (was it in place)

| Performance Man | No of companies | Percentage | Sample size |
|--------------------------------------|-----------------|------------|-------------|
| Lack of productivity measurement | 146 | 100 | 146 |
| Labour efficiency/quality/operations | 66 | 45 | 146 |
| No garment costing | 66 | 45 | 146 |

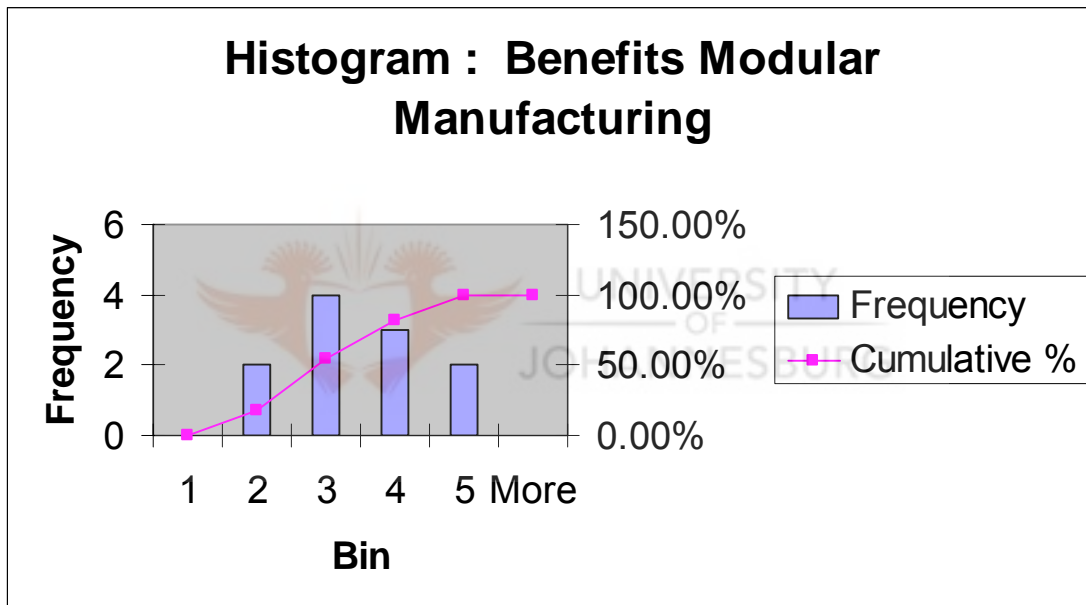
30. CHANGE MANAGEMENT (cope with change)

| Change Management | No of companies | Percentage | Sample size |
|-----------------------|-----------------|------------|-------------|
| Difficulty to adjust | 117 | 80 | 146 |
| Struggling to survive | 110 | 75 | 146 |

13. APPENDIX 4 : Qualitative Context Analysis

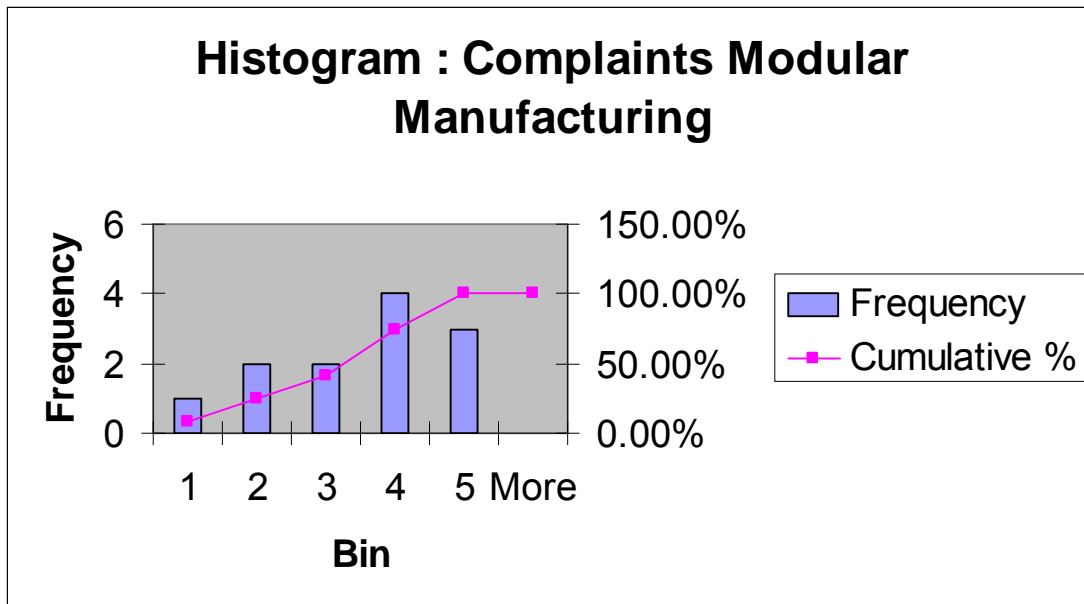
Qualitative Context Analysis: Benefits of modular manufacturing from interview transcripts in collaboration with Leon Pretorius. 1 indicates few 5 indicates many.

| <i>Bin</i> | <i>Frequency</i> | <i>Cumulative %</i> |
|------------|------------------|---------------------|
| 1 | 0 | 0.00% |
| 2 | 2 | 18.18% |
| 3 | 4 | 54.55% |
| 4 | 3 | 81.82% |
| 5 | 2 | 100.00% |
| More | 0 | 100.00% |



Qualitative Context Analysis: Complaints of modular manufacturing from interview transcripts in collaboration with Leon Pretorius. 1 indicates few 5 indicates many

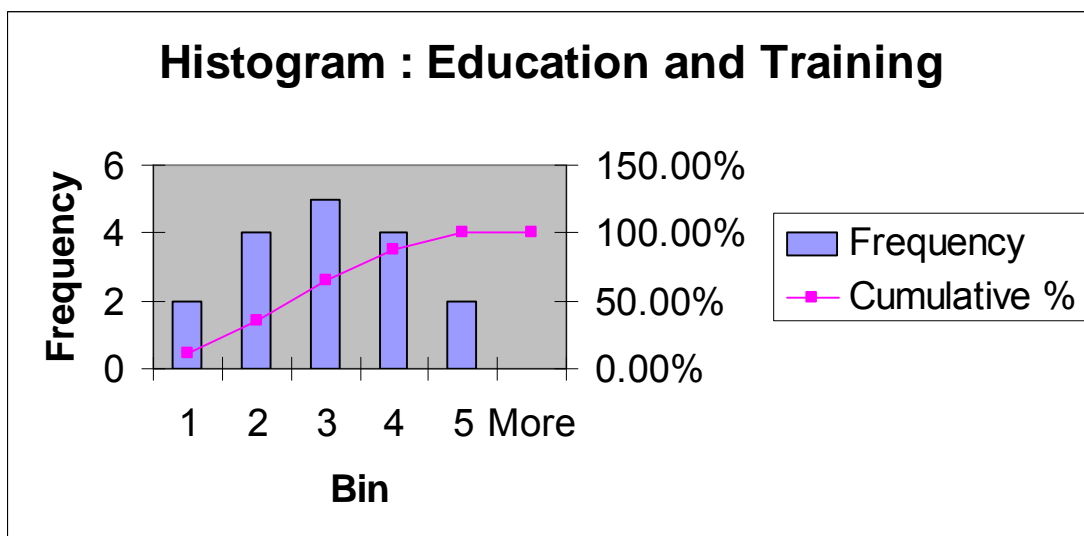
| <i>Bin</i> | <i>Frequency</i> | <i>Cumulative %</i> |
|------------|------------------|---------------------|
| 1 | 1 | 8.33% |
| 2 | 2 | 25.00% |
| 3 | 2 | 41.67% |
| 4 | 4 | 75.00% |
| 5 | 3 | 100.00% |
| More | 0 | 100.00% |



Qualitative Context Analysis: Education and Training in modular manufacturing from interview transcripts in collaboration with Leon Pretorius. 1 indicates acceptance 5 indicates excitement with concept.

| <i>Bin</i> | <i>Frequency</i> | <i>Cumulative %</i> |
|------------|------------------|---------------------|
| 1 | 2 | 11.76% |
| 2 | 4 | 35.29% |
| 3 | 5 | 64.71% |
| 4 | 4 | 88.24% |
| 5 | 2 | 100.00% |
| More | 0 | 100.00% |

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Qualitative Context Analysis: Management Commitment in modular manufacturing from interview transcripts in collaboration with Leon Pretorius. 1 indicates acceptance with commitment 5 indicates excitement with commitment.

| <i>Bin</i> | <i>Frequency</i> | <i>Cumulative %</i> |
|------------|------------------|---------------------|
| 1 | 2 | 16.67% |
| 2 | 1 | 25.00% |
| 3 | 2 | 41.67% |
| 4 | 3 | 66.67% |
| 5 | 4 | 100.00% |
| More | 0 | 100.00% |

