

**THE INTRODUCTION OF NEW TECHNOLOGY IN A MATURE
INDUSTRY: AN EVOLUTIONARY ANALYSIS OF THE SOUTH AFRICAN
TEXTILE INDUSTRY**

Rachel Catharina Cornelia Jafta

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Promoter: Professor Servaas van der Berg

Co-promoter: Professor Franco Malerba

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Declaration

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and has not previously in its entirety or in part been submitted at any university for a degree.

ABSTRACT

At the beginning of the 1990s, the South African textile industry faced many challenges, including the dismantling of protective barriers, requiring firms to adapt to increased foreign competition in the local and global markets. Many opted for investment in new technology. This study set out to analyse the behaviour of South African textile firms in the process of introducing new technology in pursuit of competitiveness.

The analysis was conducted following the evolutionary approach in economics (discussed in Chapter 2). This approach incorporates time, pays attention to the deliberate actions of firms to shape their environment, as well as persistent diversity amongst firms.

This study asked two broad questions. First, what were the major trends in textiles regarding technology, demand-side factors, the trade regime, etc.? (Chapter 3). Chapter 3 sets the scene for the rest of the study in that it illustrates how the competitive environment of textile firms has changed and argues that the aggregate picture is often not a true reflection of the dynamics of the industry, thus paving the way for micro-level analysis of firms and institutions. Secondly, what were the subsequent responses by textile firms and institutions to these changes? This question is investigated for the global textile industry (Chapter 3), the South African, Italian and Mauritian textile industries (Chapters 4 and 5), and for specific firms in the South African textile industry (Chapters 6 and 7).

Institutions play an important role in shaping the development of industries, just as firms in an industry may influence institutions. The role of institutions in the South African textile industry is considered in Chapter 5, which serves as background to Chapter 6, where we enquire about the significance of these institutions from the firms' perspective. The central focus of Chapter 6, however, is on the process of acquisition and implementation of new technology in South African textile firms. The implications of this process for other strategies, organisational processes, competencies, and routines are also

analysed. Based on the outcome of the firm-level analysis, three categories of firms are distinguished, namely leading firms, moderate adapters, and laggards. Using the characteristics of the firms in each category, we select three firms to pursue further in case studies. Chapter 7 presents the results of these case studies. Although the main focus of our study is on the implementation of new technology, we want to illustrate in this chapter how the success of this process critically depends on factors such as an appropriate organisational structure, the competencies of management and labour, as well as the institutions in the industry. We further highlight the important role that individuals, such as entrepreneurs, play in shaping the paths of firms, their relationships with institutions, suppliers, and customers, and even the structure of the industry.

We conclude that investing in new technology is a necessary but not sufficient strategy for successful rejuvenation of firms in a mature industry. Complementary changes, such as in organisational structure, use of human resources, and supply-chain relations, are of crucial importance, too (Chapter 8).

OPSOMMING

Aan die begin van die 1990s het die Suid-Afrikaanse tekstielbedryf menige uitdagings (soos die aftakeling van beskermingsmaatreëls) in die gesig gestaar, wat hulle gedwing het om meer doeltreffend in die plaaslike en globale markte te word. Hierdie studie ontleed die gedrag van ondernemings in die tekstielbedryf in die proses van verkryging en implementering van nuwe tegnologie ten einde mededingendheid te bevorder.

Die studie volg die evolusionêre benadering, wat tyd inbou en aandag skenk aan doelbewuste aksies deur maatskappye om hulle omgewing te beïnvloed, asook volgehoue diversiteit tussen maatskappye (Hoofstuk 2).

Die studie het twee breë vrae gestel. Eerstens, is daar gekyk na die belangrikste tendense t.o.v. tegnologiese veranderinge, vraagkantfaktore, handelsregulasies, ensovoorts, in die tekstielbedryf (Hoofstuk 3). Hoofstuk 3 skets die struktuur vir die res van die studie deur die veranderinge in die omgewing waarbinne tekstielmaatskappye meeding uit te lig, maar ook deur aan te toon dat die globale prentjie nie altyd 'n ware refleksie van die dinamiek van 'n nywerheid is nie, omdat soveel diversiteit daardeur verbloem kan word. Hierdie argument is dus ten gunste van verdere mikrovlak analise van ondernemings en instellings. Tweedens word gevra watter reaksies op hierdie veranderinge daar van ondernemings en instellings se kant af was. Hierdie vraag word ondersoek vir die globale tekstielbedryf (Hoofstuk 3), die Suid-Afrikaanse en Italiaanse tekstielbedrywe, asook dié bedryf in Mauritius (Hoofstuk 4 en 5). Verder word dié vraag vir spesifieke Suid-Afrikaanse ondernemings in Hoofstukke 6 en 7 bestudeer.

Instellings speel 'n belangrike rol in die ontwikkeling van nywerhede, net soos ondernemings in nywerhede ook instellings kan beïnvloed. Die rol van instellings in die Suid-Afrikaanse tekstielbedryf word in Hoofstuk 5 behandel, deels as agtergrond vir Hoofstuk 6 waar die belangrikheid van instellings uit die ondernemings se oogpunt van naderby beskou word. Die hooffokus van Hoofstuk 6 is egter die verkryging en implementering van nuwe tegnologie in Suid-

Afrikaanse tekstielmaatskappye. Die implikasies wat hierdie proses vir ander strategieë, organisatoriese prosesse, vaardighede en roetines van die ondernemings inhou, word ook bestudeer. Voortvloeiend uit die ondernemingsvlakanalise, word drie kategorieë van ondernemings onderskei, naamlik leiers, middelmatige aanpassers en sloeders. Op grond van die kenmerke van die ondernemings in elkeen van die kategorieë is drie maatskappye vir verdere ontleding in gevallestudies gekies (Hoofstuk 7). Alhoewel die hoofokus van die studie die implementering van nuwe tegnologie is, illustreer ons ook in Hoofstuk 7 dat dië proses sterk beïnvloed word deur faktore soos die organisatoriese struktuur, die vaardighede van die bestuur en werkers, sowel as die instellings in die industrie. Ons beklemtoon verder die belangrike rol wat individue, soos *entrepreneurs*, speel t.o.v. die ontwikkelingstrajek van ondernemings, sowel as die verwantskappe wat ondernemings met verskaffers, instellings en klante opbou. Aksies deur individue beïnvloed in die finale instansie ook die struktuur van die industrie.

Ons gevolgtrekking is dat investering in nuwe tegnologie 'n noodsaaklike maar nie voldoende strategie vir die suksesvolle vernuwing van ondernemings in 'n volwasse nywerheid is nie. Komplementêre veranderinge, byvoorbeeld in die organisatoriese struktuur, die benutting van arbeid, en verhoudings in die verskaffingsnetwerk, is ook van kernbelang.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

At the beginning of the 1990s the South African economy faced turbulent times and multiple challenges. Not least of these challenges was the competitiveness of firms in the manufacturing sector. During the Apartheid years, South African firms had been fairly insulated against foreign competition due to factors such as government protection and international trade sanctions. This was particularly true of the textile industry where protection measures have shown a steady increase for the better part of the twentieth century (Maree, 1995).

Following the changeover to a democratically elected government and the liberalisation of the South African economy in terms of the General Agreement on Tariffs and Trade (GATT) agreement reached during the Uruguay Round of trade negotiations, the period of insulation came to an abrupt end. South African firms were required to adapt to increased foreign competition in their home market and to become competitive in global markets.

Many firms saw the introduction of new technology as a means of dealing with these challenges. During the relatively protected years technology and organisational structures had become outdated and productivity in the manufacturing sector had been low compared to that of competitors. In the textile industry the situation was even worse. During the 1970s and 1980s, capital investment in this industry had fallen behind capital investment in the manufacturing sector in total. Maree (1995) shows that the average age of textile machinery used in spinning, weaving and knitting was between 14 and 20 years. Even where relatively younger machinery like those for open-end spinning was used, the average age was 8 years. Firms then embarked on an investment

programme to replace some of this old technology in a rapidly changing environment. The interest of this study lies in this process of adjusting to these internal and external changes.

1.2 PROBLEM STATEMENT AND MOTIVATION

While simple neo-classical microeconomic theory assumes that all firms have access to the same technology and are able to implement new technology without major obstacles, empirical work has shown that this is not the case. Acquiring the new technology is only one of the first steps in a complex process of change. The implementation of new technology invariably happens in a dynamic environment, where most of the time the firm does not only experience internal changes, but the external environment (e.g. government policies, institutions, etc.) changes as well. The challenge to the firm is to adapt its organisation and the use of its resources to get the better of the changing environment. The ability of firms in an industry to adapt their organisational structure to the changing conditions could make the difference between survival and exiting the industry. Antonelli (1998) and Antonelli *et al*, 1992 have presented this argument in relation to technological and organisational change in the textile industry. More generally, Pavitt (1998: 433) with reference to firms in the industrialised countries, maintains that " Firms rarely fail because of an inability to master a new field of technology, but because they do not succeed in matching the firm's systems of coordination and control to the nature of the available technological opportunities."

If this is the case for firms in developed countries, the question is 'how would firms in an economy emerging from a protected past deal with this process of change?' More specifically, how would firms in the South African textile industry deal with this process of change? There have been two major studies in recent times focusing on this industry. The Swart Commission Report (1994) is the result of the work done by the commission appointed by the previous government to research the position of the textile and clothing industries in relation to the

reduced tariff protection in terms of the Uruguay Round of GATT negotiations. Given its brief, the report focused mainly on the trade regime, but it did make recommendations for increased expenditure on technology both for the purpose of replacement and expansion. There was, however, no systematic attention paid to the process of introducing new technology. The second piece of research on the textile industry forms part of a series of industry-level research projects under the umbrella of the Industrial Strategy Project.¹ This report by Johan Maree (1995) focused mainly on the performance of the textile industry, its strengths and weaknesses and the changing trade regime. Apart from showing how outdated textile technology in South Africa had become and recommending restructuring to become more competitive, the *process* of technological acquisition and implementation was not addressed. However, its assessment of the state of technology in the industry at the beginning of the 1990s provides a useful point of departure for this inquiry.

1.3 PURPOSE OF THIS RESEARCH

The purpose of this study is to gain an understanding of the behaviour of firms in a mature industry in the process of introducing new technology in the face of a changing environment. The firm is, however, not studied in isolation, but in the context of the South African textile industry as well as in its broader environment, including the influences of policies, institutions, international forces, etc.

While it is challenging and exciting to study the dynamics of emerging industries, it remains true that in many economies, mature industries are a significant presence. It is argued that the analysis of the process of decline and renewal could yield useful insights, which will add to the existing body of

¹ The Industrial Strategy Project (ISP) has its origins in the Economic Trends Research Group, initially convened at the behest of COSATU to study the impact of enforced isolation on the South African economy. Under the ISP a number of researchers were engaged to study key sub-sectors of South African manufacturing. The report on the textile industry, by University of Cape Town academic, Johan Maree, was one of the series of reports generated by the project.

knowledge in industrial economics. Issues such as training and education, technology and employment and the role of trade unions also come to mind. The textile industry in South Africa is without doubt a mature industry in the process of restructuring and renewal. Firms in this industry have had to introduce new technology at a fairly rapid rate with diverse implications for the organisation of the firm, the creation, and destruction of competences in the use of resources and the evolution of the industry.

1.4 THEORETICAL FRAMEWORK

To investigate the aspects of technological and organisational change elaborated on above, an approach is necessary, which allows for the incorporation of time, deliberate actions of firms to shape their environment, and recognition of persistent diversity amongst firms in an industry. The evolutionary approach in economics promises to fulfil these requirements. In chapter 2 we give an exposition of the foundations of the evolutionary approach in economics. The evolutionary approach in economics introduces the concept of evolution by means of natural selection. Using concepts and insights from biology, the aim is to explain how 'species' (firms in economics) in an industry survive by adapting to the new environment. Diversity is essential for the selection process to work, while the transfer of characteristics that ensured survival (heredity) and the existence of inertia allow for a relatively stable system to facilitate the selection process. Explaining how systems change from an evolutionary perspective also assigns a crucial role to time, i.e. recognising that history matters. Employing these concepts, we attempt to explain the evolution of the South African textile industry over time, with specific reference to the role of firm behaviour in the face of internal and external changes, especially where technology is concerned.

1.5 METHODOLOGY AND OUTLINE OF THE STUDY

The evolutionary approach to economic change (including industrial dynamics) has resulted in three inter-related styles of investigation:

- analysis of specific sectors, technologies and firms over time;
- Constructing taxonomies of basic 'types', e.g. industrial structures, learning processes and technologies; and
- Building formal models (including computer simulations)(Dosi and Pavitt, 2001: xiii).

In this study we employ the first form of investigation, and to a lesser extent the second form, constructing composite profiles of firm 'types' in Chapter 6. We do not attempt formal model building, but believe that the rich detail generated by applying the other two methods could be useful in complementing the work of model builders. The data for the analysis were collected by means of a postal questionnaire to firms in the textile industry, followed by factory visits and interviews. Interviews were also conducted with representatives of the relevant institutions in the textile and clothing pipeline. The data were supplemented by interviews with other knowledgeable persons in the industry, as well as secondary sources of information.

The study proceeds as follows. After presenting the basic tenets of the evolutionary approach in economics in Chapter 2 (see section 1.4. on the theoretical framework), we proceed with an analysis of the major trends, prospects and challenges in the global textile industry in Chapter 3. This chapter sets the scene for the rest of the study in various ways. First, it elaborates on the major changes, such as in technological development and consumer preferences, which have taken place over the last 25 to 30 years, thus illustrating the changing environment facing the textile firms now wishing to compete in the global arena. It also argues that the aggregate picture is often not a true reflection of the dynamics of the industry, masking considerable

diversity. It thus argues for further study at industry and firm level to uncover the sources of this diversity. To this end, Chapter 4 studies the South African textile industry in historical and comparative perspective. In particular, the history of the textile industry from inception to the major reduction in import protection in the 1990s is considered. The industry's subsequent attempts at restructuring and rejuvenation are studied in comparison with similar efforts in the textile industries of Italy, a leading developed country textile producer, and Mauritius, a developing country known for its success in textile and clothing exports.

Institutions can play a very important role in shaping the development of an industry, just as institutions may be influenced by the actions of firms in the industry. The role of institutions in the South African textile industry is considered in Chapter 5. Chapter 5 serves to an extent as background for Chapter 6, where we amongst other things, enquire about the significance of these institutions from the perspective of firms. The central focus of Chapter 6, however, is on the process of acquisition and implementation of new technology in South African textile firms. The implications of this process for other strategies, organisational processes, competencies, and routines are also analysed. Account is further taken of the impact of the technology implementation process on the firm's relationship with suppliers, customers, and other institutions in the pipeline and in broader context (such as research, education and training institutions). Based on the outcome of the firm-level analysis, three categories of firms are distinguished, namely leading firms, moderate adapters, and laggards. Using the characteristics of the firms in each category, we select three firms (one each per category) to pursue further in case studies. Chapter 7 presents the results of these case studies, which enable us to investigate some of the issues highlighted in Chapter 6 in more depth. Although the main focus of our study is on the implementation of new technology, we want to illustrate in this chapter how the success of this process critically depends on factors such as an appropriate organisational structure, the competencies of management and labour, as well as the institutions in the

industry. We further want to highlight the important role that individuals, such as entrepreneurs, play in shaping the paths of firms, their relationships with institutions, suppliers, and customers, and even the structure of the industry.

Chapter 8 summarises and concludes the study.

1.6 DELIMITATIONS AND LIMITATIONS OF THE STUDY

This study is confined to the *textile* industry, comprising fibre production, spinning, weaving, knitting, finishing, and non-wovens. Other sectors of the textiles and clothing pipeline are referred to only when it is necessary to employ a *filière* approach, such as in reference to integrated supply-chain management.

The questionnaire survey did not obtain a sufficiently high response rate. Almost 14% of the 273 questionnaires sent out were returned to sender (post box closed), while 182 remained unaccounted for. Fifty-three replies were received, which made up 19.4% of the total, but of these only 20 were usable. The results must therefore be interpreted with caution. To supplement the questionnaire results, however, factory visits and three detailed case studies were conducted.

1.7 EXPECTED CONTRIBUTION

At a theoretical level, the study sets out to contribute to the body of work aimed at the development of an evolutionary theory of the firm, currently in its adolescence.

From a practical point of view, the insights gained may be useful to firms engaged in processes of restructuring and technological change as well as policymakers and individuals responsible for institutional change in the industry.

CHAPTER 2

THE FOUNDATIONS OF EVOLUTIONARY ECONOMICS

2.1 INTRODUCTION

The purpose of this study is to contribute to the understanding of how firms in a mature industry respond to changes in their environment. These changes may arise from within, e.g. changes in the use of technology, or from external sources, e.g. changes in consumer preferences, policy changes or changes in the nature of competition. What strategic choices such firms make are likely to be influenced by their past experiences, their capabilities and their strategic objectives. To gain such an understanding, an analytical approach, which caters for three important elements, is required. These elements are time, deliberate actions by firms to shape their environment and the persistence of diversity amongst firms and across industries.

In this chapter we argue that the simple microeconomic textbook account of the firm, where all firms are homogenous, produce identical products, have access to the same technology and perfect information and pursue profit maximisation in a given environment¹, clearly will not do. Thus, it is proposed that the evolutionary approach in economics presents a relatively better alternative in terms of the requirements stated above.

The rest of the chapter is organised as follows. We begin with a short overview of the cross-fertilisation between economics and biology. In the section on Malthus and Darwin, we show how the evolutionary process in biology came to be expressed in economic terms. In the next section, we explain the concepts of variety, heredity and natural selection and the role they play in evolution. This section is followed by an exposition of how these concepts had gained relevance in economics. We are particularly interested in showing how these concepts had been useful in explaining the evolution of technological progress at the firm,

¹ Important exceptions to this simplistic view are the neoclassical treatment of imperfect competition, allowing for product differentiation and the game theoretic approach, which allows for strategy differentiation [See for example, Hall (1994), Nelson (1994) and Kirman and Salmon (1995)].

industry, and macroeconomic level. Since it is at the firm level that decisions about technology are made, we need to focus on how different perspectives on the theory of the firm have dealt with the concept of technological change. However, since it is clear that the firm does not operate in isolation, we need to place the firm in industry context and take account of broader institutional influences that affect the firm's decisions.

2.2 EVOLUTION IN BIOLOGY AND ECONOMICS

Charles Robert Darwin (1809-1882) first introduced his ideas "*On the tendency of the species to form varieties; and on the perpetuation of varieties and species by Natural means of selection*" to the public in 1858. He had started working out his ideas on evolution since 1837 and was planning to write his 'big book' on Natural Selection, when in 1856 it came to light that Alfred Russel Wallace, an English naturalist had written a paper, which by coincidence, incorporated several of Darwin's ideas on the subject. In order to solve the dilemma of priority to publish, it was decided to present the work of both authors in the same issue of the journal issued by the Linnean Society (the leading British natural history organisation)(Porter & Graham, 1993:86-87). With this event passed into history many of the concepts that are today in common usage in evolutionary branches of many subjects, including economics.

2.2.1 MALTHUS AND DARWIN

Over the years, there has been a significant cross-fertilisation between economics and biology (Foster, 1994:23).

Having read Thomas Malthus's "*Essay on the Principle of Population*" (1803), Darwin took Malthus' doctrine and applied it to the 'whole of the animal and vegetable kingdom' (Darwin, 1859:110)². According to Malthus, populations tend to increase faster than the increase in the scarce resources needed to maintain their numbers. This leads to a 'fierce struggle for survival' in which many may

² Since then, as Marshall (1946:139) observed 'biology has more than repaid her debt; and economists have learnt much from the profound analogies which have been discovered between industrial organisation on the one side and physical organisation of the higher animals on the other'.

perish. Taking this essentially economic argument, couched in the terminology of scarce resources with competing demands, Darwin proceeded to formulate his explanation of evolution by means of natural selection³. If we suppose that the environment is undergoing change, as in a dynamic world it does, those members of a population that varied slightly in such a way that would give them a better chance to survive under the new conditions would prevail. In Darwin's words, they would be 'naturally selected'. By means of inheritance, any selected variety will tend to propagate its new and modified form. The argument is not that those that are selected and prevail are necessarily the optimal form of their kind, but simply that they must be sufficiently superior to existing forms to survive. Darwin saw this process as taking place gradually over time and in large enough numbers to generate sufficient variety for the selection mechanisms to work. Whereas this belief in gradualism – Darwin's '*natura non facit saltum*' (nature does not perform leaps) forms the basis of the tradition that much of technological change is incremental and gradual, there is another view allowing for saltatory technological change, notably from Schumpeter (1935)⁴.

Since Darwin, the discovery of the gene has brought renewed understanding of the process of heredity, but the essential concepts of variation, heredity and natural selection remain unchanged (Dennett, 1996:20).

2.2.2 BIOLOGICAL 'CONCEPTIONS' IN ECONOMICS

In his *Principles of Economics* (1962: xii) Alfred Marshall lamented the larger share assigned to 'mechanical' approaches in economics because of the complexity of biological conceptions. The mechanical approach generally seeks to explain the changes in systems or variables in terms of external natural laws (as in physics). When the objective is to explain such change in terms of factors operating inside the system (as in the biological sciences), the approach is called *evolutionary*. Marshall considered this approach clearly desirable for economics,

³ Darwin himself was quite circumspect about using the term 'evolutionary' to describe his work because of the controversy surrounding the subject and did not use the term until the sixth edition of his work (Hodgson, 1994:219)

⁴ When confronted with a gradualist view, Schumpeter (1935:7) retorted: "Add as many mail-coaches as you please, you will never get a railroad by so doing."

but was aware of many difficulties that needed to be overcome to reach the 'Mecca of economists'.

Since then, considerable work has been done to develop an evolutionary line of thinking in economics (See for example, Freeman's 1994 critical survey article in the Cambridge Journal of Economics and Stoneman's Handbook of the Economics of Innovation and Technical change, 1995). It was never the intention to transfer biological insights into economics indiscriminately. The limits to the use of biological metaphors in economics have been well documented (see for example, Sidney Winter's contribution in the New Palgrave Dictionary of Economics (1991:614-617). On a lighter note, Nelson (1995: 54) observes that sexuality and mating behaviour are important variables in biology but seldom modelled in economics.

Nelson (1995:56) sees an 'evolutionary' approach as encompassing the following:

- dynamic analysis, where the aim is to explain the movement of something over time, why that something is what it is at that moment in time in terms of how it got there;
- the explanation involves both randomness and systematic mechanisms of sifting which work on existing variables; and
- the existence of inertial forces that ensure continuity in the variables that survive the sifting process referred to above.

Hall (1994:9) summarises these characteristics as variation, heredity, and selection. The existence of diversity is central to evolutionary explanations of how systems change. Without variety, there can be no selection. Heredity then ensures that the system is relatively stable to facilitate the selection process. Other than in evolutionary biology, evolutionary economics maintains that learned behaviour could be transmitted and thus 'inherited'. In this sense, evolutionary economics is Lamarckian⁵ rather than Darwinian.

⁵ According to Lamarck, acquired characteristics can be inherited (Hodgson, 1994:223).

At the forefront of evolutionary thinking is also the notion that one can never start with a clean slate: history matters. What happens today is strongly influenced by what happened in the past. This idea of historicity underlies two concepts in evolutionary analysis, namely **path dependence** and **cumulativeness**. The concept of path dependence has been given much attention, following the initial work of Paul David (1986, 1988) and Brian Arthur (1986,1988). While their work tried to explain how paths taken in the past, may not have been the optimal choice (see for example David (1986) on *The economics of Qwerty*), relatively newer work on path dependency (e.g. in Magnusson & Ottosson, 1997), extends the metaphor to ask additional questions, for example: how do firms choose paths? Is it possible to escape from particular paths? Do paths cross? In this study, these questions are addressed in Chapters 6 and 7. We return to the concept of cumulateness in more detail later in this chapter.

2.3 LEVELS OF ANALYSIS

Research in the evolutionary vein is conducted at three levels: the firm, the industry, and the macro-economy. The aim is to find the analytical means to reach a situation where the 'stories' that are told to explain micro-level phenomena are compatible with explanations at the macro-level and vice versa. For the purposes of this study, we concentrate on the views of evolutionary researchers in the analysis of firm behaviour. We ask what sort of behaviour, i.e. strategies and routines at the firm level, enable them to survive the industry selection process. Relatedly, as Bart Nooteboom (1999), puts it 'How do firms adapt to their changing environment, while at the same time maintaining enough stability and continuity to remain in business?' Further, we need to know what competencies and capabilities are necessary to deal with technology-related issues. Are the answers to these questions the same for firms across industries? However, since firms do not operate in isolation, some understanding of industry dynamics and its influence on firms is required, too. Beyond the industry, we need to look at institutions that shape the environment in which firms and industries evolve. We ask what role institutions or the lack thereof play in enhancing or retarding the creative forces that give us technological

progress, and by extension, increased industrial output. Examples of these institutions are the legal framework, industrial institutions, and training and technology institutions.

We now turn to our discussion of the firm in an evolutionary world.

2.3.1 UNPACKING THE FIRM

The firm (like households) has been treated as an individual actor in the economic game for so long, that it has only relatively recently become convincingly clear that something could be learned from studying what is going on *inside* the firm as opposed to seeing it as always responding to external stimuli. Evolutionary scholars have long maintained that there should be more to the theory of the firm than it being seen as a profit-maximising entity producing a homogenous product with the aid of technology that is exogenously available to all firms. The evolutionary approach argues that there is significant diversity amongst firms, be it in size, strategies, or competencies that persists over time. The evolutionary theory of the firm in the words of Nelson and Winter (1982:110) has to set itself the task of explaining the ongoing interrelated processes of change in technology and organisation. Dosi and Malerba (1996:4) define firms as “behavioural entities, characterised by specific **competencies**, largely embodied in their **routines**, and evolving over time, partly as the outcome of their internal learning and partly as a response to environmental changes.” [*Emphasis in original*]. We will use the elements contained in this definition to discuss the essential insights of the evolutionary approach in this field.

2.3.1.1 Competencies and the role of routines

The competencies of the firm refer to the ability to do certain things, i.e., to take strategic decisions amid uncertainty, to manage specific functions or to learn. Taking such decisions requires two types of knowledge. The first is knowledge of the object that the decision is about and the second, knowledge of the procedures and mechanisms that make the decision-making process possible. In both cases, the decision-maker does not have perfect information, but is in

fact subject to bounded rationality. This is in sharp contrast to simple textbook microeconomics where decision-makers have perfect knowledge and are not confronted by unimaginable occurrences down the road of time. The concept of **bounded rationality** is generally credited to H. A. Simon. Essentially it refers to the fact that time introduces uncertainty and that a person at any point in time can make decisions only on the basis of information available to him/her then. This implies that the decision maker is not optimising, but 'satisficing'. As March and Simon (1994:162, first published 1958) emphatically stated: *"Most human decision-making, whether individual or organisational, is concerned with the discovery and selection of satisfactory alternatives; only in exceptional cases is it concerned with the discovery and selection of optimal alternatives"*. However, Williamson (1975:23) introduces a further element, namely complexity:

"...as long as either uncertainty or complexity is present in requisite degree, the bounded rationality problem arises..."

For this reason, Langlois (1994:8) argues that it is in fact the person's ability to handle complex information that is bounded, not strictly speaking his rationality.

According to Nelson and Winter, firms develop over time a set of 'rules of thumb' that enables them to deal with day-to-day decisions. The authors use the term 'routines' to describe such mechanisms. Nelson (1995:69) distinguishes three different types of routines:

- 'standard operating procedures', for example those that determine what and how much to produce, given the firm's circumstances and constraints in the short run. A prime example here would be production technologies;
- routines that determine the investment decisions of the firm, for example the 'rules' that govern its growth and decline;

- the deliberate processes of the firm, which include searching for better ways of doing things. This 'search behaviour' could be focused on any of the routines, but in practice search is presumed to be aimed at discovering new production techniques or to improve prevailing ones. Nelson and Winter call this process Research and Development (R & D), while others call it 'learning.'

All activities of the firm then rest on 'routines', which evolve over time; the ones that yield satisfactory results, are selected and the others are replaced by new routines, which incorporate new knowledge. This process is clearly dynamic (Gavetti, 1995:187). The essential implication of this process is thus that a firm's success depends upon its collection of routines and its ability to evolve such routines in response to a changing environment.

However, Gavetti (1995:185) argues that the concept of routines as defined by Nelson and Winter still seems to be too much of an 'empty box' rather than a rigorous theoretical construct. To give more content to this concept one needs to look more closely at the nature of the competencies and knowledge of the firm. One needs to decipher which competencies could be transferred (e.g. traded) and which must be built. Also, what obstacles are there in the way of replicating or imitating acquired capabilities? These questions are crucial for firms in countries generally viewed as technological laggards. Teece and Pisano (1994) and Gavetti (1995) in dealing with the development and diffusion of firm-level technological capabilities stress the importance of learning opportunities and the nature of knowledge in determining replicability or imitability. We look at each of these in turn.

2.3.1.2 Learning

The ability to learn effectively underlies the dynamics of a firm's cognitive system. Over the years, a vast literature on the process of learning has been established. [See for example Bell (1984) and Malerba (1992)]. Carlsson and Eliasson, following the work of Malerba (1992), distinguish different types of learning, importantly linked to the sources of learning (Gavetti, 1995: 192):

- *learning by doing*, leading to incremental improvements in processes in the course of normal productive activities;
- *learning by using*, which refers to the improvements generated by the use of machinery and new productive inputs;
- *learning by searching* - this involves research which is the classical source of formal knowledge for the firm;
- *learning from advances in science and technology*. This comes from the firm's relations with institutions such as universities, but also from informal sources like publications, conferences and direct contacts;
- *learning from industrial spillovers and imitation*. The source of knowledge is the imitation of products and processes of other firms. Reverse engineering of the type employed in the Asian Newly Industrialised Countries would fall into this category as well (Smith and Jafta, 1995:25);
- *learning from interacting*. The sources of information are clients and suppliers.

The firm's ability to absorb new knowledge is strongly conditioned by its past accumulation of knowledge. The experience of acquisition and use of knowledge in prior phases may have two possible outcomes: enhancing new learning and creation of new competencies or impeding new learning because of the difficulty of unlearning skills that have become obsolete. The latter means that current competencies of the firm could in future become constraints, or as Dosi and Malerba (1996:8) put it, 'core competencies' could become core rigidities and the firm could be 'locked-in' on a specific path, with the cost of changing course growing with the lapse of time.

Next, we consider in more detail the possibility of replicating or imitating capabilities that have been obtained and implemented successfully elsewhere. Replication means the transfer of competencies from one setting to another, for example from one plant to another or from one firm to a subsidiary in the same group. Imitation is then the same process performed by a competitor. The argument generally is that successful firms and successful countries set examples for others to follow. The followers are supposedly in an advantageous position, because the road has already been travelled. Scholars in Evolutionary Economics (as in Managerial Economics) point out that the process is far too complex to assume ease of transfer. This concerns in particular, the competencies that cannot be bought but must be built, i.e. dynamic capabilities (Teece and Pisano, 1994:549). We contend that factors that make replication difficult would also make imitation difficult, with the added constraint of greater uncertainty on the part of the imitator. Many of the difficulties around replication and imitation of competencies follow from the nature of the knowledge to be transferred. These characteristics of knowledge are placed on a continuum of variations to illustrate the influence it has on replicability and imitability. The extreme opposites are illustrated in Figure 2.1.

A competence exhibiting the characteristics on the left of the table will be very difficult to replicate or imitate. Some knowledge exists in the minds of people in an organisation and cannot be codified. Some tacit knowledge could be codified but would require investment in this process. This would be relatively easier for replication, but difficult in the case of imitation (bar the transfer of key individuals). Also, where a competence is localised, it will be almost impossible to transfer and implement it outside its environment. This underlies the problem with transferring technology developed and tested in the developed countries to developing countries where the circumstances are different in so many ways. It has been recognised that to imitate successfully requires considerable capabilities on the part of firms.

FIGURE 2.1: THE DIMENSIONS OF KNOWLEDGE AND POSSIBILITIES FOR IMITATION

DIFFICULT TO IMITATE	EASY TO IMITATE
TACIT	CODIFIABLE
CANNOT BE TAUGHT	COULD BE TAUGHT
NOT OBTAINABLE IN USE	OBTAINABLE IN USE
COMPLEX	SIMPLE
NOT CODIFIED	CODIFIED
PART OF A SYSTEM	NOT PART OF A SYSTEM

Source: Adapted from Gavetti (1995:189; originally in Winter, 1987).

Lall (1992: 168) discusses three essential capabilities that a firm must have to use opportunities for imitation successfully. The firm must be able to make investment decisions with all the accompanying requirements, have production capabilities and the skills to use linkages with various agents of technology transfer, e.g. suppliers, subcontractors, R & D institutions, clients, consultants, etc. Evidence from developing countries has shown that these capabilities are often lacking. One can reasonably argue that firms in these countries where requisite skills are not readily available and linkages between firms and technology institutions are weak, will use available technology less efficiently than their counterparts in developed countries (Lall, 1992: 168).

Given the insights garnered from the firm level studies of technological and organisational evolution, we now cast the net a bit wider, i.e. to industry studies. We ask whether industry studies add to our understanding of the co-evolution of technology and organisations.

2.3.2 INDUSTRY LEVEL ANALYSIS: TECHNOLOGICAL REGIMES, SECTORAL PATTERNS, AND THE KNOWLEDGE BASE

Following from the 'evolutionary' theory of the firm, one should expect persistent differences in strategies and performances based on different learning patterns prevailing in firms. This means that even in the same industry firms' behaviour and performances may differ greatly. Efforts to define patterns of learning or more generally, technological evolution in industries, have been premised on the idea that this diversity is not unlimited in the sense that 'anything can happen'. On the contrary, it is asserted that regularities in the development of industries can be discerned (Dosi and Malerba, 1996:11). In this regard, there is a central place for the link between the knowledge base, technological regimes, and sectoral taxonomies.

The concept of a technological regime emerged from the work of Nelson and Winter (1982), Winter (1984) and Dosi (1982). Malerba and Orsenigo (1993) articulated the technological regime to mean the environment in which firms develop their innovative activities. They describe this environment as a particular combination of four essential dimensions (Dosi and Malerba, 1996:11, Breschi, 1995: 195-196). These dimensions are:

- *technological opportunities*, which refer to the ease of innovation for a given level of investment. These can be measured based on two criteria. One refers to the level of opportunities the firm faces, e.g. high or low. The second refers to the sources of technological opportunities, e.g. universities, suppliers, etc. as well as the number of products and markets to which the new knowledge can be applied;
- *appropriability conditions*, which refer to the extent to which the firm could protect the innovation from imitation by competitors and appropriate profits deriving from the successful innovation. The

instruments of protection may include patents, licensing and intellectual property rights.

- *cumulativeness* has to do with the relationship between the current innovative activities and that of the future. A strong and stable relationship implies that a firm who innovates today would have a high probability of innovating tomorrow ('success breeds success');
- *the nature of the knowledge base*. This concept refers to the characteristics of knowledge already discussed earlier (tacitness versus codifiability; complexity versus simplicity; independent competencies versus competencies encompassed in a system, etc.).

It is thus argued that different firms in similar activities of production may be highly affected by the technological regimes in which they operate. If a technological regime could be identified for different industries, it might be possible to derive general patterns and regularities in the development of industries. Such sectoral patterns have been developed by various authors. Malerba and Orsenigo (1996) have identified distinct Schumpeterian patterns of innovation based on patent data for 49 technological classes in six countries (we discuss this contribution a little later). A widely quoted sectoral pattern analysis had been Pavitt's 1984 taxonomy of the organisation of innovation activities and the features of technological change. Pavitt's taxonomy includes three categories of industries, namely 'supplier dominated', 'production intensive', and 'science based'. The production intensive category is further divided into 'scale intensive' and 'specialised suppliers'. We give a brief description of each:

1. *Supplier dominated*: Suppliers are the sources of technology that is mostly of the process type. The type of user is price sensitive and innovating firms are relatively small. Intensity of technological diversification is low, while the direction thereof is vertical. Examples of these industries are private services and traditional manufacturing sectors (such as textiles).

2. *Production intensive: (a) Scale intensive.* Innovations are of the process type and come mainly from production engineering departments (in house) and suppliers' R & D. The user is price sensitive and firms are relatively large, with high levels of vertical technological diversification. Examples of such industries are those involving bulk materials (e.g. steel and glass) and assembly (e.g. consumer durables and motor vehicles).

Production intensive: (b). Specialised suppliers. In this sector, the sources of technology are in-house design and development and customers. Innovations are mainly of the product type, firms are relatively small and technological diversification is low in intensity and concentric (i.e. a significant percentage of innovations are both produced and used outside the main sector of the firm's activities). Users are performance sensitive, rather than price sensitive. Industries of this type are those producing machinery and precision instruments.

3. *Science based:* Both product and process innovations occur in this industry category. Innovating firms are relatively large and fall along a spectrum from low intensity in technological diversification of vertical form to high intensity and concentric form. The sources of technology are in-house R & D, public services and production engineering departments. Users are price and performance sensitive. Examples in this category are electronics, electrical and chemical sectors.

Keith Pavitt (1984) stresses that the diversity in the patterns of technical change that has been observed implies that most generalisations based on very specific practical experiences or any particular simple analytical model are likely to be wrong. This means that policy makers will have to make an effort to acquire better and more comprehensive data and understanding to inform their policy decisions.

Combining the notion of a technological regime discussed above with the results of sectoral studies gives a framework for making sense of the evolution of industries. In this regard, the concept of a technological regime has been

usefully employed to interpret empirical observations on the organisation and strategies of firms and sectoral patterns of technical change and industrial structure. For example, Malerba and Orsenigo (1996) have distinguished distinct patterns of innovative activity in two sets of technological classes. These sets are called Schumpeter Mark I and Schumpeter Mark II, respectively. The concept of Schumpeter Mark I refers to the pattern of innovative activity described by Schumpeter in *The theory of Economic Development* (1934). This pattern is characterised by no or relatively low barriers to entry, large numbers of participants of small size and a very important role played by entrepreneurs and new entrants in innovation. Schumpeter Mark II patterns come from the older Schumpeter in *Capitalism, Socialism and Democracy* (1942). This situation is characterised by the relative concentration of innovators, entry is more difficult, and firms are fewer and larger in size. Malerba and Orsenigo (1996) have shown that Schumpeter Mark I sectors exhibit high opportunity and low appropriability conditions, (which serves as an invitation to new entrants). Low cumulative conditions furthermore mean that it is virtually impossible for any one innovator to hold a persistent technological advantage. Schumpeter Mark II patterns are determined by high opportunity, high appropriability and high cumulative conditions. This allows innovators to accumulate technological knowledge and capabilities in piece-meal fashion *and* to build up innovative advantages over non-innovators and potential entrants.

The evolutionary approach puts a lot of store in the idea that 'all firms within a country are likely to share some common behavioural and organisational traits due to their **embeddedness in a common institutional context.**' (Dosi and Malerba, 1996: 17; *emphasis in original*). This institutional context is the subject of discussion in Section 2.3.4.

2.3.3 INSTITUTIONAL EMBEDDEDNESS

The term 'institutions' has been used to describe a loose collection of things ranging from universities, banks and banking systems to laws and regulations as well as values and beliefs (Nelson, 1994: 315).

Douglas North (1996) quoted in Fransman (1997:2) has given the following definition of institutions:

“Institutions are the rules of the game of a society or more formally are the humanly devised constraints that structure human interaction. They are composed of formal rules (statute law, common law, regulations), informal constraints (conventions, norms of behaviour, and self imposed codes of conduct), and the enforcement characteristics of both.”

Whereas other conceptualisations have included organisations in institutions⁶, North makes a distinction between institutions and organisations:

“Organisations specify the constraints that structure human interaction **inside** the organisation but in addition they are action groups. They are composed of groups of individuals bound by a common purpose to achieve objectives. They include political bodies (political parties, the senate, the city council, a regulatory agency); economic bodies (firms, trade unions, family farms, co-operatives); social bodies (churches, clubs, athletic associations); and educational bodies (schools, colleges, vocational training centres).”

Nelson (1994: 316) has difficulties with the broad spectrum of things included under the label of ‘institutions’, but nevertheless argues that all of them are of importance in the evolution of technologies. The argument is that these institutions exert an influence on the choices that firms make and in turn are influenced by the behaviour of firms (Nelson, 1994:316). Institutions themselves are subject to forces of change and do change, albeit in most cases slower than firms.

If markets and the institutions supporting them are well developed and function efficiently there would be no need for concern over institutions. However, the deficiency of necessary institutions is a defining characteristic of underdevelopment and requires serious attention (Lall, 1992:172). Which

⁶ Notably earlier Institutionalists who chose the ‘institution’ as the unit of analysis [Spechler, 1990:254].

institutions then, are of importance for the creation of firm-level and national technological capabilities?

Institutions external to the firm include the legal framework, industrial institutions, training institutions and technology institutions. The legal framework has to support industrial activities and property rights, while industrial institutions are those that are aimed at building linkages in production, technology and training. Examples would be industrial councils (e.g. the Textile Federation) and entities designed to promote small business development, such as the Ntsika Enterprise Promotion Agency in South Africa. Training institutions are aimed at providing the necessary training when firms under-invest in in-house training. Under-investment in training may occur because firms who undertake training activities generate positive externalities for which they are not properly compensated. Technology institutions include public and private institutions involved in the production and diffusion of technology. The South African Council for Scientific and Industrial Research (CSIR) is an example of such an institution. Of particular relevance in this study, is the work of the Textile Division of the CSIR (Textek).

In country comparisons, it has been noted that the effectiveness of education and training institutions in providing the required inputs to firms could have a marked effect on the pace of development. The strong linkage between universities and innovating firms in the computer industry in America has been underlined by many scholars (Bresnahan and Malerba, 1996). An efficient venture capital market is another institution that has been identified as important to enhance the innovation process (Nelson, 1993: 512). It has often been argued that the linkages between institutions and firms in developing countries are generally weak. Compared to developed countries with long histories and the more recent success stories of Asia, South Africa and other African countries have not had the same success in creating institutions that effectively support the development process. Generally speaking, education and training systems have not provided industry with sufficient quantities and qualities of personnel. Also, the research at universities does not become innovations at a significant rate. The reasons for this outcome are partly

shortages in funding for basic research, but also a lack of venture capital and investment capabilities to turn inventions into commercially successful products (Blankly and Kaplan, 1997:70-71).

2.4 IMPLICATIONS FOR DIFFUSION OF TECHNOLOGY

Drawing together the insights from evolutionary economics discussed above, we are now in a position to consider the diffusion of new technology⁷. If we take the discussion above seriously, we cannot but recognise that innovation (such as new technologies) and its adoption and diffusion depend critically on the absorptive capacity of firms. This in turn, is conditioned by their skills and competencies acquired in the past, organisational structure, routines and strategic decisions, and institutional relations, to name but a few of the crucial factors. As Farrand (1997:78) puts it: *"Firms and other institutions (networks, public bodies) have highly differentiated capacities to respond to innovation. Furthermore, in a global business environment, we should expect that differentiation to be that much greater, since knowledge is more imperfect, skills more varied, uncertainty higher, oligopoly more prevalent, and regulation more diverse."*

Underhill (1997:140) emphasises that the diffusion of technology is *'governed by complex social, institutional and economic structural factors.'*

When time⁸ is allowed for in the diffusion process (as in intra-firm studies), a gradual adoption process is recognised and the speed at which a single innovation reaches a certain diffusion level within single firms is measured. In inter-firm studies the 'rate of imitation' is measured, i.e. the number of actual adopters out of a potential number of adopters. Lissoni and Metcalfe (1994: 108) observe that this measure does not take into account that some of the adopters often differ in their commitment to the new technology and may even reverse

⁷ Our purpose here is not to give a comprehensive overview of the channels through which technology is diffused, but to deal with the *interpretations* of technological diffusion. For a good overview of the channels of diffusion, see for example Audretsch (1995) and for an excellent review of the main themes, Lissoni and Metcalfe (1994).

⁸ Firms in standard economics textbooks are usually able to adopt a new technology without any diffusion lag and are able to adapt their organisations to benefit from the new technology relatively cost-free in negligible time (Lissoni and Metcalfe, 1994: 108).

the decision to adopt. Such diffusion measures may thus overstate the success of diffusion.

Many of the factors underlying the diverse patterns of innovation and diffusion, for example, organisation and management 'culture', institutional embeddedness, and tacit knowledge are not easily susceptible to economic modelling. Detailed case studies of firms, and across industries over time, however, serve to generate regularities amid the diversity (such as the Schumpeter Mark I and II innovation regimes discussed above), which could eventually be incorporated in models.

2.5 SUMMARY AND PREVIEW OF CHAPTER 3

To sum up, the evolutionary position thus links micro-level processes with the wider environment to show how these co-evolve. According to Dosi and Malerba (1996:17), "micro-level entities path-dependently learn (and get stuck) in the generic way described by the 'evolutionary' theory of the firm, but sector-specific knowledge bases and country-specific institutions restrict the 'seeding' of the evolutionary process, and also channel the possible evolutionary trajectories."

In chapter 3, we study the long-term evolution of the world textile industry. On the supply side, we look at the development of technologies and changes in inputs, such as synthetic fibres. We also consider changes in demand patterns and market structure. We also pay attention to changes in the nature of competition in the world textile industry and link this to the international rules and regulations governing the industry, e.g. the Multi-fibre Arrangement (MFA) and the World Trade Organisation (WTO). Before concluding we consider challenges and prospects for the global textile industry in the 21st century.

CHAPTER 3

THE LONG-TERM EVOLUTION OF THE GLOBAL TEXTILE INDUSTRY

3.1 INTRODUCTION

The word 'textiles' comes from the Latin *texere*¹ (to weave), but, as we show in Figure 3.1. the global textile complex comprises so much more than weaving. The global textile industry displays considerable diversity, from the highly protected handloom industry in India (Meyanathan, 1994) to the highly capital-intensive textile industries of the industrialised countries. This diversity is evident in the nature of the fibres used, the methods of production employed as well as the end uses envisaged for the products of the textile complex. It is also one of the most globalised industries (after airplane manufacturing, higher education and soft drinks) (The Textile Institute, 1994). The question to answer is "How did the textile industry become so globalised?" To this end, this chapter focuses on the long-term evolution of the global textile industry. The earlier history of the textile industry, however, is well documented (see for example, Lazonick, 1979, 1981a & 1983; Von Tunzelmann, 1995, Mokyr, 1990 and Dickerson, 1995). In this chapter we are interested in the more recent evolution of the global textile industry, i.e. the latter part of the twentieth century. In particular, we seek answers to the following questions:

- On the supply side of the industry, what have been the most salient trends in production, employment and technological development?
- What have been the most important changes facing the global textile industry on the demand side of the market?
- How can these trends be explained?
- Are existing explanations sufficient, or
- Should further angles of investigation be pursued?
- What are the most significant challenges and prospects facing the global textile industry in the new millennium?

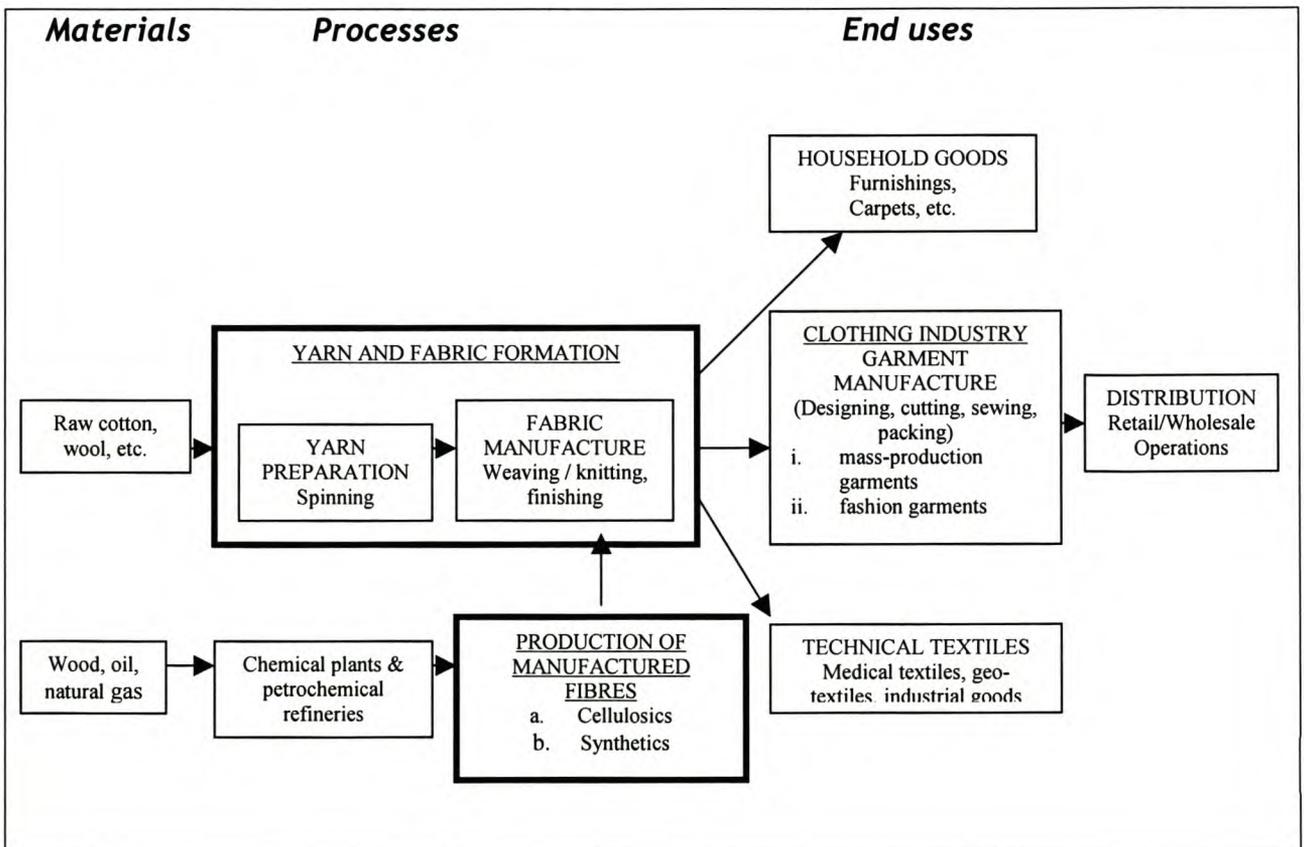
¹ Simpson, 1959:603.

Although we deal with these different aspects in separate sections, it is important to bear in mind that the developments in the different 'compartments' have feedback effects. For example, technological developments influence the direction that the evolution of the textile industry takes, but the exigencies of the market for textiles and changes in the trade regime, on the other hand, elicit particular responses in terms of technological development.

3.1.1 The textile complex

Figure 3.1 illustrates the elements of the textile complex. The textile industry forms part of a larger complex, comprising the whole range of activities from fibre production to distribution of final products. Many of the sub-parts of the process may be done separately, thus allowing for the break-up and relocation of parts of the industry, which has taken place over the last few decades. One firm may also be involved in the whole process from fibre manufacturing to end product.

FIGURE 3.1: THE TEXTILE COMPLEX



Source: Adapted from Dicken (1987:222).

Some such vertically integrated firms even have their own retail outlets. For our purposes, the textile industry comprises the pipeline from fibre manufacturing (in the case of manufactured fibres) up to the finishing of fabrics indicated by the darker boxes in figure 3.1).

3.2 WORLD PRODUCTION, EMPLOYMENT AND TECHNOLOGICAL CHANGE

The latter part of the twentieth century has been a turbulent time for the global economy and the global textile industry did not escape this turbulence; it has, in fact, in some cases been the harbinger of major changes and in other instances borne the incidence of developments elsewhere. These changes are observed broadly on the supply as well as the demand side of the market. In this section we concentrate on the trends on the supply side, as they are expressed in world production, employment and technological change.

3.2.1 World Production

World output of textiles stood at US\$ 517 billion in 1995, compared to US\$418 billion in 1980. The trend during this period, however, was mixed: there was a decline in output between 1980 and 1985, a rise of 27% in the latter part of the 1980s and a slight increase between 1990 and 1995. World output in US dollar terms was 24 % higher in 1995 than in 1980. An attempt to calculate the real change in output value cannot be made, because world price rises in textiles are not known. Judging from the general producer price changes in several countries, the International Labour Organisation (2000: 4) concludes that textile output in real terms over the period may have changed little or even declined. How then do reports of massive growth in textile production in some regions and declines in other regions fit into this production picture?

3.2.1.1 *Shifts in the distribution of output*

Shifts in the distribution of textile production have several dimensions: the *geographical* shifts, which have a domestic and international dimension, the shift in *type* of inputs used in textile production (e.g. the movement away from

natural fibres to manufactured fibres), as well as the change (especially in developed countries) in focus with respect to the *end use* of textiles (e.g. from textiles for apparel to technical textiles). This last shift will be discussed under a section on challenges and prospects.

As input costs in certain locations rise, producers tend to seek out locations that offer an advantage in the form of lower input cost, especially, but not only, labour. Within a country's borders, this process has been called decentralisation by some and delocalisation by others. This is, of course not a new phenomenon. Mykor (1990: 77) observes:

" As manufacturing in urban areas became more expensive, industry discovered the countryside. For goods whose production required relatively low skills, so that cheap and unsupervised labour could be profitably employed, rural workers in slack seasons were gradually recognised as an efficient source of labour."

The reference is to the period of early capitalism of the late seventeenth century. However, the scale at which this process took place in the industrialised countries of the twentieth century outstrips the magnitude of such processes in early capitalism.

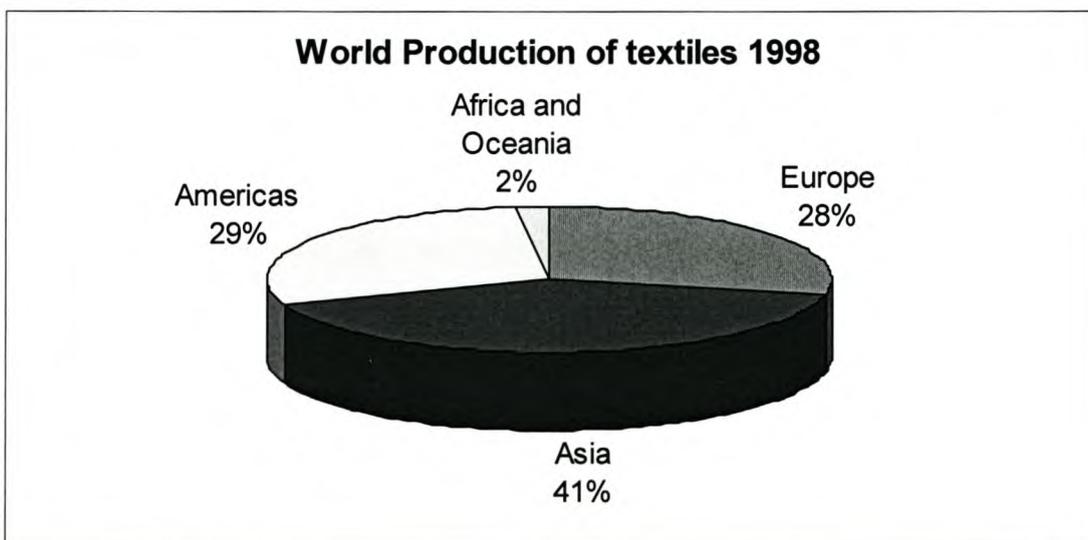
Firms relocating across borders in search of lower costs and higher profitability contributed to a trend now known as internationalisation. The production processes in textiles (see figure 3.1.) lend themselves to being fragmented into separate steps, which allows for the parts requiring lower skills to be relocated to low-wage countries, while the functions of design, marketing and innovation, amongst others, may remain in the more developed home country.

This trend is at the heart of the change in the distribution of output amongst regions. [This is, however, not the only explanation, as will emerge from later discussion].

The 1970s saw strong competition coming from new entrants as well as existing textile-producing countries and this trend continued through the 1980s and 1990s.

World output of textiles continued to be dominated by three regions in the 1990s. By 1998², Asia held 41% of world textile output, while Europe and the Americas contributed 28 and 29 per cent respectively (Figure 3.2). Figures for Africa and Oceania were not available, but the ILO (2000:4) estimates that they produce only about 2% of world output of textiles.

FIGURE 3.2: WORLD PRODUCTION OF TEXTILES - 1998



Source: ILO, 2000:4.

Secondly, there has been a shift away from natural fibres to manufactured fibres. Cotton, the quintessential growth industry of the early stages of the industrial revolution, in the latter part of the twentieth century started losing ground in global textiles (IDC, 1999:33). In 1950, natural fibres accounted for eighty per cent of total output; by 1980 they contributed little more than half (Dicken, 1987:223). Of the manufactured fibres, polyester (staple and filament) is by far the most dominant, followed by acrylic and nylon (Meyanathan, 1994:40). Various factors explain the shift to manufactured fibres (IDC, 1999: 33):

² More recent comparable production figures for all textile-producing countries are not yet available, but it is expected that the trend observed here would not have altered dramatically in the past few years.

- Fluctuations in the quantity, quality and price of natural fibres relative to manufactured fibres
- The properties of manufactured fibres relative to natural fibres that make them suitable for increasing machine speeds
- Falling relative prices of manufactured fibres
- Lower stock-keeping costs of manufactured fibres relative to natural fibres since the former can be delivered just in time
- The blending of natural and manufactured fibres (such as poly-cotton) to improve the properties of natural fibre yarn.

Cotton makes up about 90% of the natural fibres. A relatively new development in cotton production, namely bio-cotton, allows for the improvement in cotton quality, less contamination (allowing better and more consistent dye affinity) and resistance to pests. Genetically modified (GM) cotton eliminates the need for pesticides³ (a high cost item for developing-country cotton farmers), produces higher yields and offers higher profitability. India, one of the largest cotton-producing countries, currently only gets about 300kg per hectare with traditional methods (the world average is 650kg). Bio-cotton yields 30 to 40 per cent more than non-GM seeds and it is hoped that this will help cotton to gain back some of its market share lost to manufactured fibres (Abraham, 2002:6). The growth in technical textiles, including medical textiles, also opens up new demand avenues for cotton.

3.2.2 Employment trends

As textile producers relocated in favour of lower-wage countries (see Table 3.2 for wage rate comparisons), it is expected that employment will decline in industrialised countries and increase in developing countries. This has indeed been the case in the 1970s where overall textile employment between 1970 and 1980 declined by 15.3% in the major industrialised textile-producing countries (Hamilton, 1990:38, Table 2-14). In the beginning of the 1980s world textile employment stood at 16.4 million, declining between 1980 and 1985, but picking

³ For example, to control bollworm, a common pest regarding cotton.

up again towards 1995, to reach 16.8 million and subsequently declined again by 2.5% between 1995 and 1998 (Table 3.3).

Table 3.2: Comparative wage rates in global textiles (in US\$ per hour) -2000

Position	Country	Wages
1	Japan	26.10
2	Denmark	22.27
3	Switzerland	22.15
4	Belgium	19.55
5	Holland	19.48
6	Germany	18.10
7	Norway	17.97
8	Sweden	17.00
9	Austria	15.80
10	Italy	14.71
11	Canada	14.29
12	USA	14.24
13	Finland	14.06
14	France	13.85
15	United Kingdom	12.72
16	Australia	10.85
17	Ireland	10.31
18	Spain	8.32
19	Israel	7.43
20	New Zealand	7.28
21	Greece	7.24
22	Taiwan	7.23
23	Malta	6.62
24	Hong Kong	6.10
25	Argentina	5.90
26	South Korea	5.32
27	Portugal	4.31
28	Uruguay	3.63
29	Brazil	3.20
30	Venezuela	2.78
31	Turkey	2.69
32	Hungary	2.63
33	Poland	2.35
34	Lithuania	2.23
35	Mexico	2.20
36	Czech Republic	1.97
37	Colombia	1.92
38	Morocco	1.87
39	South Africa	1.82
40	Peru	1.74
41	Tunisia	1.65
42	Slovakia	1.61
43	Estonia	1.53
44	Mauritius	1.47
45	Thailand	1.18
46	Malaysia	1.13
47	Egypt	1.02
48	China	0.69
49	Kenya	0.60
50	India	0.58
51	Sri Lanka	0.46
52	Madagascar	0.37
53	Pakistan	0.37
54	Indonesia	0.32

Source: Werner International, quoted in Villa (2001:1-2).

TABLE 3.3: EMPLOYMENT OF TEXTILES 1995 -1998 (BY REGION)

Countries in:	(in '000)		% changes		% shares in total	
	1995	1998	1990-95	1995-98	1995	1998
Africa	595	478	-1.2	-19.7	3.5	2.9
America	1 355	1 247	-8.1	-8.0	8.0	7.6
Asia	11 627	11 914	17.2	2.5	69.0	72.5
Europe	3 207	2 733	-30.9	-14.8	19.0	16.6
Oceania	65	62	12.1	-4.6	0.4	0.4
Total	16 849	16 434	0.9	-2.5	100.0	100.0

Source: ILO, 2000:14.

The aggregate figures thus remained fairly unchanged; not so the distribution of employment. The overall trend of decline in employment in advanced countries observed in the 1970s continued. The largest share of employment (72.5% up from 69% in 1995) is to be found in Asia, with China the single largest employer, followed by India (Table 3.3). The second largest regional share is taken up by Europe (16.6% down from 19% in 1995), where Italy is the largest textile employer: 8th in the world (Table 3.4). The Americas provide the third largest share of textile employment (7.6%), where the United States is the largest employer in this region. Africa follows some distance behind with a share of 2.9%, with Egypt the largest employer, while Oceania's share amounted to 0.4% only (ILO, 2000:14 and 18).

Asia's share in textile employment is much higher than its share in world output of textiles, reflecting the lower productivity in the industry in the developing region (ILO, 2000:14).

TABLE 3.4: TWENTY PRINCIPAL WORLD EMPLOYERS IN TEXTILES (1998)

Ranking	Countries	Employees ('000)
1	China	7 672.4
2	India	1 470.5
3	Bangladesh	679.1
4	United States	588.0
5	Indonesia	515.4
6	Russian Federation	495.0
7	Japan	432.0
8	Italy	341.1
9	Pakistan	279.6
10	Thailand	257.5
11	Korea, Republic of	248.8
12	Mexico	240.0
13	Turkey	227.5
14	Egypt	223.0
15	Brazil	188.0
16	Taiwan, China	159.4
17	Romania	159.0
18	Spain	151.4
19	United Kingdom	146.9
20	Germany	141.2

Source: ILO, 2000: 18.

Although employment in textiles in the developed countries has declined, several of these countries experience a shortage of skilled workers to employ in the ever-more sophisticated textile plants (Rigamonti, 1999:22). In the United States it is a question of school leavers who are willing to work in textiles not having the basic education required, while in Italy the younger generation does not see the textile and clothing industry as an appealing career choice. In the district of Biella in Northern Italy, for example, they experience such severe shortages of skills that they go as far afield as Bulgaria and Morocco to attract workers (Industria tessile, 2002, Nr4).

According to Rigamonti (1999:23), world-class textile plants require a level of education for supervisors of sixteen years of schooling (the equivalent of a college degree). For production workers twelve years of good schooling are required. With sophisticated technology, physical strength is no longer a central requirement, but brainpower is. Today's work place requires continuous training at all levels of the organisation, including management. This means that training

programmes should be well thought-out and updated regularly, especially in an industry where technological upgrading is an important strategic imperative.

3.2.3 Technological change

Not only has technological change occurred in virtually every section of the textile complex described in figure 3.1, but other enabling technologies and organisational and management processes have also impacted on the global textile industry. It is not our intention to undertake a full stocktaking of all the technological advances that have taken place in textiles and related industries; we therefore concentrate on four broad categories of change:

- Technological advances embodied in textile machinery.
- New inputs or hybrids of old and new inputs, resulting in new products, such as intelligent fibres.
- Enabling technologies, specifically Information and Communications technologies (ICT).
- Innovations with respect to organisational and management processes.

3.2.3.1 *Textile machinery*

The changing nature of competition, requiring ever faster delivery, higher quality, yet more custom-made and differentiated products has challenged textile producers and their technology suppliers to respond with technologies that will deliver economies of scale, scope and time.⁴ The result has been ever faster and more sophisticated machinery, by and large reducing the need for high cost labour in advanced countries, and, at the same time enhancing the productivity of labour still in employment. Tables 3.5 and 3.6 bear evidence of the improvements with respect to speed and labour productivity. Product innovation contributed to further automation in textiles. Some of the major developments include shuttle-less looms, rapier, water jet, open-end /rotor, air jet

⁴ Whereas economies of scale derive from being able to produce larger volumes, reducing the cost per unit, economies of scope derive from factors that make it cheaper to produce a range of related products. Factors that allow reduction in throughput and delivery times, for example, result in economies of time (Bannoch, et al, 1998:122-123).

and vortex spinning⁵ as well as various improvements in finishing, dyeing and printing of textiles. Even in the fibre preparation stage the machines are smaller, but with greater efficiency. For example, the application of micro-sensors and new technology that regulates the airflow in the process of cleansing fibres ensure that the fibre is cleaned gently without breaking it.

TABLE 3.5: EVOLUTION OF TECHNOLOGY

Process	1959	1999
Carding (Cotton)	3 - 5 Kgs/Hr	100+ Kgs/Hr
Drawing	40 M/Min	800 M/Min
Spinning*	12 M/Min (Ring)	350 M/Min
Weaving**	220 M/Min (Shuttle)	6000 M/Min (Wave)

* Medium yarn count

** Weft insertion rate

Source: Rigamonti, 1999:21

TABLE 3.6: LABOUR PRODUCTIVITY (YARN - MEDIUM COUNT)

Year	Kg/Oper Hr
1750	0.0083
1800	0.11
1850	0.33
1900	1.25
1950	3.30
2000	100

Source: Rigamonti, 1999:21.

3.2.3.2 *New and hybrid inputs*

New inputs and hybrids of old and new materials allow for the expansion of the choices offered to consumers as well as supplying other needs outside of the textiles for apparel market. The development of intelligent fibres,⁶ for example,

⁵ One of the latest developments is the magnetically elevated ring spinning system, which eliminates for the first time the metal upon metal contact between the traveller and the ring, which has been the primary impediment to increasing production speed in currently installed ring-spinning systems. Because the traveller is 'floating', it can be permanent rather than disposable, resulting in a 17% cost saving (a disposable traveller usually lasts between six days and three weeks). Production speed is substantially higher, resulting in a 43% manufacturing cost saving per spinning unit on average (Abdel-Hady, et al, 2002).

⁶ The natural fibres and fibres regenerated from natural materials are often referred to as the first generation of fibres. Second generation fibres are those manufactured fibres synthesised after the discovery of nylon.

employs knowledge at the cutting edge of R & D (traditionally in chemistry, but now also in biology, especially biotechnology). The key characteristic of intelligent materials is their ability to adapt their properties because of external stimuli. A textile material may be required to be hydrophobic at one point and hydrophilic at another, conductive or non-conductive, change colour, be cool on the skin when it is hot and provide heat when it is cold, etc. Two examples serve to illustrate: 1. Work is underway at the National Textile Centre in the United States to develop bioactive fabrics, i.e. fabrics that contain micro-fabricated bio-environments and biologically activated fibres. These fabrics will have genetically engineered bacteria or mammalian cells incorporated into them that will enable them to generate and replenish chemical coatings and chemically active components. Applications in the medical and defense industries, e.g. drug producing bandages or protective clothing with highly sensitive cellular sensors are obvious, but commercial applications are also promising, e.g. odour-eating fabrics, self-cleaning fabrics and fabrics that regenerate water and dust repellents. 2. Another project at the National Textile Centre is exploiting recombinant DNA and plant transgenic technologies to create and produce novel protein polymers in adequate quantities for fibre spinning (National Textile Centre, June 2002: CD Rom). Researchers in China have already managed to extract an environmentally friendly new fibre from soybean protein, which resembles natural silk and improves on cotton and natural silks in as far as its properties for moisture transportation, ventilation and warmth retention are concerned (Textiles Unlimited, 2001b:12).

3.2.3.3 *Enabling technologies (ICT) and organisational management changes*

ICT and the textile industry have a 'familial' connection that goes back to the first usage of binary code. This was in the use of the Jacquard loom, perfected

These were new generic fibres based on differences in chemical composition. For the third generation fibres of the last two decades, technology has focused primarily on developing manufacturing processes and fibre modifications to produce *high performance fibres*. These fibres are usually developed for specific purposes or end uses. They are also called high technology fibres and super fibres. High technology fibres have specially engineered properties such as flame resistance, chemical absorbance and biodegradability. A polyester fibre with the cross section of silk and micro-slits to simulate silk's lustre and scroop is one example. Micro-fibres are another example of high technology fibres. Super fibres are manufactured to have exceptionally high strength (tenacities higher than 20 grams per denier). (Tortora & Collier, 1997: 132).

by Joseph Marie Jacquard in 1801⁷. This loom was a sophisticated piece of machinery (for that time) that could weave patterns into fabric. The patterns were coded on cards by means of holes representing the information in a binary code. Rods connected to wires probed the cards, and in so doing transmitted the information embedded in them. This loom inspired Charles Babbage in the design of his famous Analytical Engine and the American, Herman Holleridge, in using punch cards to store information from the 1890 US census (Mokyr, 1990:103). These were thus early forerunners of the information and communication technologies now ubiquitously embedded in textile machinery⁸. What then, are the nature and significance of ICT used in textiles today?

The ICT embodied in textile machinery pertains mostly to the use of computer software and statistical methods such as Computer Numerically Controlled (CNC) machines, Computer Aided Design (CAD), Computer Aided Manufacturing (CAM) and Computer Integrated Manufacturing (CIM). The specific details and implications of these technologies are discussed in chapter 6 (Section 6.4). Suffice it here to note the major advantages and impact of such technologies on the textile complex. Apart from its contribution to the increased operational speed, it also delivers real time, detailed information to management on all aspects of the procurement, production and distribution processes. The communication aspect of the technology [such as Electronic Data Interface (EDI) and Electronic Point of Sale (EPOS)] allows for the development of management techniques and processes that have become indispensable in modern textiles, viz. Quick Response (QR), global supply-chain management and adherence to quality and environmental standards. Some commentators believe that technological and supply-chain practices are redefining the conditions of comparative and competitive advantages in the global textile industry (Coughlin, et al, 2000:3). Further, it is these technologies that enhanced the *inter-*

⁷ The loom was the invention of two Frenchmen in the late 1720s. One of them, Basil Bouchon, was the son of an organ maker. This, according to Mokyr (1990:101), is significant, because the organ was the first direct application of the binary coding of information.

⁸ It is interesting to note that the textile industry, in the 21st century, is also making a significant contribution to the advancement of information and communications technologies: because of the need for more information capacity, the demand for polymer optical fibres (POFs) is accelerating. The most used industrial material for this purpose has been polymethyl methacrylate (PMMA), but the current and future trend is for POF systems to be optimised at wavelengths at which PMMA does not work so well. Researchers are currently working to develop a fluoropolymer optical fibre that will enable the reliable reception, routing and secure broadcasting of information (Ballato, et al, 2002:1).

relationships between firms of different sizes and types (which) increasingly span national boundaries to create a set of geographically nested relationships from local to global scales. These inter-firm relationships are the threads from which the fabric of the global economy is woven.' (Dicken, 1987:184).

3.3 CHANGING DEMAND CONDITIONS

Over time there has been a marked increase in the consumption of textiles (Table 3.7). As the population increased, the demand for textiles, especially in providing a basic need (clothing) grew as well. Especially between 1950 and 2000, the average annual percentage growth in the demand for textiles (in millions of tonnes) had been 3.2%, compared to 1.9% in the first half of the twentieth century. Per capita consumption (kg/p.c.) rose from 4.5 kg in 1950 to 7.9% in 2 000. However, these broad growth trends do not tell us much about the nature of demand. As far as textiles for apparel is concerned, Engel's law⁹ has set in in developed countries, that is, as household income increases, spending on clothing forms a smaller percentage of income. Further, with increasing incomes, consumers become more discerning, spurning mass-produced goods in favour of more differentiated products to suit their lifestyles. Supplying more differentiated goods in smaller quantities adds to the production costs of firms. To reduce costs, firms need to find new production and marketing strategies. One option is to identify market segments abroad with similar tastes, in order to increase volumes and bring down costs per unit. This leads to increased intra-industry trade, especially in the high-end of the market. The other option is to change the set-up of production, becoming more flexible to the extent that a batch of one can easily be produced to suit customer needs. This approach has been called many names, e.g. flexible specialisation, lean production, etc. The need to supply more specialised, higher value-added products has given a new life-line to textile producers in developed countries with sophisticated design facilities and innovativeness in new products, such as new intelligent fibres, with applications in fashion, leisure and sports apparel.

⁹ The law relates to food, but has also been applied to basic goods, such as clothing and shelter (Underhill, 1997; footnote 1, page 150).

Changes in consumer preferences, especially in developed-country markets, have also included more stringent demands with respect to quality, increasing concerns for the environment and labour standards in textile-producing countries. This has led to the development of integrated systems of quality, environmental and social standards. The latter not only includes concerns for labour, but also the safety and dignity of the consumer of the product. These concerns have seen the development of internationally recognised standards, such as ISO 9000 for quality and ISO 14 000 for environmental standards. A further standard (SA 8000) regarding social norms is not yet as widely accepted and implemented. The introduction of e-commerce has also prompted the development of a standard for firms trading on the Internet. In Europe, for example, certification can be obtained for websites. This certification vets a firm with respect to quality standards as well as reliability and secure trading conditions on the site. In Italy, CERTITEX, the textiles standards body, administers the Qweb label, which testifies that the firm complies with the aforementioned criteria (CERTITEX, 2003).

TABLE 3.7: WORLD CONSUMPTION OF TEXTILES

Year	Pop mm	M Tons	Ave % Growth	Kg/Cap	Ave % Growth
1770	750	1400		1.9	
1800	860	1600	0.5	1.9	0
1850	1091	2200	0.6	2.0	0.1
1900	1571	3893	1.2	2.5	0.5
1950	2513	9939	1.9	4.0	0.9
2000 ¹⁰	6083	47743	3.2	7.9	1.4

Source: Rigamonti (1999:20)

Sophisticated information and communications technology allows for the continuous collection and analysis of data on consumer preferences. To turn these volumes of information into cost-effective feedback for producers and

¹⁰ Estimate for 2000.

retailers remains a daunting task. To face this challenge, many researchers seek online (web-based) solutions. For example, Solomon, et al at the National Textile Centre in the United States (2002:1) are attempting to chart 'consumer constellations', which would record and reflect the cross-category (e.g. in clothing and home furnishing) preferences of consumers across the whole lifespan (e.g. young adult, single professional, families, etc.). The outcome would be a programme able to provide highly automated data-collection, analysis, and presentation tools in order to gain more timely and cost-effective feedback about customer preferences in textile and garments industries.

3.4 INTERNATIONAL TRADE IN TEXTILES

3.4.1 Shifting Comparative advantage and the evolution of trade in textiles

According to the neoclassical Heckscher-Ohlin model, comparative advantage is the *rationale* for nations to trade. The basis for comparative advantage is the different endowments of factors of production and the fact that these factors of production are put to different uses in different countries. Thus, Heckscher and Ohlin conclude that countries will specialise in the production and export of those products which use their relatively more abundant factor of production more intensively and import those products which use their relatively scarce factor of production more intensively. With respect to textiles, a World Bank publication (Meyanathan, 1994:6) argues that the global textile industry is evolving as predicted by the Heckscher-Ohlin theory of comparative advantage, i.e. that as labour becomes more expensive in developed countries (DCs), they started to lose their comparative advantage in textiles and clothing to the Newly Industrialised Countries (NICs), and the latter soon found their comparative advantage eroded by the so-called second-tier NICs and other low-wage developing countries. Indeed, when we peruse the trends in for example the share of the developed countries, the NICs and the developing countries in world output and trade in textiles (see Sections 3.2.1 and 3.4.1), this would seem to confirm the predictions of the Heckscher-Ohlin theory. In 1963, only one developing country (India) was in the top ten leading exporters of textiles, while there were four in the top 15 (Table 3.8). These developing countries

contributed only 14.59% of the exports of the top 15 (who themselves accounted for 84% of world exports of textiles). By 1985 there were four developing countries in the top 10 exporters' list and they now accounted for 32% of the total for the top 10, while by 1994 there were seven in the top 15 accounting for 54.69% of the exports by these top exporters (the top 15 were responsible for 78.3% of world exports of textiles). By 2001, world exports of textiles stood at US\$147.00 billion, of which the top 15 produced 89.1% (Table 3.9).

TABLE 3.8: LEADING EXPORTERS OF TEXTILES, 1963, 1973, 1985, 1994 (BILLIONS OF DOLLARS)

	1963		1973		1985		1994
Japan	0.92	Germany, Fed. Rep	3.04	Germany, Fed. Rep.	6.0	Hong Kong ¹¹	12.57
UK	0.71	Japan	2.45	Japan	4.9	Germany	12.56
France	0.63	France	1.69	Italy	4.7	China ¹²	11.82
India	0.54	Belgium-Luxembourg	1.69	China	3.6	Italy	10.86
Germany, Fed. Rep.	0.53	Italy	1.53	Hong Kong	3.0	Korea, Rep. of	10.69
Italy	0.53	UK	1.45	Belgium-Luxembourg	3.0	Chinese Taipei	10.20
Belgium-Luxembourg	0.51	Netherlands	1.29	France	2.9	Belgium-Luxembourg	6.80
US	0.49	US	1.22	Korea, Rep. of	2.5	Japan	6.78
Netherlands	0.36	India	0.69	Taiwan	2.5	US	6.59
Switzerland	0.21	Hong Kong ¹³	0.67	US	2.4	France	6.22
Hong Kong ¹⁴	0.14	Switzerland	0.64	N/a		UK	4.37
Austria	0.11	China	0.60	N/a		Pakistan	3.99
China ¹⁵	0.10	Taiwan	0.56	N/a		India ¹⁶	2.92
Portugal	0.09	Austria	0.45	N/a		Netherlands	2.69
Pakistan	0.09	Pakistan	0.44	N/a		Indonesia	2.50
Above countries as a percentage of world exports	84.		79		64		78.3

Source: Dickerson, 1995: GATT, 1985-86; WTO, 1995

However, the biggest exporter was now the integrated EU (15) earlier shown separately; the lists are therefore not strictly comparable. Next to the EU,

¹¹ Domestic exports (1994) were US\$ 1.95 billion, re-exports amounted to US\$10.63 billion

¹² Includes significant shipments through processing zones

¹³ Includes re-exports: domestic exports were US\$ 0.46 billion in 1973.

¹⁴ Includes re-exports: domestic exports were US\$ 0.11 billion for 1963

¹⁵ Includes trade through processing zones

¹⁶ 1993 instead of 1994

though, Mainland China is the single largest exporter, accounting for 11.4% of exports, up from 6.9% in 1990 (Table 3.9). If we add Taiwan Province of China, Taipei¹⁷ and Hong Kong, China's share moves up to 18.78 for 2001.

TABLE 3.9: LEADING TEXTILE EXPORTERS 2001 (BILLIONS OF US DOLLARS AND PERCENTAGE)

Exporting country	Value in 2001	% of world exports	
		1990	2001
EU (15)	50.5	48.7	34.4
China ¹	16.8	6.9	11.4
Hong Kong ²	12.2	-	-
Rep. Korea	10.9	5.8	7.4
USA	10.5	4.8	7.1
China, Taipei	9.9	5.9	6.7
Japan	6.2	5.6	4.2
India ³	5.9	2.1	3.8
Pakistan	4.5	2.6	3.1
Turkey	3.9	1.4	2.7
Indonesia	3.2	1.2	2.2
Canada	2.2	0.7	1.5
Mexico ⁴	2.1	0.7	1.4
Thailand	1.9	0.9	1.3
Switzerland	1.4	2.5	1.0
Total top 15	131.0		
Total world	147.0		
% of world exports		91.7	89.1

Note: 1. Includes trade through processing zones; 2. Re-exports amounted to US\$ 11.2 billion; 3. f.o.b.; 4. Data for 2000 instead of 2001

Source: WTO International Trade Statistics 2001 (www.wto.org; accessed November 2002)

As far as imports are concerned, the developed countries dominated in 1963 and 1973, with Germany, the UK, and the US the largest importers. By 1985, the US topped the list of importers with the UK and France still important, but Hong Kong was now established in third position and by 1994 it was in the top spot. Germany was still a significant importer, followed by the US, China and the UK. By 2001, many developing countries feature in the top 15 importers. This is partly explained by the textiles shipped there to be processed under Outward

¹⁷ Taiwan Province of China. These terms are used interchangeably in the literature. In this study the term Taiwan Province of China will be used except where doing so will result in altering the content of a quotation or extract from a source.

Processing Trade (OPT) arrangements (e.g. Mexico and Turkey), but developing countries such as China import both low-value fabrics for processing as well as high value-added products from industrialised countries.

TABLE 3.10: LEADING IMPORTERS OF TEXTILES 1963, 1973, 1985, 1994 (BILLIONS OF DOLLARS)

	1963		1973		1985		1994
Germany, Fed. Rep	0.77	Germany, Fed. Rep.	2.74	US	5.0	Hong Kong ¹⁸	15.29
US	0.68	US	1.58	Germany, Fed. Rep.	5.0	Germany	10.72
UK	0.41	France	1.40	Hong Kong	4.3	US	9.66
Netherlands	0.37	UK	1.26	UK	3.9	China	9.35
USSR ¹⁹	0.30	Japan	1.13	France	3.4	UK	6.68
Canada	0.27	Netherlands	1.10	China	2.8	France	6.59
Australia	0.24	Belgium-Luxembourg	1.01	Italy	2.5	Italy	5.62
Belgium-Luxembourg	0.23	Hong Kong	0.94	Japan	1.9	Japan	5.15
Sweden	0.22	Italy	0.91	Netherlands	1.8	Belgium-Luxembourg	3.62
Hong Kong	0.20	Canada	0.78	Belgium-Luxembourg	1.7	Korea, Rep. of	3.34
South Africa	0.20	USSR	0.63	N/a		Netherlands	3.05
France	0.19	Australia	0.62	N/a		Canada	2.91
Italy	0.15	Sweden	0.51	N/a		Spain	2.22
Denmark	0.15	Switzerland	0.50	N/a		Mexico	2.15
Switzerland	0.15	Austria	0.48	N/a		Singapore ²⁰	2.02
Above countries as a percentage of world imports	64		67		58		57.4

Source: Dickerson, 1995: GATT, 1985-86; WTO, 1995

¹⁸ Retained imports are defined as imports minus re-exports. These amounted to 0.67 billion US\$ in 1994. Re-exports amounted to 0.025 billion US\$ in 1963, and 0.210 billion US\$ in 1973.

¹⁹ Imports f.o.b.

²⁰ Retained imports amounted to 0.85 billion US\$ for 1994.

TABLE 3.11: LEADING IMPORTERS OF TEXTILES 2001 (BILLIONS OF DOLLARS AND PERCENTAGE)

Importer	Value in 2001	% of world imports	
		1990	2001
EU (15)	45.6	46.7	29.2
USA	15.4	6.2	9.9
China ¹	12.6	4.9	8.0
Hong Kong ²	12.2	-	-
Mexico	6.0	0.9	3.9
Japan	4.7	3.8	3.0
Canada	3.8	2.2	2.4
Rep.of Korea	3.1	1.8	2.0
Poland	2.6	0.2	1.7
Rumania	2.0	0.1	1.3
Turkey	1.9	0.5	1.2
United Arab Emirates ^{3&4}	1.8	0.9	1.1
Thailand	1.5	0.8	1.0
Bangladesh	1.5	0.4	1.0
Morocco	1.5	0.3	0.9
Total top 15 importers	105.0		
Total world	156.4		
Above countries as % of world imports		73.7	67.2

Note: 1. Includes trade through processing zones; 2. internal imports amounted to US\$1 billion; 3. f.o.b.; 4. Data for 2000 instead of 2001

Source: WTO International Trade Statistics 2001 (www.wto.org; accessed November 2002)

3.4.2 The trade regime

The textile industry has been vital in the industrialisation process of the developed countries and has likewise acted as sunrise industry in the development efforts of the Newly Industrialised Countries. It is also an important source of employment and foreign exchange in other developing countries, hoping to benefit from industrialisation and freer trade.

The question is, however, as Anderson (1994:83) put it: *“Will advanced industrial countries continue to make room for further generations of NICs seeking to export their way out of poverty?”*

To answer this question, it helps to look at history, i.e. what do we know about the responses of industrialised countries to increased competition? These responses can be placed into two broad categories:

- Attempts to facilitate restructuring in the textiles and clothing industry in industrialised countries, and
- Attempts to protect domestic textiles and clothing from foreign competition.²¹

The attempts by developed countries to protect their industries and the persistent efforts of developing countries to penetrate those markets, led to a regulatory framework for textile trade that has not been entirely satisfactory to any of its participants. This section reviews the evolution of this framework and the unintended consequences that eventually may lead to its demise. Attempts to facilitate restructuring are studied in Chapters 4 and 5.

3.4.2.1 *Early protection*

Although attempts at protection have a very long history,²² these attempts gained in determination in the period between the First and Second World Wars, when the then leaders in textiles (Britain and America) perceived their industries to be under threat from Japanese competition. Other developing economies to a lesser extent also posed a threat to the leaders. In 1932 Britain instituted protective measures against Japanese exports into her markets. Other countries followed suit and by 1936, there were quantitative restrictions on Japanese exports in 40 out of 106 markets (GATT, 1984, quoted in Dickerson, 1995: 321).

The Second World War gave British and American textiles a respite from the competition emanating from Japan, but the latter's rapid recovery after the war soon had the protective hackles up again in the US. In addition, increased

²¹ Some countries, of course, pursued both, making categorisation a question of degree.

²² The attempt by the British Parliament in the late 1600s to protect the young English textile industry by prohibiting Indian cloth imports is one of the earliest records of textile trade regulation (Dickerson, 1995:319).

competition from the NICs (for example, Hong Kong and South Korea) spurred the American Cotton Manufacturing Institute into action. They commenced earnest efforts to limit textile imports (Dickerson, 1995:322).

However, when Japan became a member of the GATT in 1955, the Voluntary Export Restraints (VERs) ran contrary to the GATT principle of non-discrimination and Japan could retaliate. After persuading Japan to accept another VER in 1957, the United States in 1959 proposed that the protective measures²³ that until then had been *ad hoc*, be made more formal. The result was the Short-term Arrangement (STA), which lasted from October 1961 to September 1962 (Meyanathan, 1994:8; Dickerson, 1995:329).

The STA covered only cotton textiles, but was, like its successor, the Long-term Arrangement (LTA), a very important departure from GATT rules. It meant that textiles and apparel would be the only sectors to have their own trade regime. The LTA remained in force for 11 years (Dickerson, 1995:330).

3.4.2.2 *The Multi-fibre Arrangement, counterpoint to the GATT*

The diverse ad hoc and bilateral arrangements to restrict developing countries' exports into the industrialised countries, primarily the US and the EU,²⁴ were systematised and extended under the first Multi-fibre Arrangement (MFA), which came into effect in 1974 (Meyanathan, 1994). The language of the first MFA seemed benign enough. The basic objective of the MFA was "...to achieve the expansion of trade, the reduction of barriers to such trade and the progressive *liberalisation* of world trade in textile products, while at the same time ensuring the orderly and *equitable* development of this trade and the avoidance of disruptive effects in individual markets and on individual lines of production in both importing and exporting countries." (Article 1, paragraph 2, quoted in Meyanathan, 1994:9, emphasis added). The history of the MFA discussed below

²³ While the US made use of VERs, Britain tried to restrict cotton textile product imports 'voluntarily' under the Lancashire Pact and the other European nations used a variety of measures under Article XII of the GATT (Dickerson, 1995:326).

²⁴ At this stage still the European Economic Community, but we use the term European Union throughout, providing clarifications where confusion from such use may arise.

shows that it was neither an instrument of liberalisation, nor of equitable development of trade in textiles and clothing.

The MFA set the general rules, while the quotas and export volumes were negotiated under bilateral agreements. The rules allowed for flexibility in that some swing (switching between product categories), carry-forward (advance use of following years' quotas) and carry-over (use of quotas not utilised in previous years) were permitted (Meyanathan, 1994:9). It was under the bilateral negotiations, however, that the import-restraining countries turned on the screws and hardly any flexibility remained in the bilateral agreements. The consecutive renewal of the MFA became both more restrictive and extended its terms to cover an ever wider range of textile products beyond cotton textiles. Renewals in the 1970s and 1980s came against the background of deepening industrial crises in the industrialised countries. As our figures earlier in this chapter show, the industrialised countries were facing increasing job losses, loss of market share domestically and internationally and increasing costs. In addition, given the generally poor economic conditions (first and second oil shocks and their consequences) investment levels in the industry were falling and profitability of many firms was poor (Underhill, 1998:3). Textile producers in developed countries complained of 'unfair' competition from low-cost developing countries. In France, *employers* protested in the streets against 'cheap imports' (Underhill, 1998:243). As a result, the governments of the import-restraining countries were under pressure to tighten protective measures; and tighten them they did.

Referring to the first two MFAs, Raffaelli (1990:60) concludes: "*...in both textile Arrangements the notion of comparative advantage was ignored, and competitiveness became something 'threatening': low cost (Incidentally a much used term that does not appear in the MFA) is implied to be the result of disreputable manoeuvres, such as paying slave wages, receiving hidden subsidies, and so on.*" (Emphasis added).

Two particular 'innovations' to allow further restrictions stand out.²⁵ The first was the introduction of the idea of 'cumulative market disruption', which permitted import-restraining countries to limit even the imports from small suppliers, provided aggregate import levels had reached a specified ceiling. The second was the clause on 'agreed reasonable departures' from MFA I. This permitted the reduction of import levels below those agreed upon earlier (Meyanathan, 1994:9). The Protocol for MFA III, which came into effect in January 1982, did away with this 'reasonable departures' altogether and added an 'anti-surge' provision to restrict export growth of a product whose quota had not been utilised. One restrictive instrument was thus simply substituted for another. Upon the third renewal of the MFA (MFA IV), the United States insisted that all natural products be incorporated under the MFA, and imports from major suppliers be fixed to make room for increased imports from poorer developing countries. The flexibility provisions referred to above were made more restrictive (Meyanathan, 1994: 9). Thus, when the protocol for MFA IV was signed, the protectionist groups in the developed countries seemed firmly in the driving seat. After considering the impact of the MFA, we will examine the factors that led to the agreement to return textiles and clothing to the fold of GATT principles.

3.4.2.2.1 *The consequences of the MFA*

Much has been written about the consequences of the MFA (See for example, Dicken, 1987; Meyanathan, 1994, Dickerson, 1995; Raffaelli, 1990; Hamilton, 1990; Trella and Whalley, 1990; and Martin and Suphacalasai, 1990 for extensive accounts).

As early the beginning of the 1980s the immense effects of the MFA were evident:

"The MFA has become the key to trade flows of textiles and apparel and has had a particularly significant impact on the growth of textile and clothing

²⁵ Underhill (1998) and Raffaelli (1990) give a fascinating account of the interplay and collaboration between governments and industry associations to achieve this result.

exports from the NICs. The data show a marked slowing in the growth of clothing exports from developing countries, principally the NICs, after the MFA came into effect in the mid-1970s. From 1963 to 1976, the real growth in exports of clothing was about 21% per annum, whereas real growth from 1976 to 1978 was about 5% per annum. The impact of the MFA is unmistakable, since 1976-78 was a period of general economic recovery..." (McMullen, 1982: 91, quoted in Dicken, 1987:249).

The MFA had to a certain extent made life more difficult for producers in developed countries in that:

- It encouraged production in developing countries, which before the introduction of the MFA had virtually no textile and clothing industry. As producers in search of unused quotas and lower production costs settled in these countries, new competitors for the industrialised countries were born.
- It led to diversification into manufactured fibre (MMF) products, in direct competition with developed-country producers who had found competitiveness in this branch of the industry. The MFA initially covered cotton, so to escape the limitations on cotton exports, developing-country producers turned to other products, including manufactured fibres. Countries such as China, South Korea and Taiwan invested heavily in MMF production capacity.
- The reduction of imports from restrained exporters were replaced by imports from developed countries and developing countries with whom they had preferential trade agreements, such as the Mediterranean countries for Europe and the Caribbean for the US. The United States for example, was a major beneficiary of the restrictions on the NICs in the EU market. The US increased its volume of textile exports to the EU by 64 % between 1977 and 1979, while its exports of clothing grew by an impressive 90 % during the same period (Dicken, 1987:250).
- It encouraged the development of supply-chains between developed and developing country producers, undermining the interests of developed country firms who would not, or could not adopt this strategy. In the US

for example, the result of outsourcing provisions (re-imports under special legislation) made up only 5% of the textiles and clothing imports in 1987. By 1997 these imports had increased more than fivefold (Levinsohn and Petropoulos, 2002:7).

- It prevented much-needed structural adjustment in the developed-country textile and clothing industries. The United States and France are prime examples of instances where the necessary restructuring to regain competitiveness did not take place to a satisfactory extent (Underhill, 1998).

3.4.2.3 *The MFA and the Uruguay Round of GATT negotiations*

By 1986, at the launch of the Uruguay Round of GATT negotiations, the capture of the global textile and garment trade regime by protectionist groupings seemed as unbending as ever. This was evident in the fact that the US initially refused point blank to have the MFA put on the agenda for the Uruguay Round negotiations and the EU put it on the agenda with a myriad of provisos (Faini, et al, 1997:109; see Table A3.1 for details of shifts in position during the Uruguay Round).

However, some changes had been brewing, which eventually moved the entrenched interests in the developed countries to accede to what became known as the Agreement on Textiles and Clothing (ATC) under GATT auspices. These changes and their impact on the negotiations are discussed in the next sub-section.

3.4.2.3.1 *The changing landscape of textile trade, inertia and the role of institutions*

The changes to the global textile and clothing trade landscape included:

- Increased use of Outward Processing Trade (OPT) instruments by firms in developed countries; the result being that much of the import competition was generated by domestic firms and their activities abroad

(Firms from Holland, Germany, and Belgium were the first to use this strategy; the US, France and Italy followed later).

- Firms involved in OPT found their quota access for certain categories of products into their home markets inadequate and thus felt constrained by the MFA (German firms in particular had this problem, but some American ones were in the same boat, too).
- A new export mix from LDCs and NICs, including products made from fibres other than cotton and products with higher value-added (Dickerson, 1995:431).
- 'Quota-hopping', creating more producer countries, which then as members of GATT gave the developing countries more bargaining power (e.g. as part of the International Textile and Clothing Bureau).
- The desire of some developed country governments to use the MFA as leverage to wring market access from developing-country negotiators. This made them amenable to eventually agree to the dismantling of the MFA, when it was way past its peak of usefulness for the textile and garment interests in developed countries (Underhill, 1998:243).

Despite this reality on the ground, the institutions²⁶ in developed countries continued to lobby for protection and their governments assumed a protectionist stance at the GATT negotiations. It was only after about three years into the GATT negotiations that their attitude started to soften. But, textiles (in particular ramie) still stopped the clock on the last day of negotiations.²⁷ Underhill (1995: 95) calls the reluctance of the developed-country institutions to adapt a form of inertia:

²⁶ The French industry associations — the Union des Industries Textiles (UIT) for textiles and the Union des Industries de l'Habillement (UIH) — were already during the successive rounds of renegotiating the MFA renewals very successful in winning the French government over to their cause. This expertise they employed successfully to capture the EU trade policy on textiles through their dominance of the European textile organisations (COMITEXIL and the Association Européenne des Industries de l'Habillement). In the United States the American Textile Manufacturers Institute (ATMI) and the American Apparel Manufacturers Association were powerful lobbying organisations, sponsoring several pieces of protectionist legislation even during the Uruguay Round of negotiations (Underhill, 1998:197-230). The Apparel association in the US gradually became less enthusiastic about maintaining restrictions under the MFA, but the textile association was unrelenting until the very last day of GATT negotiations.

²⁷ When the deadline for the conclusion of negotiations arrive, the staff at the WTO (previously GATT) headquarters in Geneva stop the clock at one minute before midnight and the negotiations continue until an agreement is reached. When this is achieved, the clocks are started again. On the last day of the Uruguay Round negotiations, the United States representatives, at the behest of fibre producers in the US, insisted on

" the dynamics of demand and international trade called for change and adaptation; organisational ineptitude and the traditional practices of firms resulted in inertia."

Dickerson (1995) concurs with this view.

While the developed-country institutions thus seemed unable to look beyond calls for protection, the developing countries, however, had their own institution acting on their behalf at the negotiations. While much has been made of the role of the Cairns group in advancing the interests of developing countries, the efforts of the International Textile and Clothing Bureau (ITCB) had received much less attention. But, it is worth noting that the ITCB consists entirely of developing country representatives, which presented a united front during the negotiations (Underhill, 1998:226 and ITCB, 2002). This organisation was instrumental in resisting the developed countries' attempts at maintaining the MFA or to demand a phase-out period of 15 years instead of 10.²⁸ When the Agreement on Textiles and Clothing was finally reached, the ITCB undertook to monitor the phasing out of the separate regime for textiles and clothing. At the time they believed that the biggest advantage of the Uruguay Round for the developing countries would come from the integration of textiles and clothing under GATT rules (ITCB, 1999:1).

3.4.2.3.2 *The ATC: a victory for liberalisation?*

The Agreement on Textiles and Clothing (ATC), which came into effect on 1 January 1995, and expires on 31 December 2004, rests on six pillars. The first pertains to the products covered under the agreement, the definitions of which are set out in an Annex to the ATC. The second pillar involves the integration of the sector into GATT, which is to take place in four steps over ten years. On the 1st of January 1995 each party had to integrate into GATT products from the list

additional fibre coverage under the new agreement. This position was fiercely opposed by China and India, for whom ramie had become an important fibre (Dickerson, 1995:343).

²⁸ Although the GATT negotiations dragged out so long that, counting from the end of MFA IV (1991) to the end of the Agreement on Textiles and Clothing (31 December 2004), they almost had their 15 years (Underhill, 1998:243)

in the ATC, which accounted for not less than 16% of its imports in 1990. This means quotas on these products need to be removed and trade in these products be governed by GATT rules. At the beginning of phase two (1 January 1998) products, which accounted for not less than 17% of 1990 imports had to be integrated and on 1 January 2002, a further 18% had to be integrated. The rest (49%) would be integrated in the last phase (by 1 January 2005). The process is thus heavily back-loaded in that almost 50% of the integration is left to the very last phase. At every stage products should be chosen from each of the following categories: tops and yarns, fabrics, made-up textile products and clothing.

For products remaining under quota restraints, progressive liberalisation is required. For the first phase, the annual growth rate (enlarging the quota) should not be less than 16% higher than the rate applicable under the previous MFA. For phase two the annual growth rates should be 25% higher than the rates in stage one, while for phase three it should be 27% higher than the phase two rates. This is the third pillar.

The fourth pillar is the recognition that some members maintain non-MFA restraints on imports that do not comply with GATT provisions. Such restrictions should be adapted to GATT rules within a year of the commencement of the ATC or be phased out by 1 January 2005.

The fifth pillar is the provision of a transitional safeguard mechanism to deal with further surges in imports causing serious damage or threatening to do damage to the domestic industry. This allows the importing country to impose temporary restrictions on specific exporting countries, provided it can prove damage as a result of increases in imports from all sources and a sharp and substantial increase from the country against whom they want to impose restrictions. The safeguard measures can be implemented either by mutual agreement following negotiations, or even unilaterally. Such restrictions are subject to review by the Textile Monitoring Body (TMB). The TMB supervises the implementation of the ATC and reports to the Council on Trade in Goods of the WTO, which reviews the implementation of the Agreement before each new step of the integration process.

The ATC makes provision for special treatment for certain categories of countries, such as least-developed countries, cotton-producing countries, small suppliers and new market entrants. It further contains rules and procedures concerning circumvention of quotas, through for example, transshipment, rerouting, false declaration of origin or fraud with respect to official documents. The agreement also established the principle that members should make provision for continuous autonomous industrial adjustment and increased competition in their markets.

At the time of the agreement, at least two points of concern had been raised regarding the first two pillars. First, since import-restraining countries are free to choose the products for integration, they could select from 'a list of all products under restraint anywhere in the textile and clothing trading system, whether imported by that country or not, or indeed whether a threat to the domestic industry or not.' *"It was fully possible to 'liberalise' imported products a country did not even produce or trade and had never restrained or intended to restrain, depending on how the list was manipulated."* (Underhill, 1998: 242, emphasis in original). Secondly, the developing countries could not help but be sceptical about the developed countries' commitment to fulfil the requirements for full integration in the last stage.

The comprehensive report of the TMB (2001) for the review of the ATC implementation process by the Council on Trade in Goods, revealed some interesting developments, which the mouthpiece for the developing countries, the ITCB, was quick to seize as justification for their scepticism. First, it was clear that although the minimum percentages to be integrated had been achieved²⁹, little attention was paid to the implicit encouragement in the ATC to accelerate the process of integration (Table 3.12).

²⁹ The EU had to re-evaluate and correct its programme for first stage integration following a complaint by Colombia to the TMB that the programme included certain products not eligible for integration, implying that the exclusion of these products will result in the EU's integration programme accounting for less than 16% of the total volume of 1990 imports. The TMB essentially concurred with Colombia's view (WTO, 2000:16-17).

TABLE 3.12: INTEGRATION PROGRAMMES: FIRST SEVEN YEARS OF TRANSITION PERIOD OF ATC (As percentage of 1990 import volumes)

WTO member	Yarns	Fabrics	Made-up textiles	Clothing	Total
USA	16.46	4.15	8.73	3.90	33.24
EU	16.04	9.47	5.27	2.53	33.31
Canada	10.26	6.43	15.50	2.78	34.98
Norway	10.10	14.26	14.66	4.32	43.34

Source: ITCB, 1999:6 (Based on TMB notifications)

The figures indicate a preference for integrating less value-added products, with clothing not quite reaching a share of 5% for any of the members. If we further look at the percentage that the freed products make up of the total imports under restraint in the two largest members (the EU and the US), it could be inferred that very little really meaningful phase out of quotas has so far occurred (Table 3.13). According to the ITCB, eight years into the agreement, very few quotas have been eliminated, leaving the bulk until the end of the last phase: 701 out of 758 in the US, 167 out of 219 in the EU and 239 out of 295 for Canada. If the quotas applicable to China and Chinese Taipei, who have only recently become members of the WTO, are added, the picture looks even bleaker: 851 out of 932 in the US, 222 out of 303 in the EU and 292 out of 368 in Canada (ITCB, 2002:3).

TABLE 3.13: RESTRAINED TRADE FREED OF QUOTAS (As % of imports)

YEAR	EU		USA	
	In volume	In value	In volume	In value
1995	4.74	4.28	6.23	6.40
1996	4.92	4.34	6.03	6.14
1997	4.77	4.18	6.00	6.12

Source: ITCB, 1999:8

On the positive side, both Canada and Norway have made progress beyond the minimum requirements for integration. Norway, in fact, has lifted all quotas that it imposed under the MFA as of 1 January 2001 (WTO, 2000:2).

In their submissions to the Council on Trade in Goods, dealing with the implementation issues under the Doha Round, developing countries voiced their concerns regarding a number of instances where they believe the developed countries' behaviour was not in line with the letter and spirit of the ATC. One concern is about the use of the special safeguard measure to introduce new restrictions.

The special transitional safeguard mechanism was invoked on 24 occasions in 1995 by the US, eight times in 1996 (7 times by Brazil and once by the US), twice by the US in 1997 and nine times by Colombia and once by the US in 1998 (WTO, 2003). On several occasions members have simply ignored a ruling by the TMB to rescind a restriction imposed under the transitional safeguard provisions (The USA and Colombia were the most prominent cases). This forces the exporting countries to request a review panel at the WTO Dispute Settlement Body (WTO, 2002:71). Even in cases where the TMB or on appeal the WTO's Appellate Body found that the new restrictions were unjustified, the damage to exporting countries have been substantial. In the event that an import-restraining member requests a consultation with the view to using the special safeguard measure, the exporting country is already disadvantaged in that it has to seize exports of the particular product until the consultations are concluded³⁰. Thus, whether the safeguard mechanism is eventually applied or not, the exporting country stands to lose.

Developing countries are also concerned that importing countries will be using anti-dumping duties on a massive scale after quotas have been eliminated. The recent WTO Dispute Settlement Body's ruling against India regarding their complaint against the EU anti-dumping duties on Indian bed linen is considered a decisive indicator of things to come for developing-country exporters (Textile Topics, 2002:14). The Foreign Trade Association (based in Belgium) in its submission for the WTO Ministerial Conference (2002) underlines the fact that the number of anti-dumping cases has risen sharply over the last few years. Anti-

³⁰ During the first implementation stage, the TMB received notification of 33 requests for consultations (26 from the US and 7 from Brazil), while the number was down to 29 in the second stage (TMB, 2002).

dumping seems to be viewed as an acceptable way to protect domestic industries in the face of reduced tariffs and disappearing quotas. An increasing number of former targets of this policy (e.g. Mexico, India, Argentina and Egypt) now also embraces this view of anti-dumping measures as a 'tool for all seasons', joining the US and the EU in their use of this instrument for protection against 'undesired' imports (Foreign Trade Association, 2002:3).

The developing countries also assert that import-restraining countries have eliminated restrictions on non-WTO members (e.g. Russia), while maintaining them on WTO members. They further allege that countries under import restraints have benefited relatively little from healthy growth in demand in developed countries. To support their argument, the ITCB (2003a: 1-7) has shown that between 1990 and 1994 imports of textiles and clothing from preferential suppliers³¹ into the EU 15 market has grown by 12.63%, slowing to 7.51% between 1994 and 2001. For restrained suppliers³² however, growth has been much more subdued: 6.10% between 1990 and 1994 and 3.30% between 1994 and 2001. Imports of textiles only from preferential suppliers grew at a slower rate (5.44%) but picked up to 9.81% since the implementation of the ATC between 1994 and 2001. For restrained suppliers EU 15 textile imports grew by 5.46% in the first period, slowing to 4.34% between 1994 and 2001. During the same periods intra-EU imports of textiles declined by 2.83% and 0.27% respectively. For the United States the picture is different. While its imports of textiles from the world market grew by 9.40% between 1990 and 1994 and 6.97% between 1994 and 2001, the most significant growth was in imports under specific arrangements (CBI³³ and NAFTA): 18.95% and 13.74% respectively. In contrast, imports from restrained suppliers³⁴ grew by 9.94% between 1990 and 1994, then slowed down to 7.21% between 1994 and 2001 (ITCB, 2003b: 1-7).

³¹ Preferential suppliers include 10 exporters: Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovak, Malta, Morocco, Tunisia and Turkey (ITCB, 2003a: 7).

³² Suppliers whose imports are restrained by the EU include 16 exporters: Argentina, Brazil, China, Chinese Taipei, Hong Kong (China), India, Indonesia, Korea (Rep.), Macao (China), Malaysia, Pakistan, Peru, Philippines, Singapore, Thailand and Vietnam (ITCB, 2003a: 7).

³³ The Caribbean Basin Initiative includes 25 exporters: Anguilla, Antigua, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica, Dominican Rep., El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Nicaragua, Panama, St. Kitt-Nevis, St. Lucia, St. Vincent/Grenadines, Trinidad and Tobago (ITCB, 2003b: 7).

³⁴ Restrained exporters into the United States include 45 exporters: Bahrain, Bangladesh, Brazil, Bulgaria, China, Chinese Taipei, Colombia, Costa Rica, Czech Republic, Dominican Republic, Egypt, El Salvador, Fiji, Guatemala, Haiti, Hong Kong (China), Hungary, India, Indonesia, Jamaica, Kenya, Korea (Rep.),

With respect to the special provisions in the ATC for small suppliers, there is some dispute over the interpretation of the requirement that the small suppliers be advantaged by the advancement of one stage of the growth rates for products remaining under constraints applicable to other members (see page 29 for details). The EU interpreted this to mean that in the first stage, the pre-ATC quota growth rate should be increased by 16% + 25%, whereas Canada and the US ignored the cumulation and simply substituted the second stage growth factor for the initial one, i.e. instead of 16+25% they simply used 25% (ITCB, 2002:5). The latter resulted in lesser access for small suppliers in the US and Canada. As far as provisions in favour of least-developed and cotton-producing exporting countries are concerned, the US and Canada stand accused of completely ignoring the provisions for least developed countries, while all three remaining restraining members apparently ignored the provisions for cotton exporting members (ITCB, 2002:3). In addition, the US changed its rules of origin for textiles and clothing effective from July 1996. The result was that the coverage of cotton made-up articles was enlarged, e.g. products with as little as 16% cotton by weight are now classified as cotton products. This change had widespread disruptive effects on trade, also detrimental to the EU³⁵ (ITCB, 2002:3).

With reference to the dismantling of the MFA, Underhill (1998:344) concluded:

“ Globalisation was here to stay, for a good while anyway. At the end the MFA had few real friends in the Round and few look back today.”

With hindsight and taking into account the progress with implementation to date and the repeated calls for increased protection from developed-country institutions, one is tempted to conclude that Underhill's conviction of the demise of what the MFA stood for was premature.

Kuwait, Macao (China), Malaysia, Mauritius, Oman, Pakistan, Philippines, Poland, Qatar, Romania, Singapore, Slovak, Sri Lanka, Thailand, Turkey, U.A. Emirates, Uruguay, Myanmar, Cambodia, Laos, Macedonia, Nepal and Ukraine (ITCB, 2003b:7).

³⁵ Because of the change in the rules of origin based on the definition of 'cotton', products that previously did not face import restrictions were now classified as cotton and subject to trade restrictions (ITCB, 2002:3).

Next, we consider various explanations for the evolution of production and trade patterns in world textiles and develop an argument that analysis beyond the aggregate level is necessary to explain the diversity in global textiles.

3.4.2.4 *Comparative advantage and the problem of aggregates*

To explain the evolution of production and trade in the global textile industry, various theoretical approaches had been applied. We have already mentioned the Heckscher-Ohlin theory above and referred briefly to other reasons for trade in Section 3.3. Toyne, et al (1984) proposed a stages-of-development framework for explaining the evolution of the global textile industry. This conceptual framework sees the industry as developing in stages ranging from an *embryonic stage* to the last stage of significant decline. All stages can be discerned in the countries of the world today and it is possible that one country may be in different stages of the continuum simultaneously, depending on the relative sophistication of the different sections of the textile *pipeline* (Dickerson, 1995:129). Dickerson (1995) gives an updated exposition of Toyne's original scheme, which we briefly discuss here.

In stage one, producers focus on production of simple fabrics and garments for domestic market use, using natural fibres. Such countries are net importers of fibre, fabric and garments. Most least-developed countries find themselves in this stage.

During stage two production of mostly standard clothing for exports, incorporating 'craft' techniques for developed markets, takes place. Competition is on the basis of low prices. The less advanced Asian, African and Latin American countries are in this phase.

In stage three the quantity, quality and sophistication of domestic fabric formation increase, while the clothing sector expands and improves quality. Development of domestic fibre manufacturing also takes off. There is now increased involvement in exports of fabric, clothing and synthetic fibres.

Examples of countries at this stage include the most advanced members of ASEAN and East European producers.

Stage four sees further development and sophistication of fibre, fabric and garment production as full members of the international trading system. Significant trade surpluses occur. Examples include South Korea, Hong Kong and China.

During stage five, output of textiles and clothing continues to grow, but employment declines and capital intensity and specialisation increase in the face of fierce international competition. Examples include Japan, the USA and Italy.

The final stage brings a substantial reduction in employment and the number of establishments in the industry, with declines in both relative and absolute terms in some sectors, e.g. the commodity end of the market. Countries in this phase experience severe import competition and trade deficits. The United Kingdom, Germany, France, Belgium and the Netherlands fit this picture (Dicken, 1987:236-237; Dickerson, 1995:129-135).

Another heuristic device for explaining the pattern of development of an industry in relation to trade is the product/industry lifecycle/technology gap concept. Essentially the pattern unfolds as follows. A new product is developed for the domestic market. Production is un-standardised and the product is rather expensive. As the product wins over consumers in the domestic market of the innovating country, the production volumes can increase and economies of scale be achieved. The product becomes more standardised. At this stage the innovating country sees a marked growth in exports of the new product. In the next stage the importing country acquires the new technology and starts to produce the imported product. Once it has developed the capacity to produce the product in large volumes at reasonable prices, the importing country becomes the exporter and the innovating country becomes a net importer of the product (Wakelin, 1997:16-21). The notion of birth, growth and decline applied by Toyne, et al specifically to textiles is also evident in these theories. However, the reality of textiles in the world indicates that firms in these

industries did not all go gently and quietly into this expected decline and finally, death. Many firms sought to rejuvenate themselves, to adapt to new forms of competition and to new demand conditions. Both Underhill (1998) and Dicken (1987) have shown that the strategies adopted by textile firms in different industrialised countries were a crucial factor in explaining the evolution of the textile and clothing industries.

A further problem with talking about the 'comparative advantage' of 'nations' is that so many factors influence comparative advantage that are not adequately captured by a single theory, nor easily recognised by analysis at the aggregate level only. As our aggregate level analysis above indicated, textile industries in developed countries have been in decline for decades. There is, however, remarkable diversity across countries and across industry sub-sectors. Comparative advantage (measured in volume terms, e.g. tonnes, or US \$ terms) in a sub-sector does not tell us anything about the variety of products traded under that sub-sector heading. For example, Canada is losing market share for blue denim in the US market in favour of Taiwanese, Turkish, Indonesian, Italian and Japanese producers. On closer inspection, though, it is evident that the Asian producers (excluding Japan) saw remarkable increases in volume terms, but they are still focusing on the lower end of the market. Turkey, on the other hand, is joining Italy and Japan at the higher end of the market, with its imports increasing by 57% in value terms and 'only' 46% in volume terms between January and September 2002 (US Import analysis: Blue Denim, Emerging Textiles, 2002). A less aggregated³⁶ level of analysis is thus necessary to uncover the sources and nature of this diversity. Often the picture painted by the aggregate data is much more complex and nuanced at the micro-level. In a study of the American textile and garment industry, for example, Levinsohn and Petropoulos (2001) wanted to determine whether these industries were really dying or whether it was a case of creative destruction (as opposed to a declining

³⁶ Schumpeter (1942) warned about the perils of drawing conclusions about an industry solely on the basis of a snapshot of aggregate data: "*Since we are dealing with an organic process, analysis of what happens in any part of it — say in an individual concern or industry — may indeed clarify details of mechanism but is inconclusive beyond that. Every piece of business strategy acquires its true significance only against the background of that process and within the situations that created it. It must be seen in its role in the perennial gale of creative destruction; it cannot be understood irrespective of it or, in fact, on the hypothesis that there is a perennial lull.*"

industry where things (employment, production, profitability, productivity) are going just *one* way: down. By creative destruction³⁷ they mean:

- Although some jobs are destroyed, new and hopefully better jobs are created to replace some of those lost;
- As some firms exit, there is significant simultaneous entry of new firms;
- that the less efficient firms exit, while remaining firms become more productive and smart new firms enter.

The distinction between declining industries and industries experiencing creative destruction is important, since policy prescriptions for the two differ markedly. For the former, policy is usually aimed at easing adjustment (exit), whereas for the latter policy may well enhance adjustment by promoting entry. The study, conducted with the aid of plant-level panel data for 1972 to 1995, found that the US textile and garment industries are indeed examples of creative destruction. These industries have experienced tremendous simultaneous entry and exit, much job creation and remaining firms are increasing their productivity (Levinsohn and Petropoulos, 2001:4).

When we consider these points together, it is clear that it is necessary to dig further than the aggregate level to improve our understanding of the evolution of the textile industry. Porter (1990)'s idea of the competitive advantage of nations, giving a more prominent role to the competitiveness of *firms* and the environment in which they operate, goes some way towards explaining the diversity observed within the industry and across countries. It is Malerba and Orsenigo (1996:84), however, who address the problem more directly when they suggest further aspects of analysis that may throw more light on the dynamics of industry evolution and the persistence of diversity. Specifically, they emphasise (amongst other things) the "need to:

- Analyse firms according to several dimensions at once: competences, innovative activities, productive specialisation and organisational structure.

³⁷ Creative destruction in this context refers to a process *within* the textile and clothing industries.

- Focus on the connections that firms develop with suppliers and users. Suppliers and users do not interact with the firms solely through the exchange of products, knowledge and people: in several cases (as in vertical integration and in long-term relationships) they are also involved in the very process of structural change.
- Pay attention to institutions. Universities, research organisations, financial institutions and the government affect structural change within the industry, by influencing the stock of scientific knowledge, the diffusion of new technical knowledge, the amount of R&D, the speed of development and the extent of production, the entry of new firms and the exit of existing ones".

These aspects of analysis are pursued in the chapters to follow.

3.5 GLOBAL TEXTILES IN THE 21ST CENTURY: CHALLENGES AND PROSPECTS

Most of the factors that present challenges to the global textile sector also hold opportunities. These challenges and prospects may differ for developed and developing countries. Hence, in the following discussion we distinguish between challenges and prospects for developed and developing countries where necessary.

3.5.1 The expiry of the Agreement on Textiles and Clothing in 2005

In terms of the ATC all quotas maintained under the MFA (and brought over to the ATC) should be eliminated by 1 January 2005. This will intensify competition for developed-country markets and some regions may be harder hit than others. The International Monetary Fund (IMF) estimates that Africa's apparel trade will be 30% lower than before the dismantling of the MFA (Mattoo, et al, 2002:4). This may be compensated for by increased access to other markets under preferential agreements, regional integration agreements and further multilateral trade liberalisation. The proliferation of trade agreements is discussed in the next section.

3.5.2 Proliferation of regional and bilateral trade agreements

The proliferation of regional blocs, bilateral free trade agreements and preferential access treaties³⁸ threatens to undermine the multilateral trade regime under the WTO. It further makes for a very complicated trade administration system with differentiated duty structures and rules of origin requirements. This, of course, adds to administration costs in the importing and exporting countries and imposes extra compliance costs on firms. From the exporting firm's point of view this becomes another trade barrier.

On the other hand, the increased market access may allow for better utilisation of resources and specialisation in textile producing countries. One such form of market access, the Africa Growth and Opportunity Act (AGOA)³⁹ is seen as a timely lifeline to Sub-Saharan African (SSA) countries. AGOA is not a negotiated trade agreement, but rather like a gift with strings attached. AGOA is part of the American Trade Development Bill (2000). It gives preferential access⁴⁰ to exporters of specified goods from eligible countries. To be eligible countries must meet a comprehensive list of conditions. Rules of origin requirements, especially for clothing, are quite stringent. Whilst AGOA offers a welcome opportunity for SSA countries to accelerate economic growth through exports, some commentators argue that the benefits would have been so much more substantial if the terms of market access were less restrictive. Mattoo, et al (2002:3), for example, estimated that the benefits from AGOA could have been in the region of US\$0.54 billion of additional non-oil exports, rather than the expected US\$100-\$140 million in the presence of the restrictions. The restrictions referred to are the triple transformation (or 'yarn-forward') rule,

³⁸ Examples abound: the United States have concluded or is in the process of negotiating a large number of free trade agreements (with South Korea, Vietnam, the Southern African Customs Union, several Central American countries, Taiwan, etc.), while the EU has recently concluded a free trade agreement with Pakistan, several North African countries and Canada's free trade agreement with Costa Rica is viewed as one of the most generous as far as textiles is concerned (Alden, 2003; Emerging Textiles, 23 October 2002 and 14 November 2002).

³⁹ AGOA and other trade agreements of particular importance to Southern Africa are discussed in more detail in Chapters 4 and 5.

⁴⁰ It offers quota and tariff-free access to specified products from eligible SSA countries until 2008. Only Mauritius and Kenya were under MFA quota restrictions. There are currently 38 eligible countries (Just Style, 2003: January 7).

which is more stringent than the MFA rules of origin, and the exclusion of certain items. Textiles, for example, benefits only indirectly through garment exports.

AGOA also foresees the creation of reciprocal Free Trade Agreements with SSA countries. The first of these will be negotiated between the US and the Southern African Customs Union (SACU) in 2003.

Another offer of preferential access for less developed countries came from the EU in the form of the Everything-but-Arms initiative, which came into effect on 5 March 2001. It allows for duty-free access to the EU market for the 49 poorest countries, excluding weapons and certain sensitive agricultural products. The latter is a temporary barrier that should fall away for bananas in 2006 and sugar and rice in 2009 (Casadio, 2001).

3.5.3 Intensification of competition from low-wage countries

The textile industries in developed countries will have to face increased competition from developing countries (in commodity type products) and NICs (in higher value-added, diversified products), especially after the expiry of the ATC. Such increased competition from abroad challenges developed-country firms to make important strategic decisions. For example, should they invest in high technology, labour-saving machinery or in R&D to develop new products for new markets or changing existing markets or should they opt for ICT to enable them to use supply chains more efficiently? All these decisions must be made under great uncertainty.

One particular developing country and its membership of the WTO seem to be a major cause for concern. Textile industry representatives in the United States⁴¹, Canada and Europe clearly view China as the most important threat to their domestic industries. As part of China's protocol of accession to the WTO, both the US and the EU insisted on the right to invoke safeguard measures against China even after 2005, when the MFA has come to an end. This assessment of

⁴¹ The American Textile Manufacturers' Institute, in a newly-launched 8-point survival plan, agitates for renewed import quotas on imports from China and Vietnam (Dalyan, 2002).

China as a threat is not unfounded. Although China has been a strong competitor in textiles and apparel for the better part of the second half of the twentieth century (Tables 3.8 and 3.10), it was prevented from fully exploiting its comparative advantage in these industries, by its own government's domestic policies and the import-restraining measures imposed by developed countries. China's Association of Textile Industry estimates that the industry has generated output to the value of \$121 billion in 2002, an increase of 15% over 2001. Industry profits grew by 23% year on year and exports exceeded \$60 billion (Just-style, 2003, January 6). Exports are expected to grow by five to six per cent in 2003 (Global Sources, 2002).

China certainly is a strong contender for world leader in textiles for the next decade or so. Currently, its textile production is concentrated on the East coast, but the government's 'Go West' programme provides, amongst other things, investment incentives to expand industrialisation into the vast inland, promising renewed growth in output. Wages in the interior are also lower than at the coast (Yang, 1999:10). On the other hand, China's manufactured export composition already shows increased diversification and a relatively lower significance of textiles and clothing. Also, as Table 3.2 indicates, China's wages are not the lowest and it is already facing competition from lower-wage producers such as India and Indonesia. This suggests that in time, China will also lose its comparative advantage in textiles. Again there seem to be two types of responses to the 'Chinese threat'. The first we have already mentioned, i.e. renewed pressure for protection (and not only in developed countries⁴²). The second is a more strategic, forward-looking approach, i.e. recognising in China a huge opportunity⁴³. This opportunity entails China as a market for higher value-added textiles products (such as fashion goods and technical textiles), setting up joint ventures for production in China as well as a profitable market for textile machinery, design and marketing services, etc. Group Iteima (Italy) for example, has committed itself to the creation of a textile district in Shanghai. The initial investment will amount to €10 million, but the firm wants to establish a

⁴² India, for example, has also used anti-dumping duties against Chinese imports (Just-style, 6 January 2003)

⁴³ It is worth noting that from 2005 China's customs duties on textiles and clothing will be very close to those prevailing in the European market and upon accession to the WTO China will have to rescind all non-tariff barriers to entry, paving the way for greater reciprocity in trade (Robba, 2002).

presence in the whole pipeline (TextileItaly, 2002). Already in 2001, the Italian Textile Association (l'Associazione tessile italiana) established offices in China; one in Shenzhen, not far from Hong Kong, to cater for the needs of the household textiles sector and the other in Beijing for the apparel textiles sector (Mazzuca, 2001:1).

3.5.4 Consumer tastes and preferences

If we consider that roughly two-thirds of the world's population live in developing countries where per capita income levels are such that the demand for commodity type products in the textiles for apparel market is likely to be at worst steady, there is scope for low-cost producers in developing countries to grow their textile and clothing industries. However, in the higher end of the market, Europe, North America and Japan will still substantially hold comparative advantage in products that offer specialised characteristics, high performance and quality. In addition, producers in these regions still have the leading role in innovation, customer service, flexibility, infrastructure, investment capabilities and the synergy derived from integrated markets such as the EU (Gatti and Vittori, 2002). Having said that, it should be noted that some first-tier NICs, such as Taiwan are restructuring and shifting resources to the higher end of the market. For example, after investing in updated equipment, Taiwanese producers started selling more sophisticated yarns, also entering the technical textiles market. Exports of high filament counts and blended textured yarns are gaining relatively more significant shares of total sales (Textile Trade News, 2002).

3.5.5 Ecological and social responsibility concerns

Consumers have also become more aware of environmental damage that could flow from textile production and demand not only good quality products but also environmentally safe products. In answer, clean production systems, recycling, ISO 14000 and eco-labelling have become important means of distinguishing one firm's products from another and this presents an extra edge in the market for early compliers. Consumer safety is also a major concern, for example avoiding textile finishes that may cause allergies. Some developed-country producers complain that they have to comply with stringent environmental requirements

(e.g. EU legislation), yet imported products do not necessarily comply with these norms and are sold for less (Sala, 2001).

Although ISO 9000 and 14 000 certification had not been *as important* in developing countries as in industrialised countries, it is becoming much more so for firms exporting to developed-country markets.

Social standards (e.g. SA 8000) represent an issue that was left unresolved at the Uruguay Round of negotiations and that developed countries will certainly want on the agenda for the Doha round. From the developed country perspective, adherence to stringent social standards amount to an additional cost to firms, which they aver firms in developing countries do not have to incur. Developing countries worry that adoption of uniform WTO rules regarding social standards will hand the developed countries another potential non-tariff trade barrier.

3.5.6 Technological innovation and diffusion

Whereas technological innovation was the salvation of the textile industry in industrialised countries, developing countries are at a disadvantage in the sense that they have many impediments to the acquisition and diffusion of appropriate technologies in textiles. Some of these problems are investment capabilities, inappropriate plant size and degree of integration of operations, education and skills, poor productivity and maintenance of equipment, wasteful use of inputs, especially energy, and lack of management and marketing skills.

The NICs and some other developing countries, however, have been upgrading their technology for years, as evidenced by the textile machinery shipments published by the International Textile Manufacturers' Federation (2001). For spinning machinery, by far the largest percentage for cotton spinning went to Asia, with India the largest investor (874 000 units), followed by China (612 000 units), Pakistan (476 000 units), and Bangladesh (394 000 units). Western Europe increased investment in wool spinning equipment by 84% (over 2000 figures), with Italy by far the largest investor. Asia's (especially China) investment in wool spinning machinery grew by 34%. The largest shipments of texturing, weaving

and knitting machinery also went to Asia, with Western Europe receiving the second largest.

3.5.7 Product innovation and market diversification

The application of textiles in spheres of life other than apparel (Figure 3.1) has become an important growth area. Technical textiles have applications in, for example, home textiles, automotive textiles, new applications of non-wovens, geo-textiles and engineering, aviation, and medical fields (Planck, 1999:87). In biomedical engineering, for example, textiles are used in the operation theatre as protective clothing, patient covering or implants. As implantable materials, textiles have been used in several fields (see Planck, 1999:87). Technical textiles provide an avenue of escape from the decline in the traditional textile sector in industrialised countries. Very few industrialised countries have managed to remain competitive in this sector, but the technical textiles sector has been booming. As little as five years ago, the size of the sector was only about 9.3 billion tonnes (valued at US\$60 billion). Forecasters in the industry now predict that it will be worth US\$150 billion (24.4 billion tonnes) by 2005, roughly a quarter of the global textile market (International Journal of Clothing Science and Technology, 2002).

3.5.8 Radical innovations in supply and distribution systems

With the world becoming truly more integrated and textiles more internationalised, the trend is towards more integrated pipelines or supply chains, incorporating all players from fibre producers to end users. Retailers have in the last decades become much more powerful and have been applying a form of 'lean retailing' with the aid of ICT. Retailers require that producers be able to respond quickly (within days, at worst weeks) to re-orders and slight design changes. The implication for textile and clothing producers is that more of the risk e.g. of carrying stock (especially in fashion goods) is shifted back to them. For firms in developed and developing countries being in an appropriate supply chain and managing relationships and information flows in the chain becomes a strategic matter.

3.5.9 Labour: skills, productivity and costs

As we have shown in Table 3.2, most industrialised countries have a comparative disadvantage as far as labour costs are concerned, but they hold, by and large, the upper-hand in terms of labour productivity. Yet, they are experiencing shortages of skilled labour to use with their sophisticated technology and in R & D. Indications are that they will have to invest in drawing a new generation of labour from their own labour force, or source skilled labour internationally. A study by the OECD (2002:8) shows that international migration of skilled workers is on the increase as international competition for skills intensifies and industries become more knowledge-intensive.

The downside, at least in the short-term⁴⁴ for developing countries is that they will experience a 'brain drain' as skilled labour (already a scarce factor) leaves for greener pastures in developed countries. As developing countries acquire more advanced technologies they will have to invest more of their limited resources in education and training to improve productivity and quality.

3.5.10 The trade regime

Textile producers in developed and developing countries fear that textiles and clothing would once again be a bargaining chip at the Doha Round of WTO trade negotiations, currently under way in Geneva. This fear is of course, fuelled by experiences in the past:

" The importance of textiles and clothing as a basis for today's newly industrialising and less industrialised countries, together with their continued, though much diminished importance in the older industrialised economies, have made these industries into an international football." (Dicken 1987:222).

The developed countries want opening up of third-country markets, i.e. reciprocity. The United States, for example, is proposing that all trade restrictions on manufactured products be eliminated by 2015. This proposal has

⁴⁴ On the supposition that eventually workers return to the home country with more knowledge and experience.

united some developing countries (notably India) and textile producers in developed countries in their resistance to completely free trade in textiles, especially given their fear of China, discussed above.

It is safe to say that the outcome of the Doha Round trade negotiations will, at least from the developing country point of view, depend crucially on how the matter of the implementation of the ATC and further liberalisation of textile trade is handled.

3.5.11 Macroeconomic conditions and uncertainty

Given the slow-down in economic growth in the world's largest economies (the EU and the US), the stagnation in Japan and the winds of war blowing from the Bush-administration in the US, the dominant climate is one of uncertainty. This is reflected in consumer spending decisions and business investment decisions and will inevitably impact on the textiles and related industries. Expectations of war also drive up the oil price, an essential ingredient in the synthetic fibre sub-sector of the global textile industry and an important source of energy for many textile-producing countries. Recovery of the world economy is now expected to be delayed until 2004, thus making this year (like 2002) an intermediate year of preparing for a recovery that might not materialise (Mazzuca, 2002). In the event of war, the demand for technical textiles, however, would increase strongly⁴⁵.

3.6. SUMMARY AND PREVIEW OF CHAPTER 4

The focus of this chapter was on the evolution of the global textile industry. On the supply-side we found that production continues to shift to newly industrialising and developing economies (notably those in Asia), while the more sophisticated and complex parts of the textile pipeline remain in the industrialised countries. Man-made fibres continue to gain ground on natural

⁴⁵ It is estimated that as much as 10,000 separate textile and textile-related products are supplied to the US military. Also, the needs of the military tend to dominate advanced US research and development in fibre and textile related areas. The size of this market in 2003 is now believed to be three or four times greater than was indicated by forecasts made prior to September 11 2001 (Just-style, 2003, 7 February).

fibres, although new improved cotton varieties are being developed that might partially offset this trend. While the world market in textiles used for apparel has been relatively stagnant, the technical textiles sub-sector has seen tremendous growth and its growth potential is very promising. Overall employment in world textiles has remained fairly stable, but developing countries have gained in employment, while the textile industries in industrialised countries continue to shed lower-skilled jobs. They are, at the same time, experiencing a shortage of skilled workers to use the advanced technology employed in the industry.

Technological developments have occurred broadly on four fronts, viz. in textile machinery where the trend is to increase speed and efficiency, incorporating information and communications technology, the development of new and hybrid inputs, such as intelligent fibres with novel uses, and innovations in organisational and management processes. These developments have had an indelible impact on the way in which firm's operate.

On the demand-side producers are faced with consumers who are more discerning about quality and environmental concerns and less inclined to opt for mass-produced items. Satisfying these preferences has led to increased specialisation and intra-industry trade and major changes in production systems, e.g. a move towards more flexibility.

Trade patterns in textiles are by and large compatible with a shifting comparative advantage account, i.e. industrialised countries losing their comparative advantage in textiles to the NICs and they, in turn, losing theirs to other developing countries. This process was, however, not without interference from governments and other institutions. The textile and garment industries have been for many years the object of protectionist interests under the MFA, now incorporated in the ATC, scheduled to expire on 1 January 2005. Although the trade patterns in textiles are compatible with shifting comparative advantage, we developed arguments to the effect that such an aggregate picture could be misleading, disguising the rich diversity, which exists in the

global textile industry. We thus argue in favour of further analysis, which goes beyond the aggregate picture.

The rest of the study will thus employ industry-level analysis (Chapters 4 and 5) as well as firm-level analysis (Chapters 6 and 7) with respect to the South African textile industry. As we have briefly seen in this chapter, the role of institutions can be very powerful in steering the development of industry. Hence, this study also has to consider the role of institutions in the South African textile industry. This is done in Chapter 5. In this chapter we have also seen images of the modern textile industry (especially as far as technological developments are concerned) that fit very uneasily into Pavitt's taxonomy (discussed in Chapter 2). We reconsider textiles in this taxonomy in Chapter 8.

APPENDIX 3.1

TABLE A.3.1: INTERESTS OF MAJOR GROUPS OF COUNTRIES IN THE URUGUAY ROUND AND OUTCOMES OF NEGOTIATIONS (REGARDING TEXTILES AND CLOTHING)

INITIAL REQUESTS	DECLARATION OF PUNTE DEL ESTE	FINAL ACT PLAN (DUNKEL TEXT 1991)	FINAL AGREEMENT (1993)
USA: no liberalisation in this sector EC: inclusion of this sector in GATT with strengthening of safeguard regulations; greater market access for exports in LDC markets (especially in South East Asia and Latin America for high quality products) LDCs: reduction of restrictive measures through the dismantling of the MFA and the elimination of bilateral agreements; differentiated and favourable trade treatment for LDCs	Dismantling of MFA and integration of the sector into GATT	Almost general consent on the dismantling of MFA in 10 years and of the sector's integration into GATT	Establishment of 4 phases (with quantitative targets) for integration into GATT; specification of a safeguard mechanism for the products not yet integrated into GATT

Source: Faini, et al, 1997:109.

CHAPTER 4

THE SOUTH AFRICAN TEXTILE INDUSTRY IN HISTORICAL AND COMPARATIVE PERSPECTIVE

4.1 INTRODUCTION

In Chapter 3 we have given an overview of the evolution of the global textile industry in terms of trends in output, employment, technological development, trade, demand for the industry's products, as well as the changes in the environment in which the firms in the industry do their business. In this chapter, we are interested in the evolution of the South African textile industry. First, we tell the story of the South African textile industry's development and explain how it came about that the industry was caught in an intolerably uncompetitive situation when trade barriers were reduced in the 1990s. We pay particular attention to the industry's subsequent attempts at survival and growth. Secondly, to put this experience in comparative perspective, we study the experiences of one developed country, Italy and one developing country, Mauritius. The choice of these two countries is based on the following grounds:

- The Italian textile and clothing industry was one of the few developed country industries that had managed, by and large, to remain competitive in the face of fierce competition and successive changes in the international trade regime;
- Italy has always been an important trading partner for South Africa and has gained increased significance in the context of the South Africa-European Union Free Trade Agreement, especially in terms of market access, investment and cooperation opportunities¹;
- The Mauritian textile industry's success achieved by means of Export Processing Zones (EPZs) promises important lessons to be learned;

¹ In 2000 and 2001, Italy was the third largest market for South African exports of textiles and clothing, after the United States and the United Kingdom. As a source of textiles and clothing imports, Italy ranked ninth in 2000 and eighth in 2001 (Wesgro, 2002:69-70).

- From a regional perspective, South Africa and Mauritius are important role players in the development of a textile and clothing pipeline in the Southern African Development Community²; and
- Lastly, Mauritius is an important partner for South African textile producers, who supply textiles to Mauritian clothing manufacturers for conversion into garments for the American market under the African Growth and Opportunity Act (AGOA).

We are especially interested in the restructuring experiences of the textile industries in our review. In particular, we focus on:

- The reasons for the restructuring;
- The role of technology in necessitating or enabling the restructuring;
- The organisational changes (if any) that were necessary;
- The changes in human resource use in the change processes; and
- The strategic behaviour of firms (as precursor to the firm-level analysis in Chapters 6 and 7).

We mention the role of institutions where applicable, but defer a thorough coverage of the relevant institutions active in the South African textile industry to Chapter 5.

4.2 THE SOUTH AFRICAN TEXTILE INDUSTRY IN HISTORICAL CONTEXT

In 1838, the story goes, South African farmers imported 12 rams and 1 ewe from Turkey, but in an attempt at protecting their own mohair producers, the exporters sterilised the rams before shipping them to South Africa. The ewe, however, gave birth to a ram kid during the journey and when she and the kid were used in cross-breeding with indigenous goats, the South African mohair³ industry was launched (“Support programme”, 1993, quoted in Dickerson,

² In 2000, Mauritius was ranked the seventh most important export destination for South African textiles and clothing, moving up to sixth position in 2001. Mauritius was not under the top fifteen source countries for South African imports of textiles and clothing – its markets are mostly in the EU and the US (Wesgro, 2002:69-70).

³ The South African mohair industry now supplies 60% of the world demand for mohair (Viljoen, 2000:11).

1995:570). Ironically, it would be under heavy protection that the broader South African textile industry evolved to reach its current state. In the following section we briefly recount the history of the South African textile industry.

Blanket production is the oldest sector of the South African textile industry, with the first blanket factory established in King Williams Town in 1891 (Du Toit, 1978:33). By 1925 the blanket manufacturing sub-sector was firmly established, but at a high cost: protective duties on imports ranged from 197,5% to 312%. By 1944 sixteen factories provided employment to 3711 people and supplied 90% of domestic demand for blankets, rugs and sheeting (Du Toit, 1978:33; Steenkamp, 1983:7). The development of the South African textile industry, however, only really picked up steam after the Second World War. Between 1946 and 1952, 30 factories that were not aimed at blanket production were established. Foreign capital and know-how from the UK, France, the Netherlands, and Italy made a significant contribution to the growth of the industry. Another important development was the integration of operations such as spinning and weaving. By 1956 there were 170 factories, employing 35 000 workers (Franzsen and Reynders, 1960: 150-151). The industry now included apparel, household and industrial textiles. Government support for this development took two forms:

- financial assistance, provided by the Industrial Development Corporation (IDC). The latter is a public sector institution whose role at the time also included setting up textile plants;
- protection. In 1950, the import duties on cotton and cotton-related fabric were (bar a few exceptions), below 10 per cent. This was changed in 1952 when *ad valorem* duties of 15% on yarns and 25-35% on fabrics were imposed in an attempt to cope with foreign competition. This was in addition to duties ranging from 20-30% already introduced on worsted fabrics a year earlier (Maree, 1995:23).

Throughout the 1950s and 60s, the textile industry, still well protected, expanded rapidly, encompassing spinning, weaving and finishing of cotton and wool products, knitting and the production of synthetic fibres (Barker, 1963: 292; Maree, 1995:24). Already by 1963, it was evident that the textile

industrialists had come to rely too heavily on protection and that the Board of Trade and Industry quite willingly played into their hands. This was illustrated quite clearly in the Board's decision to widen the scope of duties to apply to fabrics not even produced in South Africa. In response to frequent applications for amendments to tariffs, the Board produced no less than 60 reports dealing with amendments between 1950 and 1963 alone. In criticism of the Board and the textile industrialists, Barker (1963: 291-2) expressed himself as follows:

"Once an implied pledge of protection had been given and received, there was understandably little disposition on the part of textile manufacturers to consider anything that might tend to limit or regulate the operation of their mills, even temporarily or only tacitly. So the hint of their concentrating on specialised output, with no certainty on how that might accord with future trends, was repugnant, even though at the time it might have helped in attaining growth and stability. In any event when an industry has been conceived, born and brought up in the expectation that its well-being will be ensured by tariffs, it is likely to have a built-in mistrust in its own ability to compete on any other basis".

This warning was not heeded and we will see later how this behaviour had a direct bearing on the circumstances the textile manufacturers found themselves in at the beginning of the 1990s.

By 1981, 80% of local demand for woven and knitted fabrics was supplied by local production (given the combined effects of tariffs and quantitative import controls on demand) (Texfed, 2000c: 3). From then onwards, as import penetration increased (about 40% of local consumption of fabrics in 2000), output and employment in the industry plummeted. Output declined from R12 147 million in 1981 to R9 200 million in 1985, and R 6 825 million by 1993. Employment fell to 86 490 in 1993 from its high of 121 370 in 1992 (Texfed, 2000: 3; Maree, 1995: 126). From 1985 to 1993, South Africa was forced to maintain a surplus on the current account of the balance of payments (because of its political stance, sanctions, etc). To discourage imports, a surcharge was levied on various goods, including machinery. This, together with the severe

depreciation of the Rand from 1985 onwards, was a severe impediment to new investment and technology upgrading in the textile industry (Texfed, 2000: 3).

In 1989, a policy change, aimed at reducing protection and creating an export orientation, was introduced. This was contained in what became known as the Structural Adjustment Programme (SAP) for the industry. The SAP rewarded exports by offering duty-free imports, based on export volumes, for a period of five years. This export incentive, with hindsight, turned out to be ill-conceived and destructive⁴ (Texfed, 2002:3).

By the time South Africa became a member of the WTO in 1995, the industry was characterised by a complex protective structure, old technology, and an inward-looking mindset. We consider the restructuring attempts that began in earnest in 1995 in the comparative section.

4.3 THE SOUTH AFRICAN TEXTILE INDUSTRY IN INTERNATIONAL PERSPECTIVE

In this section the aim is to compare the process of restructuring and rejuvenation in the South African textile industry since the 1990s with the processes taking place in the textile industries of Italy (whose first major restructuring precedes the South African process) and Mauritius, a developing country for whom textiles and clothing were crucial in its remarkable growth performance. But, first we give a brief overview of restructuring and its general goals.

4.3.1 Restructuring in textiles: a brief overview

The kind of restructuring that has been taking place in the textile industries of the world, seems to be different from the normal structural change, where certain industries decline in the course of development and new industries take their place. This kind of restructuring is far more complex and multi-faceted. On

⁴ The South African Textile Federation for example, asserts that the SAP allowed the destruction of certain sectors of the textile and clothing industry, such as jerseys. This process was exacerbated by the growth in illegal imports (Texfed, 2002:3).

the one hand, it has been necessitated by changes in the external environment, e.g. the effects of the Multifibre Arrangement (and the implications of its demise for developing countries), product and process technologies, the changing nature of the international market (changing product composition, organisation and marketing), offshore production by industrial country firms, and changes in demand patterns. On the other hand, domestic circumstances have changed and require adjustment on the part of firms in the industry. These circumstances include changes in government policies, e.g. decreases in protective tariffs, labour legislation and general macroeconomic policies such as interest rate and tax policies.

4.3.1.1 Goals to be achieved by means of restructuring

The general goals to be achieved by restructuring include:

- Absorption of new technology
- Increased productivity
- An increase in capacity utilisation
- Changes in the composition of output
- Promoting changes in the organisation of the industry (Meyanathan, 1994: 15).

With this background, we can now consider the experiences of the Italian, South African and Mauritian textile industries with respect to their industrial restructuring.

4.3.2 The Italian textile industry

Italy is known as one of the world's leading countries in textiles and clothing. In 1985, Italy made the third largest contribution to world value added in textiles (8,7% compared to 10,7% for Japan and 15,6% for the United States). By 1993, Italy with a share of 9,3%, had overtaken Japan (by then contributing 8,1%) while the USA remained in first position with 18,4% (UNIDO, 1996:42). Today, Italy is the undisputed world leader as far as production of quality yarn, fabric and fashion goods is concerned. Even over the last forty years or so, when other

European countries lost market share in terms of textile output, Italy's output continued to grow before starting to decline as well, but by less than the other European producers (Sacchi, 2003:1). In 2001 the textiles and clothing industry delivered 48 billion Euro in output, exported €29 billion, and generated a trade surplus of €14, 8 million (Mazzuca, 2002:1). Thus, Italy contributes about 24.5% to total EU-15 textiles and clothing output and 71% of the sector's exports⁵ (Euratex, 2002: 5).

The Italian textile industry, as in other countries, has been classified as mature, but not necessarily declining (Belussi, 1996a: 3). The Italian textile and clothing industry, as a result of historical developments rather than deliberate planning, has evolved as part of a chain of connected activities⁶, which include:

- The production of textile machinery
- Chemical fibre production
- Fashion design of new styles and products (Belussi, 1996a:5)

There is a strong regional specialisation, e.g. the district of Como-Lecco is known for silk, Biella and Pistoia for high quality wool, Prato (in Tuscany) for recycled and carded wool and Vicenza for combed wool. Varese and Bergamo are known for cotton textiles, while other textile regions include Novara-Verbania, Padua, Verona, Modena and Brescia. Lombardia and Piemonte are the most important regions for textile activity (Belussi, 1996a: 5; Hermes Lab, 2000:33).

4.3.2.1 Restructuring, technological change and industrial organisation

The first restructuring period to be considered is the phase from the 1970s to the mid-1980s. A number of factors contributed to the need to restructure the Italian textile industry in this period. The following were the most important factors at work:

⁵ Exports as percentage of EU-15 textiles and clothing output make up 20.7% (Euratex, 2002:5).

⁶ While textiles and clothing play a very important part in the Italian district context, it is not our purpose here to give a comprehensive overview of industrial districts. For a thorough coverage of Italian districts, see for example Bianchi, et al, 1997; Beccatini, 1989, 1990 and 1991; and Dei Ottati, 2003.

- The reduction in tariff and non-tariff barriers in terms of the General Agreement on Tariffs and Trade (GATT) and the restriction of imports from developing countries under the Multi-Fibre Agreement (MFA).
- Increasing competition from Newly Industrialised Countries (NICs) where textiles became a leading sector in their bid to increase their share of world trade. At this time developed countries were at a disadvantage because of higher labour costs and outdated technology.
- Changes in consumer demand⁷, leading to product differentiation, e.g. home furnishings.
- The use of traditional fibres blended with more sophisticated ones opened up new possibilities. Synthetic fibres from the chemical industries created a demand for new process technologies (Antonelli (1998:3-4; King, 1996: 866-874).

Commentators such as Antonelli, et al, (1992) and Antonelli (1998) have argued that the organisational structure that evolved in the Italian textile industry during this period was successful in allowing the absorption of new technology such as shuttleless looms and open-ended spinning (the details of which we have discussed in Chapter 3). While the introduction of shuttleless looms and open-end spinning offered the potential to increase production tremendously (quantatively illustrated in Chapter 3), the textile industry worldwide suffered a severe decline during 1973-1990. From 1963 to 1973 worldwide textile production grew on average by 4,5% annually, but between 1973 and 1990, this average annual growth rate fell to 1,1%. Employment in textiles experienced a similar decline. From 1963 to 1973 the average annual growth rate in employment was 3,2%. During the period 1973-1985 the textile employment in developed countries, measured in absolute terms, declined by 30% (King, 1996: 868).

What was the situation in Italy? Antonelli (1998:5) records that in the cotton industry alone between 1960 and 1987, total employment decreased from 167

⁷ For the woollen textile sector in Prato, for example, changes in consumer lifestyles meant that they now preferred lighter and easier to care for fabrics rather than the carded wool products of the Prato district. This, together with the new technologies being diffused, prompted a general industrial restructuring (Dei Ottati, 2003:512).

432 to 60 842. Yet, production and productivity increased markedly. The increase in labour productivity was closely related to the rate of increase in new machinery. By 1987, the rate of purchase of new machinery was highest for Italy. This period saw the evolution of radical changes in the organisation of the industry. This was mainly captured in a distinct decline in the number of firms, vertical disintegration and higher levels of specialisation. In the cotton industry, the number of firms fell from 701 in 1960 to 400 in 1987. In the shake out, large plants were less flexible and failed to survive. Smaller firms started to specialise in spinning, weaving or finishing, because of the high cost of investment. The end result was that the average size of the firms and plants declined and the industry was dominated by relatively small, flexible, modernised firms. These firms could also exploit opportunities to learn from suppliers, especially of textile machinery and by imitating (given the proximity of other producers in the industrial districts) (Belussi, 1996a and b; Antonelli, 1998). This change in organisational structure thus enabled the industry to exploit the available technological innovations successfully. However, in the late 1980s and especially the 1990s, the environment changed again: new technology entered the scene and global competition increased.

4.3.2.2 Information technologies and organisational structure in the 1990s

The factors at work in changing the environment in this period include GATT 1994, requiring reduction in the levels of tariff protection and the phasing out of the MFA, which reduced protection against imports from developing countries even further. The industry also had to adapt to increased competition in the unified market of Europe and growing competition from textile producers in the Newly Industrialised Countries. In the latter part of the 1990s the accession of China to the World Trade Organisation became an added concern (as we have elaborated in Chapter 3).

The early 1990s a recessionary period in the Italian economy. Some textiles and clothing firms managed to weather these bad times well, but others were less prepared for the hard times. Those firms that were well established in niche markets, offering products consistently in demand, turned in good

performances. Even through the bad times they maintained the technological gap in relation to their competitors through their commitment to investment. When the upturn came in 1994, even those firms in difficulties were able to improve their performances (ANT, 1995:2). The good recovery of the Italian textile and clothing industries was helped by a number of favourable factors, namely a depreciation in the external value of the Lire, favouring exports, a decrease in the interest rate, favouring new investments, and stability in labour costs, following an accord with the trade unions (ANT, 1995:33). By the beginning of the 1990s, the Italian textile industry was characterised by the presence of a few large firms and a large contingent of small to medium-sized enterprises. However, there was a large amount of co-operation amongst firms in the industry, including suppliers of machinery and sub-contractors (Belussi, 1996a and b).

According to Belussi (1996a: 6) the Italian textile and clothing *filière* is flexible and competitive enough to remain internationally competitive. This view is strongly supported by Michele Tronconi (President of the Association for Textile Refinement) who emphasises the role of the small, but agile and specialised enterprises in the textile system, which was built through the interactions of many actors, large and small (ANT, 1999:1).

4.3.2.3 Strategic choices by Italian firms

4.3.2.3.1 Investment in new technology

As we have explained in Chapter 3, the introduction of the new information technologies⁸ in the textile industry represents the possibility of reducing costs, improving co-ordination of production and marketing and administrative functions and generally improving efficiency. These technologies, however, have implications for organisational structures, skills requirements and intermediate

⁸ First rate technologies designed to enable, from a technical point of view the management of production, quality, administration and logistics of textiles, are for example the management systems, such as OneWorld, IT Plant Manager and Proxima (Magni, 2001:3). Benetton has recently chosen SAP Apparel Footwear, a software package developed by Germany's SAP AG, that will give 1500 Benetton employees visibility across the entire supply chain, including the firm's worldwide production plants, business facilities and logistics centres (Bharat Textile News, 2002b:1).

inputs. This implies that it may be a longer waiting period before the benefits of such an investment become evident. The introduction of new technologies in Italy included automatising of equipment and process control technologies. While Antonelli (1998:8) argues that firms need to be larger, more vertically integrated and run by professional managers to exploit these new technologies successfully, Belussi (1996a:11) is of the opinion that the development of networks of co-operation amongst firms in the pipeline would enable smaller firms to absorb the new technology, too. She further argues that the high level of machinery renewal in the previous period and the good relationship with machine suppliers should lead to a more effective process of learning and diffusion of competencies amongst firms. During this period, the network firm, for example Benetton, has emerged stronger. This means that the firm basically hollows out its structure by sub-contracting to various small and medium-sized producers. The firm then concentrates on brand name maintenance and promotion as well as quality controls. The international versus local network is considered in the next section.

4.3.2.3.2 Internationalisation versus strengthening relationships in the district

In addition to the creation of international supply chains and the emergence of the network firm, Italian firms also started a process of 'internationalisation'. First, they increased their size by means of mergers and acquisitions, e.g. the acquisition of Hugo Boss of Germany by Marzotto. Secondly, they moved production to sub-contractors outside the traditional regions of production in Italy and finally outside of the country. Outsourcing went mainly to countries in Eastern Europe, such as Hungary and Poland, as well as North African countries. Direct investment for production purposes went to France, Germany, the USA, Japan and other Asian and EU countries (Belussi, 1996a:13-14). While Italy also attracted inward investment for textile production, these flows were exceeded by FDI textile outflows. Inward Foreign Direct Investments (new investments minus disinvestments) into textiles in Italy between 1997 and 2000 amounted to US\$ 709.8 million, which was about 2.5% of all FDI inflows. Outward FDI for textiles over the same period amounted to US\$ 1187.5 million, constituting about three per cent of all FDI outflows during this period. (US Commercial

Service, 2002:5-6). The latest moves were into countries where access to markets was one of the primary concerns, such as setting up spinning mills in Mauritius to benefit from exports under the African Growth and Opportunity Act, or investing in high quality, high value added production in China, aimed at the higher income niche in the Chinese market (Sacchi, 2003: 1-3). There is also criticism of this view, i.e. to try and reserve high value added production for Italian firms, and leaving the rest to the Chinese firms. An opposing view⁹ strongly argues in favour of Italian firms taking their strategic management and productive competencies to China to produce even products for mass customisation. If history teaches us anything, it is that, just like Italian firms learned from the previous leaders in textiles, so Chinese firms will also soon acquire the more sophisticated capabilities which are now the strengths of Italian textile firms – and they will soon invest in Italian firms in direct competition with those firms who believed the best strategy is to produce high value products and leave the standardised ones to China and other developing countries (Sacchi, 2003:1-3). Should Italian textile producers locate in China, they will have the advantage of Italian textile machinery producers already active in the Chinese market. China is now the largest buyer of Italian textile machinery (about 17% of all textile machinery export shipments from Italy). The strong relationship between Italian textile producers and machinery producers will be an added advantage, while the Chinese producers are still on a learning curve (Bharat Textile News, 2002a:1-2).

Staying in the industrial district and not looking outward for growth prospects and rejuvenation required different competencies than the ones required for the process of internationalisation described above. Finding ways to strengthen and deepen relationships with customers, suppliers and institutions in the region may be necessary. This is particularly important in mature industrial districts where rejuvenation by means of new technologies needs the cooperation of all the roleplayers to succeed. In Prato, for example, the process of adjusting to the introduction of information and communications technologies was very hard because of a lack of coordination in the system and the high risk of imitation.

⁹ This position is held for example, by Poalo Borzatta, director of international consulting group, Ambrosetti, who has lived in China for many years (Sacchi, 2003:1).

The addition of a well designed industrial park reduced the risk of imitation and professional training and improvements in relations with industry associations and labour contributed to a recovery in the flexibility and competitiveness of the firms in the region (UNIDO, 2002:1-5).

The second half of the 1990s saw the birth of new industrial districts in the South of Italy, including some for textiles, e.g. Martina Franca (near Taranto) and for clothing at Putignano (Dall'elettronica al tessile, spunta il Sud che funziona, 1998).

The fact that Italian firms remained competitive during this period testifies to their ability to survive in a changing environment.

4.3.2.3.3 Diversification of product range and markets

Diversification in products and markets, was one of the strategies that Italian textile firms introduced with success. Firms in Prato, for example, is diversifying into a noted fashion system by adding to textile production also knitting, clothing and accessories. This region is now recognised as leader in terms of quality and the scope of its operations. The new additions now account for 10 000 employees out of the 45 000 in the region (Nardi, 2001:1).

One of the weak points of the evolution of Italian trade in textiles and clothing has been the importance of the EU market in its export strategy. One analyst, for example, has argued that this focus on the EU market has caused the Italian textile and clothing exporters to lose an opportunity to increase its market share in the US market (Mediatexint.com, 2002). Over the last decade, the demand for fashion goods in the USA has grown significantly, from 25% of total global imports to 32,5%. In the mean time, Italy's share in the American fashion market has dropped from 5,77 percent to 4,45 percent (Mediatexint.com, 2002). The market focus included in the strategies for the future of the industry is threefold: maintenance of the traditional markets, such as the EU, and the east of the United States, markets where the penetration of Italian textile products is relatively low, e.g. the Scandinavian countries, Ireland, the EU candidate

countries and parts of southern Africa, and finally entirely new markets, such as the western states of the USA and China (Onida, 2002:9).

4.3.2.3.4 *Integrated Quality, Environment and Social management systems*

Quality, the environment and safety are terms that are so often used in relation to trade and competition that it seems to imply that firms can easily comply with the demands that these aspects of production place on them. Nothing could be further from the truth: incorporating quality, environmental and safety aspects into the production system is a complex, exacting process that management is expected to achieve with great speed. Yet, such processes are today indispensable if a firm is to remain competitive in modern textiles. Italian firms have to comply with both EU and national regulations. The internationally recognised standards to start with are ISO 9001 (version 2000¹⁰) for quality, ISO 14000 (for the environment) and SA 8000 (for social standards, such as worker security). The Oeko-tex standard guarantees the absence of colourants that may cause allergies and medical textile regulations ensure consumer safety, for example, preventing allergies and skin irritation by fabrics (Sala, 2001:1). Environmental management certification also includes EMAS, the EU standard verifying compliance with the EU requirements (Comunità europea, 2001: 21-29). Integrating the three standards at firm-level allows cost reductions, resulting from the better management of information, documentation and recording of processes, human resources and equipment, and the regular evaluation of the efficiency of the system (Bubbio, et al, 2002:1-3). Leading Italian textile firms that have already gone through the integration process are sharing their experiences with other firms still in need of integration. There are at least two instruments for disseminating this information. The first is through Ente Nazionale Italiano di Unificazione (the Italian National Standards Body), who has produced a book of guidelines (Le Linee Guida Qualità, Ambiente, Sicurezza) for the use of textile firms. The second instrument is the website of the Italian Textile Association (www.asstex.it) [Bubbio, et al, 2002:3].

¹⁰ Version 2000 is an improvement on the previous standard (1994). The new version is much more innovative, orientated towards management and the process of increasing value-added throughout the firm, rather than a rigid checklist of specific requirements for quality assurance (Bubbio, et al, 2002:1).

4.3.2.3.5 *Marketing strategies and 'Made in Italy' in the 21st century*

In Italy, in the light of the reality of a larger EU market¹¹ and the increasing internationalisation of textile production, there has been a concern to maintain the 'Made in Italy' trade mark, which has been crucial in the export success of the Italian districts.

The response of textile manufacturers has been diverse. On the one hand, the reaction has been to define the label of origin even narrower, e.g. 'Made in Biella', thus giving it a regional specialisation. On the other hand, another distinction is made on the basis of the product content, for example 'Il Marchio Seri.co', which is the distinguishing mark for silk produced in the Como district. The mark may be used on products for which at least two stages of the production process were completed in Italy, but other criteria such as quality and EU environmental regulations will also apply (Nardi, 2001:1-2).

Marketing strategies are embracing the possibilities offered by ICT, including virtual market places. Textileitaly.com, for example, is an Internet portal for textiles that Project Automation and the association for Italian textiles have developed. It is a vertically integrated portal. This means that it is much more than a website, offering the services of a collection of firms and institutions in the textile pipeline, including consulting and research organisations. It also offers the opportunity to share information, conclude business, obtain information about funding for projects, for example from Italian government or EU incentives, and learn about 'best practice' strategies from research disseminated via the portal (Magni, 2001:1-3). The textile producers of Como have also introduced a virtual market place, 'Market Piace' (www.textilebusiness.it) to enhance their efforts towards internationalisation of their silk products. They envisage a system of about 22 000 firms eventually making use of the market place (Nardi, 2001:1). There are no doubt other similar efforts in progress, but for our purpose these ones suffice to illustrate the phenomenon.

¹¹ Suggesting a 'Made in the EU' label.

4.3.2.4 Recent performance and prospects

The past few years have seen many textile firms in the Italian districts face increasingly difficult operating conditions. The reasons are manifold, but have a great deal to do with factors that negatively affected the export growth of the industry. These factors include the aftermath of the events of 11 September 2001 in the United States, the appreciation of the Euro against the currencies of Italy's most important export destinations and the expectations of war in Iraq, as well as the actual war and its aftermath (Esportazioni, il calo sfiora l'11 per cento, 2002:1). Further adding to the reduction in cost competitiveness of the textile industry is the increase in the cost of labour because of a shortage of skilled labour in some regions, especially Como and Biella (Como: ripresa vicina, ma i giovani fuggono, 2002:1). In the short term, to solve this problem, labour is attracted from other countries, such as Morocco and Eastern Europe. For a longer-term solution, the industry is implementing strategies to attract the younger generation to choose careers in textiles. These strategies include for example, open days at firms, where members of the community and especially schools are invited to familiarise them with the modern textile firm. The idea is to show the younger generation that a career in textiles could be exciting and rewarding. Other initiatives include modernised education and training programmes for the textiles and fashion industry (Magni, 2002:1-2).

As far as the international trade regime under the World Trade Organisation is concerned, the Italian textile producers (through their regional industry associations) affirm their commitment to the liberalisation of textiles and clothing trade as agreed at the Uruguay Round of trade negotiations. They, however, argue very strongly for reciprocity, i.e. opening up the markets of countries outside the EU to their exports. They specifically have in mind the USA, India and China¹². In addition, they emphasise the cost disadvantage that European textile producers have because they comply with stringent regulations regarding the protection of the environment, worker rights and security, as well

¹² For example, wool fabric imported into the EU attracts a customs duty of 12%; when exported from the EU to the USA, the duty is 30%, to India it is 40% and 30% when entering China (Il tessile ora busa all'EU, 2002:1).

as customers' safety. These are the issues that they would like the EU trade representatives to address at the Doha Round of trade negotiations (Il tessile ora bussa all'EU, 2002:1-2).

As far as export growth in the medium term is concerned, much will depend on the economies of the United States and the EU, and Germany, Italy's largest textile and clothing market, in particular. However, the attempts to diversify export markets (especially in growing economies) and offer a larger variety of good quality products, may still serve to improve the export performance of the textile and clothing complex.

As part of the EU, Italian textile producers potentially benefit from EU initiatives to encourage innovation and competitiveness (in addition to national incentives)¹³. These initiatives include various instruments, such as Structural Funds (used especially in the South of Italy to encourage industrial development), the e-learning Programme, as well as the Sixth Programme for R&D. The latter funds certain activities identified as crucial for the survival and growth of textiles and clothing firms. Two broad themes can be identified:

- Information Society Technology and specifically research that focuses on the application of ICT to solve environmental problems, e-business, e-work systems and e-learning, as well as complex problem solving; and
- Nanotechnologies and nanoscience, multifunctional materials, and new product and process innovations (Struttura e obiettivi, 2002:1-2).

The programme further seeks to foster cooperative R&D, excellent management skills and integration of R&D with other firm-level activities (Partecipare con successo, 2002:1-3).

In summary, the picture of the textile industry in Italy is mixed, consisting of firms, large and small that have already put the difficulties of the recent past behind them to find a new lease on life. Then there are still those firms very

¹³ Although some industry commentators consider the national incentives as quite inadequate. One analyst dubbed them 'bonsai' incentives — the incentives amount to €15 million, for an industry generating €48 billion in output (Mazzuca, 2002:1).

much in a muddle, not yet able to find the correct strategies for the challenges they face. The Italian firms that are struggling, especially in the cotton and textile finishing subsectors, have been unable to invest sufficiently in technological renewal and product and market diversification (La minaccia viene dal Far East, 2002:1-2).

The strengths of the Italian textile industry through the different periods of adjustment and restructuring seem to have been flexibility, creativity and innovation, attention to quality, advanced technical performance in fibres, yarns and fabrics and expertise in stylistic design, communication and marketing.

4.3.3 The South African textile industry

Like their counterparts worldwide, the South African textile firms in the 1990s faced a changing competitive environment, including changes in consumer preferences, the emergence of new technology, and the implications of the Agreement on Textiles and Clothing (ATC) at the Uruguay Round of GATT negotiations.

The first major domestic change was the South African government's commitment to trade liberalisation, signalled by its offer to GATT. In terms of GATT, the duty phase-down on South African textiles and clothing should be spread over 12 years. In 1995, however, the South African government opted to accelerate the lowering of the protective tariff walls, aiming to complete the process by 2002. Duties applicable at the end of the phase-down period are 7,5% on fibres, 15% on yarns, 22% on fabrics, 30% on household textiles, and 40% on clothing (Table 4.1). Until 1999, when minimum specific duties fell away, the customs tariff structure was rather complicated, consisting of *ad valorem* rates as well as minimum and maximum specific duties (Table 4.1).

To prepare South African textile and clothing industries for the new challenges, the government, textile and clothing firms and the South African Clothing and Textile Workers' Union (SACTWU) formed a joint task force to develop a long-term strategy for the industry. The stakeholders agreed on a restructuring plan

to achieve international competitiveness within a 10-year time frame, bearing in mind the need to minimise job losses in the textile industry and increase jobs in the clothing industry. The firms in the industry had to accept that they have to take responsibility for their own future by improving productivity through better use of resources, especially labour, better work organisation and upgraded technology. The specific goals to be achieved by the industries were:

- increased value added and utilisation of niche markets;
- minimisation of job losses because of restructuring;
- employment creation to compensate for job losses as a result of restructuring; and
- international competitiveness and export orientation (Clofed, 2000: 87).

These objectives were confirmed at the Textiles and Clothing Sector Summit (Textiles and Clothing Sector Summit document, 2000: 3-4).

The government's idea was to reduce tariff barriers under GATT, while putting in place supply-side measures to ease the adjustment process for firms. The details of these measures are discussed in Chapter 5 where we deal with the institutions who administer them.

4.3.3.1 Strategies, organisational change and structure of the industry

How did firms react to the new competitive environment and how did they fare in terms of the objectives outlined above? Strategies adopted were diverse, but not mutually exclusive. Efforts to cut costs and become more efficient included investment in new technology, relocation, consolidation, shedding of labour, changes in the product mix, and a focus on exports as long-term imperative, not as a temporary 'vent-for-surplus.' We now consider the various strategies employed by the firms in the textile industry.

TABLE 4.1: TEXTILES AND CLOTHING DUTY PHASE-DOWN (MOST FAVOURED NATION TARIFFS)

	1998	1999	2000	2001	2002
Ad valorem (%)					
Polyester fibre	17	15	13	11	7.5
Filament yarn	15	15	15	15	15
Spun yarn	24	22	20	18	15
Woven fabric	33	30	27	24	22
Knitted fabric	33	30	27	24	22
Household textiles	43	40	37	34	30
Clothing	66	60	54	48	40
Specific duties cents/kg					
Minimum					
Spun yarn & woven fabric	0.557				
Knitted fabric	0.656				
Domestic textiles & clothing	0.590				
Maximum	1.0	1.0	1.0	1.0	
3rd schedule rebates	Full less 6%	Full less 8%	Full less 10%	Full less 12%	
Yarn	Full duty	Full less 5.5%	Full less 11%	Full less 16.5%	
Fabric					

Source: Textile Federation (1999:5)

4.3.3.1.1 Investment in new technology

In the 1990s, the local textile industry accelerated investment in new technology. Several studies¹⁴ pointed out the age of the capital stock in the textile industry and emphasised the need for rapid investment in new technology to aid the industry's drive towards greater competitiveness.

A total of US\$819.5 million was invested in new equipment between 1994 and 1998. Of this, spinning and weaving received the most (US\$261.5 million), followed by auxiliary equipment with US\$192.5 million, and knitting, US\$125.5 million. The total capital expenditure also included US\$94.5 million worth of sewing machines for the clothing sector. A similar breakdown of expenditure is not available for 1999, but according to Investment South Africa, about US\$900 million was invested in textile machinery between 1994 and 1999 (Russell, 2000:3).

¹⁴ See for example, RSA (1994) and Maree (1995).

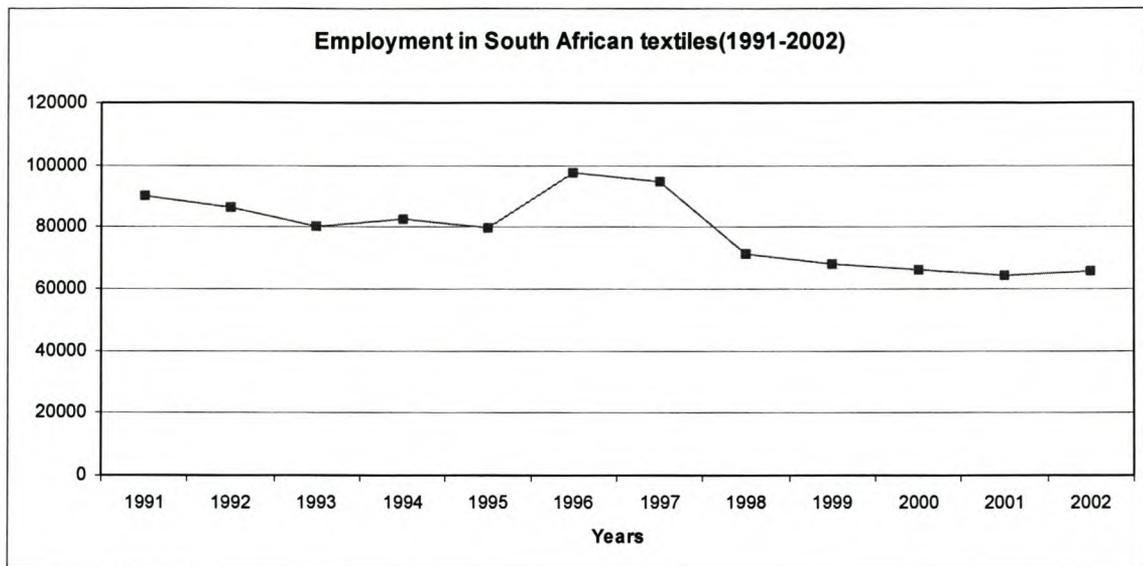
TABLE 4.2: SELECTED CAPITAL EXPENDITURE ON TEXTILE MACHINERY (US\$ MILLIONS) 1994-1998

Machinery	1994	1995	1996	1997	1998
Fibre preparation	8.5	13.0	12.5	8.0	5.5
Non Wovens	1.0	10.0	1.5	0.5	1.0
Spinning	21.0	47.0	40.5	31.0	23.5
Weaving	16.0	29.0	19.5	19.5	14.5
Knitting	25.0	28.0	26.0	26.0	20.5
Auxiliary equipment	35.0	46.5	40.0	38.5	32.5
Dyeing & finishing	16.0	21.0	21.0	15.5	10.5
Subtotal	122.5	194.5	161.0	139.0	108.0
Sewing machines	22.5	24.0	20.0	16.0	12.0
Total	145.0	218.5	181.0	155.0	120.0
R/\$ Average	3.6	3.65	4.35	4.65	5.55

Source: De Voest, 2000: personal communication.

Both the IDC and the Textile Federation maintain that the investment in new machines has led to job shedding, making the industry more capital intensive (IDC, 1999:15; Lourens, 1997:1). Employment in the textile industry showed a dramatic decline since 1991 (Figure 4.1). The work force was reduced from 90 200 in 1991 to 68 147 in 1999. The apparent increase in employment in 1996 was a result of the re-incorporation of statistics for the TBVC states¹⁵ into South African statistics. However, since the decline in employment started already before the investment in new machinery commenced, all job shedding cannot be attributed to investment in new capital equipment. While employment continued to decline after 1999, the number of employees showed a modest increase (2.5%) in 2002 (Figure 4.1). The increase was registered by the spinning, weaving and finishing sectors, while other sectors still showed a decline (Claassens, 2003:7).

¹⁵ Former homelands under the apartheid system, viz. Transkei, Bophuthatswana, Venda and Ciskei.

FIGURE 4.1: EMPLOYMENT IN SOUTH AFRICAN TEXTILES (1991-2002)

Source: Textfed, 2001:13-14; Textfed, 2002:7.

Given the slow growth in the domestic economy and the capital-intensive nature of textile production, it is not realistic to expect rapid employment growth in this sector in the short to medium term. As export growth accelerates and demand for local textiles as inputs into apparel production in the region grows, employment creation prospects will improve, *ceteris paribus*. Clothing production remains labour intensive; thus with increased export growth and improved training processes, labour absorption in this sector ought to accelerate.

4.3.3.1.2 Organisation and structure

The number of firms in the South African textile industry showed an increase in all components of the industry (Table 4.3). The number of firms suggests a competitive market structure, but as Maree (1995: 37) pointed out, there was significant concentration in the industry. The largest enterprises in 1985 produced 71% of the output and employed 66% of the workers in the industry (Maree, 1995: 37).

The South African textile industry of the early 1990s further displayed two related characteristics that hampered their efforts to become competitive, namely a conglomerate structure and an enormously complex and diversified scope of production. Appendix 4.1 documents the complex technology routes in South African textiles in the 1990s. The conglomerate structure meant that textile firms were part of groups of companies whose core business was not textiles. The second characteristic evolved because of the focus on the domestic market and the desire to provide for every need in that market, resulting in short production runs and under-utilisation of capacity in some areas. This pushed production costs up and reduced the ability of South African producers to face foreign competition effectively (Texfed, 2002:2-3).

TABLE 4.3: NUMBER OF SOUTH AFRICAN TEXTILE MANUFACTURERS

	1985	1993
Spinning, weaving and finishing	141	152
Knitting mills	123	191
Other textiles	441	466
TOTAL	705	809

Source: CSS/Stats SA¹⁶

The last decade was characterised by significant turbulence in the textile and clothing industries, including exit from and entry into the industry, but also mergers of textile and clothing firms. There is some uncertainty over the number of firms remaining in the industry though it has surely declined severely. De Voest, a well-known consultant in the textile industry, however, is of the opinion that there has been a net increase in enterprises between 1997 and 1999, at least in the textile pipeline (Table 4.4) (House and Williams, 2000:26). Although these newcomers are generally perceived as "small backyard operators", these figures also include familiar names such as Levi Strauss in clothing and Cordustex in textiles. For textiles alone, de Voest (2000)¹⁷ estimated that there were a total of 528 textile firms left, with the largest number (194) in Kwazulu-Natal, followed by equal numbers (117) in the Western Cape and Gauteng. The Eastern Cape comes in a distant fourth with 53 enterprises, while the numbers in the

¹⁶ Information received by fax from Helena Claassens, Textile Federation, 1999.

¹⁷ De Voest's estimates differ from the official statistics provided by Statistics South Africa, for various reasons, such as incomplete official statistics (industry sample not updated), rapid changes in the industry, large numbers of 'decentralised' (unregistered) producers, etc (De Voest, personal communication, January 2000).

Free State (16), North West Province (10), Limpopo (9), Mpumalanga (8) and the Northern Cape (4) are relatively small.

In clothing and to a lesser extent in textiles, there has been a move towards relocation. Some firms moved away from the urban areas where wages are determined under the regulations of South African labour laws, to rural areas where a more flexible labour regime prevails. In the decentralised areas, wages are often as low as 50% of the Bargaining Council wages, and very few firms pay any other benefits (Natal Clothing Manufacturers' Association 2000).¹⁸ At the time of the survey, there was much talk about moving operations across national borders. A high profile example at the time, was the much-publicised move of Waverley Blankets, one of South Africa's oldest textile firms, to Botswana. The main reasons cited for the move were high labour costs, crime, dumping of products from Turkey and China, and low disposable income of South African consumers. The Waverley management predicted that more firms will follow (Jenvey, 2000a). The strong incentives offered by neighbouring countries were described as a magnet attracting South African firms to move their factories (Jafta and Jeetah, 2001:10). To date the Waverley Blankets relocation has not taken place, neither has any evidence of other textile firms relocating to neighbouring countries come to light.

The year 2000 has also seen the closure of well-known names in textiles, such as Mooiriver Textiles, Coastal, and De Nim.¹⁹ The latter two had invested in new equipment before their closure, implying that idle capacity is available and could be brought into operation quickly should demand conditions improve. For the spinning and weaving sub-sector, the industry is characterised by much vertical integration, while the cotton and polycotton subsection tends towards non-integration (IDC, 1999:40). Although many changes have taken place, the number of owners in the cotton and polycotton subsection has increased slightly, while this is not so for other yarns. The number of plants has decreased in the 1990s, with the market share of the four large cotton firms declining to 50% in 1997/1998 from a high of 85% in 1984/85. In December 2000, Seardel, South

¹⁸ Fact sheet on comparative cost structures between urban and decentralised areas provided by Len Smart during an interview at the Natal Clothing Manufacturers' Association, Durban, 16 November 2000.

¹⁹ A total of six textile firms and about 40 clothing firms closed their doors in 2000 (Brink 2001:2).

Africa's largest clothing manufacturer merged with Frame, the largest textile firm. Seardel intends to invest between R 300 million and R 400 million in new technology at Frame over the next four years. The stock market liked this transaction: Seardel's share price rose from 120c to 275c before settling at 240c (Sigonyela, 2001: 9). Since textiles and clothing are sectors with low profit margins they were not favoured much by investors or bankers in the past. Viewed optimistically, the market reaction to the Seardel-Frame merger can be interpreted as an indication that improvements in competitiveness and a higher export profile may change the reluctance of bankers and investors to lend to or invest in textiles and clothing.

TABLE 4.4: NEWCOMERS TO THE TEXTILE PIPELINE (1997-1999) (NUMBER OF ENTITIES)

Time period	Textiles and clothing ¹	Other ²	Total manufacturing	Retail w/sale ³	Total	Liquidations	Net gains
1997	333	117	450	463	913	201	712
1998	319	131	450	505	955	178	777
Jan-June 1999	126	51	177	148	325	106	219

¹ fibre, non-wovens, weaving, knitting, & CMT (apparel, household and industrial)

² leather, footwear, furniture manufacturers.

³ clothing, home furnishings. Excludes footwear and furniture stores.

Source: House and Williams (2000: 26)

4.3.3.1.3 *Rationalisation, specialisation and product differentiation*

Since the opening up of new export markets, some textile firms in South Africa have implemented strategies to overcome the complexity of the production processes illustrated in Appendix 4.1 (and, of course, to become more competitive). These strategies have entailed, amongst other things, rationalisation of product lines, specialisation and product differentiation. Some firms have rationalised their product lines, moving away from producing a wide range of standardised products, to fewer product lines, but with improved styling, quality, and delivery times (Roberts and Thoburn, 2002: 35). Specialisation was based on inputs, e.g. from natural *and* manufactured fibres to one of the two, on process, e.g. from warp and weft knitting to weft only, and

by product range, e.g. narrowing the range, but seeking to increase volumes in the remaining products (Gibbon, 2002:23). For some firms greater specialisation also meant moving away from apparel textiles, for example to household and technical textiles. Evidently, technical fibres and fabric tended to generate higher margins, more consistent demand, longer production runs and less finishing work and inventories (Gibbon, 2002:23). Product differentiation to supply market segments with particular needs has also become a viable strategy for some firms. These include for example, wool and mohair for jackets and suiting, crease-resistant fabrics for trousers, underwear fabrics and twills and polycotton. Suppliers of up-market upholstery and household textiles have also seen their market share improve (Roberts and Thoburn, 2002:43).

4.3.3.2 Performance of South African textile industry

During this period of restructuring, output performance was varied: the index of physical volume of production reveals that there has been a decline in real output in the textile industry (Table 4.5). The industry has, for the most part, performed worse than the manufacturing sector as a whole. Annual growth rates in the physical volume of production (Table 4.5) indicate that fluctuations in performance have been much more pronounced for textiles and clothing than for manufacturing as a whole. Whereas textiles and manufacturing as a whole have seen a recovery since 1999, the clothing sector was still in decline both in 2000 and 2001. Preliminary figures for 2002 (Claassens, 2003a:7) show an improvement for both textiles (10.6% up over 2001) and clothing (slightly over 10 percent, compared to 2001).

For the whole period, capacity utilisation in clothing was better than in textiles (Table 4.6). During 1995, capacity utilisation was slightly better in textiles than in manufacturing as a whole. For 1999, both textiles and clothing showed a slight improvement in capacity utilisation, above that of the manufacturing sector as a whole. Since 2000 capacity utilisation in textiles has been increasing, reaching 82% in 2002 (Claassens, 2003a:7). The reasons given for capacity under-utilisation in the past were sluggish domestic demand because of poor economic growth and low disposable income, as well as import competition (Jafta and

Jeetah, 2001:6). With the opening of larger markets and the relatively large size of orders for the American market in particular, capacity utilisation ought to increase further.

**TABLE 4.5: INDEX OF PHYSICAL VOLUME OF PRODUCTION (1995-2001)
1995=100 (percentage change in brackets)**

	1995	1996	1997	1998	1999	2000	2001
Manufacturing	100.0	103.4 (3.4)	103.9 (0.5)	101.2 (-2.6)	102.2 (0.98)	106.0 (3.7)	109.4 (3.2)
Total textiles	100.0	98.2 (-1.8)	101.5 (3.36)	91.4 (-9.95)	91.2 (-0,21)	93.5 (2.52)	94.8 (1.39)
Total clothing	100.0	101.6 (1.6)	94.1 (-7.38)	87.3 (-7.22)	88.7 (1.6)	82.7 (-6.76)	78.8 (-4.71)

Sources: Texfed (2000c:17 and 2002:11); Claassens (2000a:5 and 2003b:7).

TABLE 4.6: UTILISATION OF PRODUCTION CAPACITY (1991-2001)

	1994	1995	1996	1997	1998	1999	2000	2001
Manufacturing	79.9	83.2	81.3	81.1	80.1	80.4	79.5	81.0
Textiles	78.2	84.3	80.2	80.6	79.0	83.6	80.0	81.0
Clothing	88.3	91.9	87.4	86.0	83.8	87.0	86.3	86.0

Sources: Texfed (2000c:17 and 2002:11); Claassens (2000a:5 and 2003b:7).

4.3.3.3 Trade: performance and prospects

South African imports have always exceeded exports, but at times the gap has narrowed somewhat. Imports of textiles increased steadily in the 1990s (Figure 4.2). However, in 1999, imports declined to R 4 023 million (down from R 4 276 million in 1998). During the first half of 2000, textile imports have grown at an accelerated pace, while average unit prices have shown a declining trend in both US dollar and Rand terms. This trend was clearly illustrated in the case of knitted pile fabrics, other knitted fabrics, woven towelling, polycotton, and acrylic fabrics. For example, imports of knitted fabrics increased by 59% in

volume, while average unit price decreased by 24% (Claassens, 2000a: 5). Management and organised labour in the industry maintain that the biggest threat to the industry remains illegal imports. It has been alleged that illegal imports amount to as much as 50% of textile imports (IDC, 1999: 23).

Although there has been an upward movement in the value of exports, this rise has not been nearly enough to offset the decline in demand in the local market and the loss of market share to foreign competition. That import volumes are growing while prices are falling underscores the need for the industry to rapidly increase competitiveness and exports. In 1999, exports amounted to 26.78% of total sales in the industry, leaving much room for growth (Texfed, 2000a: 5). Between January and May 2000, growth areas in SA textile exports were man-made staple fibres (49%)²⁰, cotton fabric (33%) and made-up textiles (82%). In industrial textiles export growth came from coated fabrics (230%), tyre cord fabric (68%), braids and trimmings (37%), and narrow wovens (36%) (Viljoen, 2000: 9). Since 2000 both imports and exports of textiles show a sharp upward trend, with imports reaching R6.9 billion in 2002 (up 33.5% over 2001). The depreciation of the Rand and the implementation of various trade agreements (notably with the EU, SADC and the AGOA) contributed to a surge in exports, reaching R4.5 billion in 2002. The biggest growth area was in household textiles, which saw a 61% increase in exports between 2001 and 2002 (Claassens, 2003:7).

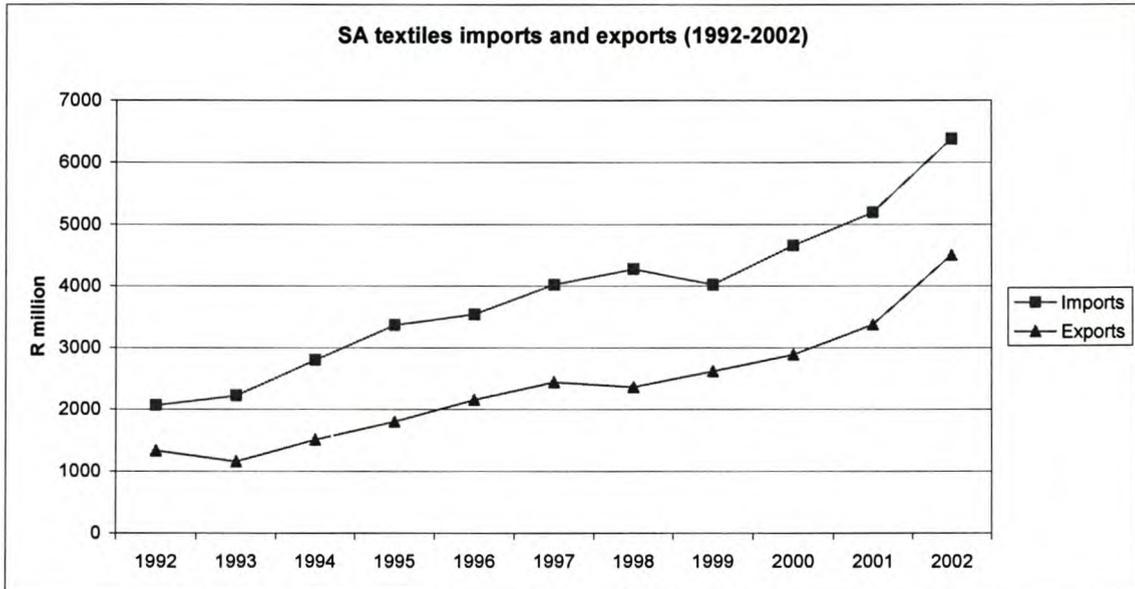
Exporting has now become a priority for the South African clothing and textile industries. Although South Africa is a latecomer to the regional integration game (with the exception of the Southern African Customs Union, discussed below), she is fast becoming an integral part of several regional trade initiatives. Amongst other things, these initiatives offer new market access opportunities for South African firms.

South Africa is a member of the Southern African Development Community (SADC) and the Southern African Customs Union (SACU). On the 1st of September

²⁰ Percentage growth compared to comparable period in previous year.

2000, a Free Trade Agreement (FTA) amongst 11 of the SADC countries came into effect.²¹

FIGURE 4.2: SOUTH AFRICAN TEXTILE IMPORTS AND EXPORTS (1992-2002)



Source: Textfed (2000, 2002), Claassens (2003:7).

The SADC FTA is to be more than just a mechanism for trade. It has the objective of creating the conditions for increased investment, leading to higher value-added in production and the diversification of the region's economies. For textiles and clothing, there is the potential to develop an efficient pipeline from farms to ports, but industrialists and trade unions in South Africa worry that the SADC free trade agreement will facilitate trans-shipment of Asian goods, exacerbating the existing import pressures.²² Under the SADC Trade Protocol, SACU will allow certain textile and clothing imports originating in Malawi, Mozambique, Tanzania and Zambia duty-free access to the SACU market under a one-stage-transformation rule of origin – within quotas – until 2005 (the MMTZ agreement). South Africa's tariff phase-down offer to the other members of

²¹ The Democratic Republic of the Congo, Angola, and the Seychelles are not part of the agreement, yet.

²² Malawian exports of textiles and clothing to South Africa grew rapidly from 1996 to 1998. In 1998, after complaints by firms and the clothing and textile workers union, a joint task team from the Department of Trade and Industry and Customs went to Malawi to investigate the situation. Their handling of the matter did not endear them to industrialists in Malawi or South Africa. As one South African industrialist put it: "they were intent to show that South Africa rules the roost in Africa". However, while their behaviour had negative repercussions for relations between the two countries, this incident highlighted problems with cross-border customs control in the context of the SADC trade protocol and South Africa's bilateral agreements (Jafta and Jeetah, 2001: 8).

SADC is asymmetrical in the sense that South Africa is lowering tariffs faster than the rest (Table 4.7). By 2004, all *ad valorem*, duties, with the exception of a 5% duty on fabrics, will be removed.

TABLE 4.7: SOUTH AFRICA'S AD VALOREM DUTIES (%) FOR SADC TEXTILE IMPORTS

	2000	2001	2002	2003	2004	2005	2006	2007
Fibres	10	7	4	0	0	0	0	0
Yarns	13	10	7	4	0	0	0	0
Fabrics	18	15	12	9	5	0	0	0

Source: RSA, Government Gazette, 1998.

The South African duties on SADC textiles are lower than the MFN rates (Table 4.1), but this is on the condition that two stages of the production process take place in SADC (i.e. the two-stage transformation rule).

The SACU consists of a common trade system for South Africa, Lesotho, Namibia, Swaziland, and Botswana. The system is administered by South Africa. There are no tariff barriers between member countries, but a common external tariff policy exists on imports from countries outside SACU. The SACU agreement has been under review and a deal has recently been accepted between South Africa and the other members.²³ All the SACU members are part of SADC (Texfed, 2000b: 6).

South Africa was granted limited membership of the Lomé Convention, but under the Cotonou agreement (signed between the African, Caribbean and Pacific (ACP) countries and the European Union (EU)), South Africa has full membership. Under this deal until January 2008, ACP exporters would enjoy duty-free access for exports to the EU market of all goods deemed to originate from ACP countries. Of particular interest to Southern Africa are new provisions that elaborate on the extent to which South African raw materials and intermediate products can be used under commutation provisions by the neighbouring ACP

²³ Botswana, Lesotho, Namibia, and Swaziland. The most important changes are a new revenue-sharing formula and an institutional framework that would give the BLNS countries a much bigger say in the running of the union's affairs.

countries without losing originating status (Regional integration key to ACP-EU Pact, 2000).

After almost five years of negotiations, South Africa and the EU finally reached an agreement²⁴ for a Free Trade Area. This agreement holds several benefits for the South African economy, ranging from increased access for exports to the EU market, to the potential relocation of industries to South Africa to benefit from reduced barriers to entry into export markets. With respect to textile and clothing exports, the EU offer amounts to EU tariffs on South African exports to be reduced to zero over six years. South Africa will reduce its tariffs to half of the MFN tariffs over eight years. In contrast to AGOA, which requires *three-stage* transformation, the EU-SA agreement allows two-stage transformation, so that , for garment exports, yarns can be imported from outside the region, but fabric must originate in South Africa, other members of the Cotonou agreement or the EU (Coughlin, et al, 2001: 76).

South Africa has been granted Generalised System of Preferences (GSP) status by a number of developed countries, including the United States of America (USA), the European Union (EU), Japan, Canada, and Norway. This status allows South African exports of predetermined products preferential access to developed country markets by means of reduced import tariffs. The preferential access varies amongst countries in terms of the extent of tariff cuts and product coverage. The USA, for example, excluded textiles, clothing, leather goods, and watches from this system.

The recent opening up of the United States' market under the African Growth and Opportunity Act (AGOA) is viewed as the best opportunity yet for South African firms to increase their exports. This latest addition to the export market opportunities aims to expand trade and investment between the USA and Sub-Saharan Africa (SSA) and to replace aid with trade. The act became effective on the 1 October 2000 and will remain in effect until 30 September 2008. AGOA provides various opportunities like the preferential treatment of certain textiles

²⁴This is a trade, development and cooperation agreement, which provides for tariff liberalisation on 95% of South African exports to the EU over ten years, while duties on 86% of EU exports to SA will be removed over 12 years.

and apparel, the extension of the GSP for Africa, the US-Africa Economic Forum, other potential free trade agreements, and the US President's Partnership Initiative. AGOA offers duty and quota-free treatment for clothing produced in eligible SSA countries. Of the 48 SSA states listed in the Act, 42 are considered to be LDCs (least developed countries), defined by the World Bank as having a per capita Gross National Product under US\$1,500. For the first four years of AGOA LDCs are allowed to source their fabrics anywhere in the world. The remaining six countries – Botswana, Gabon, Mauritius, Namibia, Seychelles and South Africa – are required to source their fabric in Africa or the US, a condition which will apply to all 48 countries after the initial phase. Nineteen SSA countries are currently eligible for textile and apparel benefits and several others have applied for eligibility (USTR, 2003:1).

African apparel exports from eligible SSA countries, if made from African (regional) fabrics and yarns, would be subject to a cap based on the volume of 1.5% to 3.5% of total US apparel imports over the eight year period (Russell, 2000:2; Texfed, 2000²⁵). This is considered the most significant potential boost to the textile and clothing industries in the region. The USA's apparel imports amount to about US\$60 billion per annum, of which 1% comes from Sub-Saharan Africa (Claassens, 2000).²⁶ This presents new opportunities not only for South African apparel producers but also for yarn and fabric producers to increase their production for apparel producers in South Africa and the SADC region. It also offers the potential for strengthening regional interindustry linkages in that South African producers will have to source more raw materials, yarn and fabric from producers in the region in order for its final goods to be eligible for export to the United States.

In August 2002, the United States extended the Trade Act to enhance the benefits under AGOA. This extension, dubbed AGOA II, allows duty and quota-free treatment of knit-to-shape apparel, doubled the quantitative limit on apparel produced in Sub-Saharan Africa from fabric originating in the region and

²⁵ Fax from Textile Federation to their members, 6 October 2000.

²⁶ Letter by Helena Claassens to members of the South African Textile Federation, 2000.

granted lesser developed country benefits to Namibia and Botswana (USTR, 2003:1).

Both the United States and SADC at the time of the inception of AGOA, made up relatively small portions of South Africa's trade portfolio: 60% of textile and clothing imports came from Far Eastern countries such as China, India, Hong Kong, Indonesia, Thailand, and South Korea in 1999²⁷ (Clofed, 2000: 81). The second most important region is the EU (22%), of which the top five source countries were Germany, the UK, Italy, the Netherlands, and Belgium. Thirteen per cent of imports came from SADC, where the most important exporters are Malawi, Zimbabwe, Zambia, and Mozambique. Five per cent (R 272 million) of imports came from the USA, up 15% over 1998. The biggest proportion of exports (41%) went to the EU, where the UK, Italy, France, Germany, and the Netherlands were the most significant recipients. Eighteen per cent (R 654.7 million) of textile and clothing exports went to the USA in 1999, up 30% over 1998. In 2000 South Africa was the second largest Sub-Saharan supplier of textile products to the USA, after Mauritius, providing 23% of total USA imports from that region (MUSBA, 2000:5). Ten per cent of exports went to SADC, where the most important markets were Zimbabwe, Zambia, Mauritius, Mozambique, and Malawi. Exports to Zimbabwe will probably decline due to that country's economic difficulties; and exports of textiles to Mauritius will likely increase due to joint efforts amongst South African and Mauritian firms to supply apparel to the United States.

The latest development in trade relations between Southern Africa and the United States is the start of negotiations towards the establishment of a free trade agreement between the US and the Southern African Customs Union. The negotiations, which opened in June this year, will focus on issues such as market access, investment, services and intellectual property rights. The target date for completion of the negotiations is December 2004 (USTR, 2003:71).

²⁷ We use the 1999 figures here to show the situation before the implementation of AGOA (2000).

The opening up of more export markets for South African textiles and clothing offer the local producers both opportunities and challenges, but the following caveats warrant attention:

- In the short-to medium term, Sub-Saharan African exports will at best replace some Asian exports to the US market; in the light of the slowdown in the American economy significant growth in demand for apparel is not expected.
- Competitors in Asia and Mexico are not taking the implications of AGOA lying down. Asian firms are investing in the Caribbean Basin to export to the United States, while Mexican firms, realising that their comparative advantage based on cheap labour is fading, are investing rapidly in new technology to improve quality and the speed of delivery. Both types of firms still have a proximity advantage over Southern African exporters (Speer, 2000).
- Lastly, the window of opportunity for Southern African firms to export into the US duty-free and *quota*-free, is smaller than usually perceived: the termination of quotas under the Agreement on Textiles and Clothing in 2005 will take away the quota-free advantage now enjoyable under AGOA.

The concerns listed above underline the fact that time is of the essence for South African firms to do all that is necessary to gain market share rapidly in the US market.

In assessing the current status of the textile and clothing sectors, generalisations are difficult to make because of the diversity that prevails in the industry. A survey conducted for SADC (Jafta and Jeetah, 2001) revealed well-managed, competitive exporters, but also found laggards, struggling to adjust to rapidly changing circumstances. Despite 'pockets of competitiveness' in the industry, much remains to be done to make the more difficult adjustments, i.e., learning to use technology better, improving worker and management skills, improving productivity, quality, reliability and delivery times and to establish and maintain good supplier and customer networks. The latest developments include increased activity in input sectors, additional investment in textile production

capacity and improved expertise in marketing strategies, as well as a comprehensive strategic plan for the industry. Starting with inputs, the cotton producers in South Africa have stepped up capacity to supply increased demand from African manufacturers aiming to export under AGOA (USTR, 2003:25). South Africa saw an increase of 45% in its total AGOA exports, from US\$923 million in 2001 to 1.3 billion in 2002, which is equivalent to 32% of total South African exports to the US. Exports of textiles and apparel nearly tripled from US\$33 million in 2001 to 88 million during 2002 (USTR, 2003:112). South African textile firms have invested in additional capacity to benefit from AGOA and foreign investors have been attracted to the textiles and apparel sector for the same reason (USTR, 2002:124). Regional integration has also benefitted in that South African imports of cotton from other Southern African countries (such as Zambia) have increased and exports of textiles to Mauritius are also growing. South African firms have also invested in the textile industries of neighbouring countries, such as Swaziland, Lesotho and Mozambique (USTR, 2002:125).

With AGOA's focus on finished products, such as apparel, it is imperative that the textiles and garment industries work together to achieve the full benefit from the agreement. However, therein lies a potential hurdle. The relationship between these two industries has not always been smooth, especially as far as the local textile industry meeting the demands of the clothing manufacturers is concerned. Complaints about the ability of the textile industry to consistently deliver quality yarns and fabric at competitive prices is a refrain that has been heard with disconcerting regularity over the decades [See for example, SABS (1976), RSA (1994), Maree (1995), Jafta and Jeetah (2001) and Gibbon (2000)]. The industry has come a long way, however. Whereas the problems of quality control in the 1970s were linked to the lack of generally agreed upon standards and specifications (SABS, 1976: 4), the latter day problems are more intermittent and blamed on a lack of organised quality circles and the attitude of workers towards quality (Jafta and Jeetah, 2001:40). We address further developments regarding quality issues in the next section.

4.3.3.4 Marketing, standards and the regional pipeline

Adapting to the changing demands of the markets, especially the export markets, has required increased attention to quality and environmental concerns. The first was addressed by introducing integrated quality management systems and getting ISO 9000 certification. Although the latter is more relevant in the EU market than in the US market (American buyers often have their own quality specifications to which local producers must comply), it is still beneficial to be certified, because of the spinoffs from the process (Jafta and Jeetah, 2001:44). In the process of becoming ISO 9000 certified the firm has to improve, document, and make consistent its internal processes, which contributes to its competitiveness. The certification is also testimony of a firm's good management, business sophistication, and reliability, which could give it a foot in the door with risk-averse buyers new to South Africa and the region.

One of the potential detrimental effects of rapid growth in textile production, is the impact that it may have on the environment. Lesotho, for example, has been one of the Sub-Saharan African countries that has benefitted most from AGOA²⁸. Environmental pollution created by footloose investors, however, could jeopardise Lesotho's chances of continuing to reap these benefits²⁹. Global textiles and indeed South African firms have shown that textile production and environmental sustainability are not conflicting goals. Through the process of ISO 14 000 certification and other cleaner production initiatives, South African firms have managed to reduce costs and safeguard the environment. Several projects to reduce water, energy and chemical use in factories were introduced in South Africa in recent years. While we report on the institutions driving this process in Chapter 5, it is worthwhile noting here that the savings on only one of these projects (water re-use) amounted to about R6 million per year (Cleaner Textile Production Bulletin, 2003:4).

²⁸ Approximately 10 000 new jobs were created and US\$ 100 million in new investment attracted. About 38 factories produce textiles in Lesotho, mainly denim for export. The new factories are mostly of Asian origin (Taiwan and Singapore) (Gibbs and Gibbs, 2003:2-3).

²⁹ The biggest pollution problem is the disposal of untreated waste water from the textile production processes in open streams, threatening the livelihood of downstream users (Gibbs and Gibbs, 2003:2-3).

Changing their perspective from focusing on the needs of the local market under protection to compete in the global market place was a tough and expensive learning experience for South African firms. The export marketing methods and channels used include export agencies, international sourcing agencies, direct sales, trade fairs, and exhibitions, though most avoid international marketing middlemen and agents. Doing so avoids unnecessary commissions and enables the firms to have better and more timely communication with their clients.

To improve marketing efforts and skills of South African exporters, several initiatives are currently being implemented, apart from trade missions arranged under the auspices of the Department of Trade and Industry. The Joint Export Action Group is an instrument of the South African Textile Industry Export Council to help members, including smaller operators to develop export capabilities. Several Web-based initiatives seek to improve dissemination by providing an on-line marketplace for suppliers and buyers. Texweb and TIMSSA are two websites developed by the CSIR and the Department of Trade and Industry. Texweb provides company and product listings and trade enquiries, while TIMSSA offers analyses of production, demand and trade in the SADC textile pipeline. Private-sector initiatives such as <http://textiles.tradespan.co.za> and www.apparelhq.com provide similar services. Orders from American buyers can be so large that no single South African firm has sufficient capacity to fill it. Innovative solutions will have to be found so as not to lose out on these new opportunities. The trading house model, such as Global Traders (www.globaltraders-sa.com) developed by Gelvenor Textiles (South Africa), provides the opportunity for local companies to overcome capacity problems. Trading houses are able to match capabilities of local producers so that orders can be filled jointly. They also investigate the market and place business where appropriate. Such a facility is very useful for novice exporters who have little idea where to begin. Similar efforts include a collaborative export industry portal (www.sa-exporter.com), which match international buyers with reputable South African exporters. This is not a dedicated textile industry portal, but includes all exporters across industries³⁰

³⁰ A novel feature is the multilingual translator, which English, French, German, Portuguese, Italian and Spanish speakers (Textiles Unlimited, 2002c:16).

(Textiles Unlimited, 2002c:16). The export help desk at the Department of Trade and Industry's Website (www.dti.gov.za/export) also provides assistance and information to prospective exporters. In the survey by Jafta and Jeetah (2001), respondents suggested similar initiatives. Apparently, the existence of such services is not well publicised in the industry; hence the providers need to market their services more widely.

The South African textile industry has thus faced a multitude of challenges over the last decade or so, and has responded by employing various strategies from technology and skills upgrades, restructuring and rationalising product mixes to shifting into exports. While there is a core of leading firms that are competitive, some firms are still en route to achieving competitiveness. In general the impression is that the industry is now leaner, and better equipped to face the competition and use the new market opportunities.

4.3.4 THE MAURITIAN TEXTILE INDUSTRY

In the early 1960s, James Meade, Nobel Prize winner for Economics predicted that Mauritius stood a good chance of being a failure. This judgement was based on the country's dependence on sugar, its rapid population growth, openness to terms of trade shocks and potential for ethnic tensions (Subramanian, 2001:22). Over the past few decades Mauritius has attracted much attention from researchers and policy makers because it has, contrary to predictions, developed from a monocrop, agriculture-based economy to a multi-industry, diversified economy. The textiles and clothing industries played a crucial role in this transformation. Our interest here is to outline the salient features of this success story and then to consider the prospects for the Mauritian textile and clothing industries in the light of regional developments and the newly opening export markets.

4.3.4.1 Factors contributing to success in the past

The growth of the textiles and clothing industry in Mauritius was phenomenal, as reflected in its contribution to GDP, employment and exports. The contribution

of textiles and clothing to GDP increased from 25% in 1970 to 33% in 1995, while employment grew from 9% in 1970 to 35% in 1995. By 1985 the exports of sugar paled in comparison to the exports coming from the Export Processing Zone (EPZ). By 1993 EPZ exports accounted for 70% of total exports. Textiles and clothing exports, in turn, made up 78% of EPZ exports and 53% of total exports (DPRU, 2002: 3-4). The clothing industry has always been more significant than the textile industry in size³¹ and export earnings, as well as employment, but the textile industry is likely to start catching up, given the renewed investment opportunities in the light of new trade agreements.

The factors contributing to the earlier success of textiles and clothing in Mauritius were of an endogenous as well as an exogenous nature. The endogenous factors can be grouped into two broad categories, namely domestic investment and domestic policies. We start with investment.

4.3.4.1.1 Domestic investment

Differently from their counterparts in other African countries, the Mauritian government largely re-invested the proceeds from sugar exports in Mauritius. The creation of the Export Processing Zones encouraged local entrepreneurs to invest in contrast to the experiences of other countries where the EPZs relied heavily on foreign investment. Where local businesses did enter into joint ventures, these joint ventures between local and foreign investors and strong linkages between Mauritian and foreign firms contributed to the transfer of technology and building of the capabilities that made Mauritian firms internationally competitive.

4.3.4.1.2 Domestic policies

The government's investments in the education and training system led to the creation of a well educated, bilingual labour force. Proficiency in French gave

³¹ In 1999 there were about 270 clothing establishments (employing 77 000 people) compared to 48 textile enterprises with 6 000 employees (DPRU, 2001:2).

them an advantage in exporting to France, while English was an advantage in their dealings with the UK and other English-speaking nations.

Mauritius further offered very attractive incentives such as low corporate tax and the option to repatriate funds freely.³² Investment in good infrastructure and excellent communication facilities with the outside world benefitted the business sector, especially in the EPZ. A crucial contribution was made by the creation of public and private-sector support institutions such as the Mauritius Export Development and Investment Authority (MEDIA), Mauritius Export Processing Zone Authority (MEPZA), Export Processing Zone Development Authority (EPZDA), Industrial and Vocational Training Board (IVTB), and the Small and Medium Industries Development Organisation (SMIDO) (Jeetah and Coughlin, 2001:5; DPRU, 2001:3-4).

4.3.4.1.3 *The exogenous factors*

Several factors ensured market access for the Export Processing Zones. These factors included historical ties to some of the industrialised countries, such as France and the UK because of the country's colonial heritage and language affinity. Mauritius also enjoyed preferential access under trade agreements, such as the duty-free and quota-free access to the European market, which it obtained through the Lomé Convention.

The favourable export environment was complemented by a number of economic and political factors. There was, firstly, considerable investment in the early 1970s by industrialists from Hong Kong, who were relocating because of uncertainties about the future of the British colony upon reversion to China.

³² The EPZ regime in Mauritius offers special provisions for investors. Both EPZ and non-EPZ enterprises pay 15% corporate tax (as opposed to 25% normal corporate tax); and all manufacturing firms now pay zero tariffs on raw materials and production equipment. In addition, EPZ firms do not pay sales tax on raw materials, equipment and spare parts and are also exempt from taxes on dividends and capital gains. Spare parts purchased after the establishment of the enterprise are exempt from customs duties and sales tax subject to approval by the Ministry of Industry, Commerce and International Trade. Firms in the EPZ sector also enjoy a 60% remission of customs duties on buses of 15 to 25 seats used for transporting workers, and a 50% exemption on registration charges for land purchases. Relief on personal income tax for two expatriate staff are allowed. All foreign investors are allowed to repatriate profits, dividends and capital freely (Jeetah and Coughlin, 2001:11; USAtrade, 2002:5). Contrary to the situation in many other countries, the Mauritian EPZ is not a geographically limited concept: firms with EPZ certificates may operate anywhere on the island (USAtrade, 2002:5).

Falling oil prices and the depreciation of the US dollar after a period of being overvalued (1983-84) reduced the country's debt servicing costs and eased the pressure on foreign exchange reserves. A combination of other exchange rate movements was influential in encouraging Taiwanese businesses to relocate to Mauritius. The Taiwanese dollar appreciated against European currencies, which reduced the competitiveness of Taiwanese exports. In the mean time, the European currencies appreciated against the Mauritian rupee, making it attractive to import from Mauritius (DPRU, 2001:4).

Thus, a mix of domestic and external factors contributed to the earlier successes of the textiles and clothing industries in Mauritius. Since the 1990s, however, the firms in these industries face new domestic and global challenges, as well as opportunities.

4.3.4.2 New challenges and opportunities

Like South Africa and Italy, Mauritius also faces competition from cheaper textile imports. By 2005 its preferential access to the EU and other European markets will be eroded, not least because of the completion of the last phase of the Agreement on Textiles and Clothing by end of December 2004. In regional context, textiles from producers in the Common Market for East and Southern Africa (COMESA) already enter duty-free and under the commitments Mauritius made to SADC, duties are being reduced gradually. A further challenge is posed by the decline in fertility and the aging of the population, which reduces the domestic pool of labour, and raises wages (USATrade, 2002:3). Firms are further confronted with rising input costs, such as electricity (Bharat Textile News, 2001:1-2).

In response to these challenges, Mauritius has adopted several strategies, based on the government's vision quoted below:

"Mauritius will have to continue to innovate in higher value-added products where competition is based more on timely delivery and flexibility to supply

small volume orders and quality rather than price. The success of this strategy depends on the capability of our firms to adapt quickly to changes in demand and fashion, to exploit niche markets by providing quality products of international standards and to honour delivery schedules.” (Statement by Mauritian government quoted in From down to upmarket, 2003:1).

For textiles and clothing the following strategies are of significance:

- Relocation of production, for example to lower wage countries such as Madagascar and other African countries;
- Many of the larger companies are now focusing on high value-added production, emphasising quality and diversifying into new and more sophisticated markets, with substantial investment in Mauritian brand names;
- Improvement in quality³³, education and management standards;
- Technology upgrades;³⁴
- Projects to increase productivity;
- Development of closer ties with customers;
- Establishment of group selling organisations, who market Mauritian products jointly;
- Joint government and industry studies to plan future directions;
- Searching for complementary industries, such as IT, enhancing the ability of Mauritian firms to reap the benefits of e-commerce (The Mauritian Clothing and Textile Industry, 2000:7);
- Integration into the southern African textiles and clothing pipeline to benefit from market access opportunities such as AGOA.

A limitation on the ability of Mauritius to benefit from AGOA was a lack of spinning capacity (especially for cotton) in the country (Jeetah and Coughlin, 2001:5). An immediate solution was to import fabric for apparel from South

³³ The Mauritian Standards Bureau is responsible for certification of companies who comply with the requirements for the ISO 9000 series on quality. Environmental certification (ISO 14 000) is only just taking off (USATrade, 2002:5).

³⁴ The capital to labour ratio in large textile firms in the EPZ has doubled between 1985 and 1998 (USATrade, 2002:14).

Africa, also eligible for AGOA benefits. A longer term solution was to attract investment into new capacity in the textile industry. This has been happening since the introduction of AGOA. Vertical integration of textile production in the SSA has been enhanced by the investment of over US\$ 100 million in new spinning mills in Mauritius. This investment was financed by Chinese, Indian and Mauritian firms (USTR, 2003:24). The Mauritian Board of Investors also approved proposals for additional plants to be erected for Italian and Indian investors (USTR, 2003:102). Mauritian-based companies have also invested in textiles in Madagascar, Mozambique and Lesotho, and are considering further investments in Senegal, Namibia and Uganda (USTR, 2002:111). AGOA also prompted several US and Asian retailers to open regional buying offices in Mauritius (USTR, 2003: 24).

The value of textiles and apparel exports from Mauritius to the US increased by eight per cent in 2001, seeing a significant slowdown after the 11th of September (USTR, 2002:111). Total duty-free exports from Mauritius to the US under AGOA amounted to US\$114 million, which make up 41% of total Mauritian exports to the US. The United States constitutes the largest market for Mauritian apparel exports (USTR, 2003:102).

The Mauritian textile industry thus seems poised to grow out of its relatively small size to become an important supplier in the regional textile and clothing pipeline. The underlying supposition is, of course, that the strategies that are in place are implemented successfully.

4.4 SUMMARY AND PREVIEW OF CHAPTER 5

By the beginning of the 1990s it was clear to all concerned that a new development path for the South African textile industry was urgently needed; the old ways of protection and focus on the domestic market would no longer suffice in the new competitive environment. In this chapter we have concentrated on the restructuring efforts of the textile industries in South Africa, Italy and Mauritius. Our comparisons have revealed diversity as well as similarities. The firms in these three countries face similar challenges, differing

only in degree of severity. However, while South Africa and Mauritius have the advantage of preferential access to export markets, Italian firms do not have similar options and face harsher competition in their own market and abroad. Hence, this is the time for them to employ their strong capabilities to find a new lease on life outside their traditional markets.

For Mauritius and Italy there seem to be two trains of thought, i.e. to try and remain competitive in the large volume market by relocating production, and to create and exploit niche markets, by focusing on quality, design and excellent delivery performance. These routes are not excluded from the path that the South African textile firms have taken, but in addition the leading firms in South Africa have started a process of specialisation ('narrow and deep'), which enable them to improve efficiencies and profit margins. Some Italian firms, furthermore, have successfully diversified products and markets. The attitude of the leading Italian firms, building on their innovative capacity, high level of plant modernisation, flexibility in organisational structure and a wide-spread entrepreneurial spirit, strongly contradicts the view that textiles is a traditional, mature industry, best left to the developing countries.

For all three countries, there is some similarity in the specific strategies employed, e.g. investment in new technology, upgrading of skills, re-organisation of work processes, integrating vertically across the supply chain, renewed focus on quality and delivery performance and customer service. However, in terms of environmental concerns Mauritius and to a lesser extent South Africa, lag behind Italy. Further, with respect to worker rights³⁵ and customer safety, South Africa and Mauritius have not yet begun the certification process.

A study commissioned by SADC (Coughlin, et al, 2001) recommended a policy regime similar to that which prevailed in Mauritius for the South African textiles and clothing industries, much to the chagrin of the South African Textile Federation. The Textile Federation believes that such an approach would benefit

³⁵ Although both South Africa and Mauritius have very worker-friendly labour laws, the issue here is about social standards in trade.

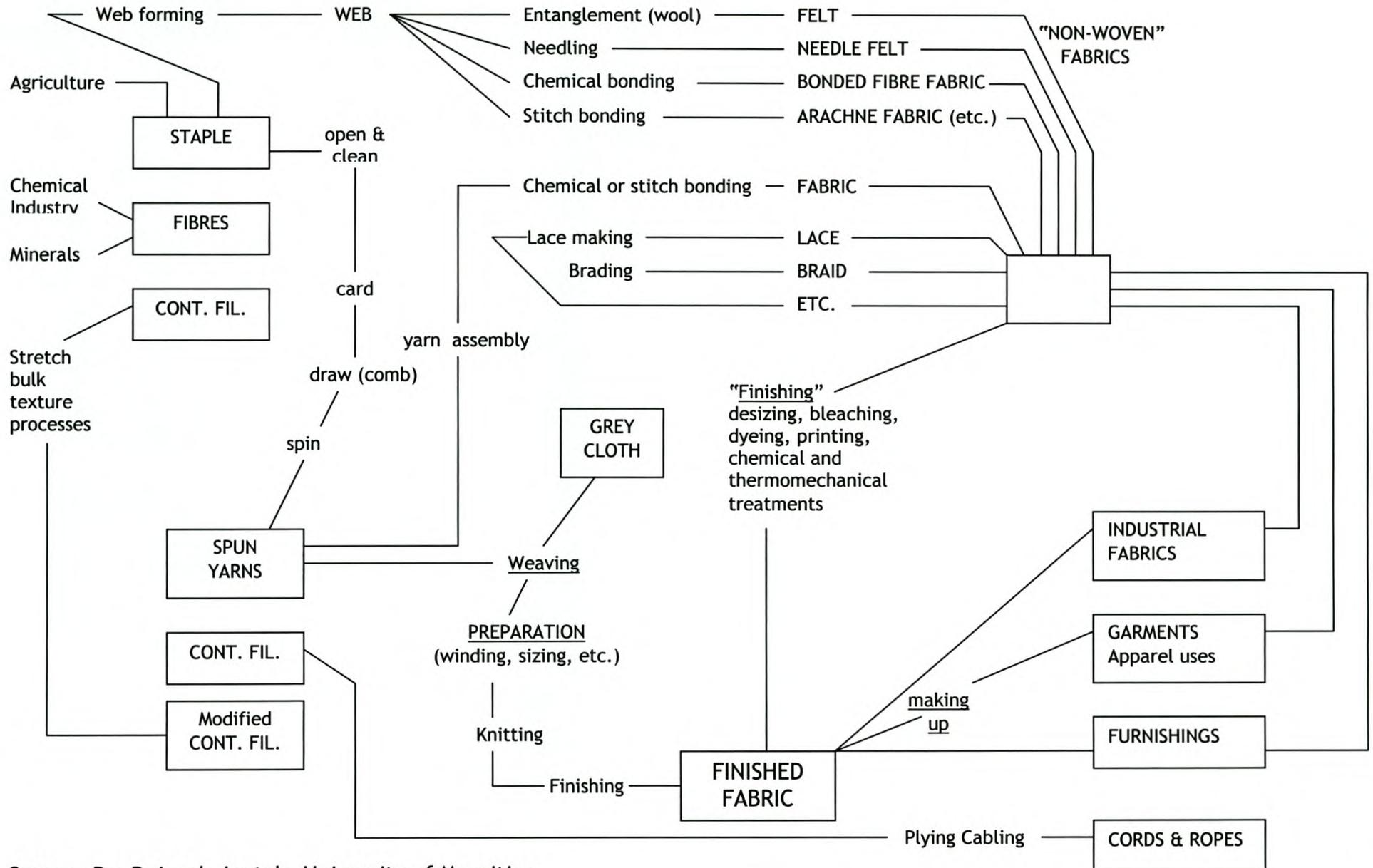
only the clothing industry, who would be able to source fabric at world prices (Mauritian model unsuitable for SA textiles federation, 2002:1-2). While the textile industry representatives may want to spend their time trying to prevent increased competition, it seems quite certain that trade liberalisation (multilateral, bilateral and in regional context) will continue. Firms thus have to adapt to these circumstances quickly.

Several observers in the industry have emphasised that survival in the modern textile industry requires creativity, passion and the ability to offer something which distinguishes a leading firm from the rest. For Italian firms this means consolidating their strong points, applying them in new settings and continuing to innovate in terms of products, processes and services. For South African and Mauritian firms this might mean developing, for example, interesting fabrics, with an African flair, which might give them an edge in the US and EU markets.

In this chapter we have made sporadic references to some institutions that are involved in the textile industry. Both Chapter 3 and this chapter gave us a tentative appreciation of the importance of institutions in the change processes that firms undergo. To explore this theme further, we consider the institutions that are active in the South African textile industry in Chapter 5.

APPENDIX 4.1

MAIN ROUTES IN TEXTILE TECHNOLOGY - South Africa



Source: Dr. Raieesh Jeetah. University of Mauritius

CHAPTER 5

THE ROLE OF INSTITUTIONS IN THE SOUTH AFRICAN TEXTILE INDUSTRY

5.1 INTRODUCTION

In chapter 4 we have studied the evolution of the South African textile industry since its inception until the early 1990s, before the implementation of the GATT agreement. In the context of the subsequent restructuring processes in textiles, we have also compared the South African textile industry to the experiences of the Italian and Mauritian textile industries.

Our analysis in Chapter 3 and 4 pointed to the important role that institutions play in influencing firms, and eventually contributing to the dynamics of the industry.

In this chapter, we are interested in the role that various institutions play in the South African textile industry. We concentrate on the services that these institutions offer the firms in the textile industry, especially related to technology. In Chapter 5 we do not deal extensively with training institutions, but we integrate them into Chapter 6 (because it fits better into the structure of that chapter). This chapter serves as background to Chapter 6 where we enquire from firms about the significance that these institutions hold for them.

5.2 INSTITUTIONS AND RESTRUCTURING

Meyanathan (1994: 14-15) lists four areas where firms may need institutional support:

- Funding for R&D, with a focus on applying foreign technologies to local needs
- Export marketing strategies
- Creating a flexible and technically-skilled labour force with appropriate management capability

- Forging strategic alliances with global companies.

In addition, Lall, *et al*, (1994:175), found that firms in developing countries need information on a whole range of technology-related issues. Examples include information on appropriate technology, where and how to negotiate the best technology transfer deal, as well as information on training and organisation of production processes. Several institutions, such as public sector agencies as well as industry associations, may assist in this regard.

5.3 SELECTED INSTITUTIONS

The success of government's policies and industry's strategies depends on the ability to implement them. Effective institutions are necessary to provide the capacity for implementation. Several institutions are active in the textile industry, be it as policy formulators or implementers. Here we examine the role of the most relevant institutions.

5.3.1 Department of Trade and Industry

The Department of Trade and Industry is the most important player in formulating and implementing trade and industrial policy. It offers and administers a range of incentives to promote investment and exports. The package offers incentives to help South African industries, emerging from a protected past, to adjust to the new competition.

The primary instrument of assistance tailored for the clothing and textile industries is the **Duty Credit Certificate Scheme (DCCS)**, which was meant to be a temporary¹ kick-start to enhance export competitiveness by offering duty certificates to qualifying exporters.

¹ Frowned upon by the WTO, this scheme was due to end on 31 March 1998 (DTI, 1997: 11; Havenga, 1996: 7). However, the Minister of Trade and Industry extended it to March 2000 to give the industry more time to restructure (Erwin extends export initiative, 1997: 3), and then extended it again to 2005. After this period of 'extension, the duty-credit scheme will be scrapped.

TABLE 5.1: BENEFITS FOR APPROVED EXPORTS: DUTY CREDIT CERTIFICATE SCHEME (PERCENTAGES)

Cat.	1999/2000				2000/1 & 2001/2				2002/3 & 2003/4				2004/5			
	c	hh	f	y	c	hh	f	y	c	hh	f	y	c	hh	f	Y
A					25	17.5	12.5	8	20	15	10	6	15	12	8	5
B	25	17.5	12.5	8	25	17.5	12.5	8	20	15	10	6	15	12	8	5
C					35	23	17	12	30	20	15	10	25	17.5	12.5	8
D					35	23	17	12	30	20	15	10	25	17.5	12.5	8

Note: *c* = clothing; *hh* = household textiles; *f* = fabrics; *y* = yarn; *Cat.* = category.

Source: Claassens (2001)²; Texfed (2001:3).

When local factories export products covered by the scheme, they earn a credit usable to cover import duties normally payable on textile and clothing products. To be eligible, each applicant must participate in and achieve targets set by the Productivity Performance Monitoring Scheme and spend a specified percentage of its annual wage bill on training. When the DCCS was extended in 2000, four categories, with different export, productivity performance and training imperatives were created. Benefits are related to the different categories (Table 5.1). Category A is aimed at small, micro and medium enterprises, as well as first-time entrants (who have a choice of category A, B and C). Category B is meant for registered exporters who export less than 15% of total annual sales, while category C applies to participants who export 15% or more of their total annual sales. Category D aims to encourage collaboration in filling big export orders and offers DCC benefits to manufacturers who have secured a large order, which they will complete in partnership with another producer. Participants in categories A, B, and C must all spend 10% of the value of the DCC in the following export year on training, and achieve export growth of 10% per annum (measured in US\$). Category D participants do not have to fulfil any additional requirements beyond the year for which they receive the DCC benefit. The value of DCC benefits increases as participants export more (Table 5.1). Exporters in category C, for example, receive a larger benefit than exporters in categories A and B. In sum, the scheme rewards export, productivity and skills development performance, as well as collaboration to complete large orders (Texfed, 2001: 3; DTI, 2003: 9-15).

² E-mail from Helena Claassens, Textile Federation, 6 December 2000.

The scheme was successful in stimulating exports. The value of textile and clothing exports generated under this scheme increased from 30,2% of all textile and clothing exports in 1995 to 37,8% in 1997 (IDC, 1999: 41). Ironically, the scheme has also helped to increase penetration of the local market by allowing duty-free imports of clothing (Flaherty and Salinger, 1998:3). During 1999, R 80 319 000 worth of clothing was imported under this scheme, while fabric and yarn imports amounted to R 317 711 000 and R 109 023 000, respectively.³ Between 1999 and 2000, clothing imports under the scheme grew by 61%, accelerating by 103,7% in 2001. Fabric imports in contrast, declined by 11,05% in 2000, but increased by 51,5% in 2001. Imports of yarn under the DCCS showed a steady increase of 53,8% and 49,2% in 2000 and 2001 respectively (Texfed, 2003: 15).

Respondents in the industry have also alleged corruption involving the embezzlement of Duty Credit Certificates. Though the certificates were non-negotiable, commentators in the industry asserted in the interviews that 'high-sea trading' in these certificates is known to occur. As a result, people who have never exported use the certificates to import duty free. Since the completion of the survey, however, the DTI has reviewed the rules regulating the sale of Duty Credit Certificates. A DCC may now be sold in full or in part to 'any company, close corporation, partnership, or sole proprietor that is a registered importer'. The buyer may not sell the certificate unless approved by the Board on Tariffs and Trade (DTI, 2003: 24).

Of concern for the further usefulness of this scheme in the improvement of competitiveness in textiles and clothing, is the finding that the aspects of manufacturing performance and human resources development have been neglected in implementing the scheme. An assessment of the progress audits in beneficiary firms by the Industrial Restructuring Project (University of Natal) found that the audit reports did not capture essential information on operational

³ The duty-credit certificates are usually valid for 12 months (not a calendar year), but since the certificates are often issued very late, its validity is then extended for six months. Since the export period is 1 April to 31 March, certificates for exports in the period 1 April 1999 to 31 March 2000 are valid from 1 April 2000 to 31 March 2001 or, if extended, to 30 September 2001. Because it is not a calendar year, it is difficult to compare with the normal import and export statistics (Fax from Helena Claassens, 23 February 2001).

performance of the firms, e.g., measures such as inventories, quality (reworks, defects, scraps and customer returns), delivery reliability and labour participation. Closer inspection of the scheme's requirements revealed that they did not compel beneficiaries to reassess their strategic operations, especially regarding supply-chain management (Reid, 1999e: 19-21). Ways to improve competitiveness that go beyond once-off cost-cutting exercises, such as retrenchments or closure of plants, require deeper thinking to be applied to work organisation, the appropriate use of labour and technology, and supplier/customer relationships. Competitiveness here is not based on price only, but on quality, reliability, and delivery performance. This is an area in which some South African textile and clothing firms still fall short. Beneficiaries surveyed by Reid (1999e: 18) did not see the DCCS' impact on their quality or other performance, e.g., inventory levels and production lead times. It is thus imperative that the scheme's components regarding productivity performance monitoring and human resource development be given priority in the future.

During 1994/95, the National Economic Development and Labour Council (NEDLAC)⁴ commissioned a study to determine the best strategy for attracting foreign investment into South Africa. The consultants recommended a small but efficient national investment-promotion agency to be established as an independent authority (Havenga, 1996:28). During February 1997, Investment South Africa was launched to coordinate and promote investment activities and establish an Investment Data Base as well as an Investor Resource Centre. In a recent restructuring exercise at the Department of Trade and Industry, Investment South Africa was reincorporated under the department and is now known as Trade and Investment South Africa, responsible for trade and investment promotion (Investment South Africa, 2000).

Investment incentives under the auspices of the Department of Trade and Industry include various initiatives. The **Support Programme for Industrial Innovation** is designed to promote technology development in manufacturing industries in South Africa through support for innovation of competitive products and processes. Assistance takes the form of a grant of 50% of the actual direct

cost incurred in the pre-competitive development activity, reaching a maximum of one million Rands per project. The programme is open to all private manufacturing enterprises (Investment South Africa, 2000).

The Technology and Human Resources for Industry Programme is aimed at enhancing the competitiveness of South African industry by developing appropriately skilled people and technology. It further encourages long-term strategic partnerships between industry, research and educational institutions and government. The programme is open to research groups in the natural sciences, engineering, and technology within educational institutions in collaboration with any private company or consortium of companies. Government and the private sector contribute to finance research by the academic partners if that involves the training of students. For every R1 that the private sector spends on this programme, the Department of Trade and Industry contributes R1 (RSA, 1997:14).

A related initiative is the **Sectoral Partnership Fund**, which supports sub-sector partnerships to prepare technical and marketing programmes to improve the competitiveness and productivity of the firms. Such partnerships will typically include strategies to:

- improve organisation of the workplace;
- upgrade the quality of equipment;
- strengthen design capability; and
- develop initiatives to enhance product quality.

Financing for these programmes comes from the DTI's Sector Partnership Fund on a cost-sharing basis, i.e. the fund covers 65% and 35% is carried by the relevant firms. There is a cumulative ceiling of R 1.5 million per partnership (Havenga, 1996:51; RSA, 2000b: 272).

The Small/Medium Enterprise Development Programme consists of four elements:

⁴ The council consists of labour, government, and business representatives. It is a forum where all policy

- an establishment grant payable for three years, calculated at 10.5% of qualifying assets;
- a profit or output incentive, calculated at 25% of profit before tax, payable for an additional one year;
- an additional two years' profit or output incentive, provided the entrepreneur can meet or exceed the human resource remuneration to value added ratio of 55% measured in the fourth financial year; and
- a foreign investment grant to companies investing in new machinery and equipment to establish new projects in South Africa.

The **Competitiveness Fund** was created to encourage South African firms to be competitive, both as exporters and in defence of their local markets. The facility is available to all South African private firms of all sizes. Funds are allocated on a first-come-first-serve basis; and firms must submit a realistic plan for the development of their business. The fund supports the introduction of technical and marketing know-how and expertise in firms. The scheme insists on a 50% contribution by the firm itself. Grants are paid on a reimbursement basis.

Market access for South African products into foreign countries has improved; and the onus is now on local firms to improve competitiveness and find suitable markets for their products. To aid in this process, the government has an **Export Marketing and Investment Assistance Scheme** in place. This scheme complies fully with WTO regulations; and the Department of Trade and Industry has recently expanded this programme as part of its comprehensive supply-side measures. The scheme consists of eight parts, namely, primary export market research, outward selling trade missions, inward buying trade missions, exhibition assistance, assistance to specific industrial sectors, outward and inward investment missions, and foreign direct investment research. The scheme provides partial financial assistance to all exporters for the above purposes, but has a specific bias towards micro, small, and medium enterprises (RSA, 2000c: 1).

South Africa's version of export processing zones is called an **industrial development zone** and is currently only in its early implementation phase. The idea is to create a competitive and efficient 'one-stop' environment for production for export. The zone offers the usual incentives encompassed in an export-processing zone,⁵ with the major exception that labour regulations will be the same in the zone as in the rest of the economy. An industrial development zone may be privately or publicly owned and managed or be a partnership between government and the private sector.⁶

The proposed legislation to create such zones was presented to parliament in December 2000 despite doubts by business and organised labour about the feasibility of investing in these zones, since neighbouring states offer more attractive incentives. Trade unions also fear that the zones will add more to the work load of customs officials who already have their hands full, thus providing more access points for illegal imports. It is also feared that only existing firms will relocate to these zones, thus transferring instead of creating jobs (Ludski, 2000: 1).

Research on the success of export processing zones worldwide casts serious doubts on the feasibility of establishing additional geographical zones. When the initial zones were established, they were a novel few. Today investors are spoilt for choice; and local governments must offer exceptional incentives in the hope of attracting new investment.⁷ This often happens at the expense of the larger domestic economy. A newer approach is not to expect firms to move to a specified area, but to allocate 'zone status' to firms in their existing locations (Madani, 1999:64-65).

⁵ Producers in industrial development zones will get duty-free imports of inputs and raw materials and be exempt from VAT on supplies procured in South Africa. However, any finished goods they sell in South Africa will be deemed imports.

⁶ The first industrial development zone to be established in South Africa will be around the development of the deep-water port at Coega, 20 kilometres from Port Elizabeth in the Eastern Cape. So far the initiative amounts to government driven investment in infrastructure in the belief that '*if we built it, they [private investors] will come*' (Schmidt and de Jager, 2001:3).

⁷ In 1996, there were already 500 zones located in 73 countries (Madani, 1999:5).

5.3.2 Industrial Development Corporation

The Industrial Development Corporation (IDC), a state-owned institution created to provide finance with the aim of promoting sustainable economic growth via industrial development, has a long history with the textile industry. It was the IDC, for example, who was responsible for establishing the first factory to produce worsted woollen piece goods in 1946. During 1946/47 the IDC together with a British firm started the Good Hope Textile factory for cotton textiles in King Williams Town (Franzsen and Reynders, 1960:274-276).

Today the IDC offers diverse financial assistance to clothing and textile firms. The IDC makes general-purpose factory buildings available for leasing in decentralised areas.⁸ The normal lease period is for four years with an option to renew. Rentals are competitive and rental subsidies are available from the Decentralisation Board (Clofed, 2000: 114). Finance under the **multi-shift scheme** offers industrialists a chance to expand operations with an additional eight-hour shift. The **Venture Capital Scheme** is aimed at stimulating the development of new products by existing firms or the establishment of new ventures for products with good growth potential. The **Economic Empowerment Scheme** assists entrepreneurs from the historically disadvantaged communities. Manufacturing businesses usually require owners to fund at least 33% to 40% of the total investment to ensure long-term viability. The scheme provides for a reduced contribution by firms while the IDC provides a larger than normal contribution. Normal finance is available to small and medium-sized industrialists and has been designed to assist them in the early growth phase. The IDC's **import finance scheme** provides credit and guarantee facilities for the importation of capital goods and services to enable industrialists to utilise capital for more productive purposes and to increase their borrowing powers and cash flow. The IDC has targeted the textile and clothing sectors in SADC as one of its most important areas for investment over the next few years. One regional project already on stream is a large cotton growing and ginning project in the

⁸ This measure is aimed at encouraging new ventures in decentralised areas such as Atlantis, East London, Berlin, Bloemfontein, Bronkhorstspuit, George, Richards Bay, Newcastle, Pietermaritzburg, and Queenstown (Clofed, 2000: 114).

northern province of Cabo Delgado in Mozambique. This will double Mozambique's current cotton production and contribute to developing a significant cotton pipeline in the SADC region. The IDC allocated R180 million in funding to textile and clothing ventures in the SADC region between July 2000 and June 2001.⁹ It also predicts that the banking sector will be more favourably disposed towards these industries in the light of new growth prospects (Lace, 2000).

5.3.3 Textile Division of the Council for Scientific and Industrial Research

Textek (now the Centre for Fibres, Textiles, and Clothing at the Council for Scientific and Industrial Research) sees itself as the industry's technology partner and aims to promote the growth and global competitiveness of the textile pipeline. It pursues this objective by keeping abreast of technological developments globally and by acquiring or developing technologies. Textek serves the textiles and clothing sectors of Southern Africa. Its clients include producers, processors, manufacturers, end-users, the public sector, non-government agencies, and their funding agencies.

The division specialises in the acquisition and dissemination of information relevant to its areas of operation, e.g., technologies, plant and animal fibre development, small business development, and training needs and trends. Textek also provides on-line industry information as well as industry-wide studies. Together with the Department of Trade and Industry, Textek has developed two new websites aimed at providing a textile information hub in southern Africa, namely www.texweb.org and www.timssa.co.za, the details of which were discussed in Chapter 4.

The division's most important task concerns technology. In this regard, Textek is involved in the development of advanced technologies such as natural-fibre R & D and beneficiation, textile machines and instruments, breathable lamination

⁹ The IDC already is involved in Botswana textiles and Mueda Cotton in Mozambique. Further investment depends on opportunities and feasibility (Interview with David Holloway, senior account manager for textiles, clothing, leather and footwear at IDC, Johannesburg, 14 November 2000).

technology,¹⁰ and wet and dry processing technologies for yarn and fibre. Textek also develops and adapts technologies for use in the informal sector. For example, since enterprises in the informal sector often have a problem with access to electricity, Textek developed a pedal-powered weaving loom.

Textek is active in a variety of networks, locally and internationally. Such involvement revolves primarily around development and transfer of technology, training and small business promotion. Examples in South Africa include its links to the South African Bureau of Standards, the Agricultural Research Council, the Fibre Boards, and the Black Management Forum. International links include its associate membership in the European Textile Technology Transfer Network, the British Technology group, and the Danish Technological Institute. Through these networks, Textek acquires information and technology and establishes useful contacts on behalf of its clients.

Textek also offers consultation services regarding needs identification and model development for the establishment of community enterprises. Some examples include the Community Self-employment Centre in Port Elizabeth and the Manufacturing Advisory Centres.

5.3.4 Industrial Institutions

The Textile Federation and the Clothing Federation are the main representative bodies for the textile and clothing industries. Both federations participate fully in policy debates and platforms such as the Textiles and Clothing Sector Summit. Their contributions include inputs on exports, marketing, industrial relations, trade policy, education, training, technology, and productivity. The industry associations disseminate information to their members, government, trade unions, and other parties.

The Textile Federation has recently amended its constitution to extend membership to suppliers in the pipeline. The reason behind this move was to

¹⁰ Textek developed an advanced technology of laminating microporous/hydrophile membranes onto textile fabrics producing a waterproof but breathable fabric. The fabric is impermeable to blood and body fluids and has many medical applications (Interview at Textek, Port Elizabeth, April 1999).

strengthen its support base and to create a forum for discussion with other sectors in the textile pipeline (Open invitation to all Textile Machinery Agents and Chemical and Dyestuff Suppliers, 2003:13). The Clothing Federation (Clofed) in a bid to broaden its horizons has changed its name to Clotrade to reflect its commitment to export growth in the industry. It now aims at much closer cooperation with the export councils (Bharat Textile News, 2002:1-2). The South African Textile Industry Export Council and the South African Clothing Industry Export Council were created as part of the strategy to promote exports. Though private sector driven, the councils work closely with government agencies and the South African Clothing and Textile Workers Union.

5.3.5 South African Bureau of Standards

The South African Bureau of Standards (SABS) offers a variety of services to the clothing and textiles sectors. These services include preparing buyer specifications, analysis and testing services, as well as training. In addition, the SABS operates a product accreditation scheme under which manufacturers may use the SABS certification mark on their products. This mark indicates to the purchaser that the article bought has been manufactured to comply with the relevant standard specification under conditions complying with an appropriate quality system. The SABS also operates a Listing Scheme introduced to assess manufacturers' quality systems. Companies achieve listing status by complying with all the elements of the Code of Practice for 'Quality Systems' (SABS ISO 9002), which is equivalent to the International Standards Organisation's 9000 series. The SABS is also responsible for the ISO 14000 series certification.

A consignment inspection service for local and imported goods is offered anywhere in South Africa and in certain southern African countries. Textiles are examined for their appearance and suitability for use and are tested for performance parameters from the relevant specifications. Clothing is similarly tested for compliance with the requirements of appropriate specifications (Clofed, 2000: 116).

With this expertise, the SABS believes¹¹ it is well placed to assist prospective exporters to ensure compliance with the quality and rules of origin requirements under AGOA as well as the SA-EU agreement. Apart from promoting quality in the industry, the bureau can contribute by:

- doing inspections in South African factories against buyer specifications on behalf of American buyers, obviating the need for American inspectors to travel here regularly;¹² and
- assisting Customs and Excise in enforcing the rules of origin requirements at South African ports of entry.

Some respondents in this study, however, suggest that the SABS is still seen by many prospective clients as merely the organisation that tests consignments for government procurement (which it did under the previous government). The organisation has been restructured and has become partially commercialised but will have to embark on a campaign to promote the new image that it wishes to establish. The SABS will also have to make a concerted effort to convince members of the textile industry and their customers of the expertise that they believe they can offer.

5.3.6 South African Clothing and Textile Workers Union (SACTWU)

The South African Clothing and Textile Workers Union (SACTWU) faced an uphill battle for recognition in the adversarial atmosphere prevailing in the South African labour market during the 1980s¹³. While the union was initially dead set against liberalisation of the textile and clothing industry, it has gradually accepted the need for restructuring. SACTWU participated in the activities of the Swart Commission, tasked with developing a long-term survival plan for the textile and clothing industries. It was also instrumental in bringing to fruition the Textiles and Clothing Sector summit in 2000, from which emerged the beginnings

¹¹ Interview at the Textile, Clothing and Leather Division of the SABS, 24 November 2000.

¹² The bureau already does inspections on behalf of a large American firm and is in the process of developing further agreements. The bureau is aligning South African standards to SADC and international standards, allowing local exporters to design and test their products here, in compliance with world standards (Interview at South African Bureau of Standards, 13 November 2000).

¹³ Details are recounted in the firm-level case studies in Chapter 7.

of an industry survival plan (Textiles and Clothing Sector Summit Document, 2000). The trade union has a very firm commitment to skills development in the industry. The union believes that worker morale and commitment would increase if they knew that there was a possibility of career development for them, i.e. that a blue collar job is not the end of the line, but the beginning (Maree, 1995:125 and Textiles and Clothing Sector Summit Document, 2000).

In a major commitment to education and training, the SACTWU launched an R8 million education trust in 1997. This enables the children of textile workers to attend universities, technikons, and colleges. Some observers believe that this marked an important shift from the union's struggle *modus operandi* to being a responsible partner in the development of the industry (Argus Correspondent, 1997:1).

5.3.7 Cleaner Production Institutions

Apart from the ISO 14000 certification by the SABS, at least three other initiatives aimed at cleaner textile production are worth mentioning. Out of these initiatives arose institutions that could play a major role in the South African textile industry in future.

The first initiative is the Cleaner Textile Production Project, supported by the Danish Co-operation for Environment and Development (DANCED). The project was launched in South Africa in July 2000 and aims to reduce the negative environmental impact of the cotton-growing sector. The approach is preventative, rather than focusing on end of pipe treatment of waste. The project covers cotton growing and all stages of textile manufacturing (Textiles Unlimited, 2001a: 12). The Cleaner Production options include saving water, electricity, chemical inputs, and effluent discharge. An important component is the transfer of knowledge for local capacity building, and to create awareness of environmental problems and the possibilities for solving them through Cleaner Production (before legislation compels firms to do so).

Out of this initiative grew the creation of the Textile Knowledge/Linkage Centre, which will support the textile, clothing, and retail pipeline with a wide range of Cleaner Production services. The efforts of this project are now being combined with another Cleaner Production initiative—the National Cleaner Production Centre (NCPC)¹⁴, supported by UNIDO. The joint operation will last three years, where after it will be reviewed. Care will be taken that the two centres coordinate their activities to best serve the needs of the industry (Cleaner Textile Production Project SA, 2003:12-13).

The third initiative is the Waste Minimisation Club Project at the University of Natal, Durban. Waste Minimisation Clubs are groups of industries cooperating to reduce their environmental impact, and in so doing improving the efficiency of their businesses. A good example is the Hammersdale Club, established in Kwazulu-Natal in 1998. Initially, it was aimed at textile firms only, but eventually all the firms in the area elected to participate, including a chemical manufacturer and a chicken abattoir (Common Goal, 2000:1-2). One of the most important contributions of the project is waste minimisation training. During 2001 and 2002, 20 organisations and 45 individuals benefited from participation in training. The total savings reported by the participants amounted to about R8.3 million per year. The biggest saving was on chemicals (40%), followed by water (20%) and energy (18%). The rest came from input materials, consumables and solid waste (Companies benefit from training in waste minimisation, 2003: 6).

This pro-active approach to environmental concerns could stand South African textile firms in good stead versus their competitors from other developing countries – so far only the richest developed countries, especially in Europe have really extensively incorporated Cleaner Production into their industrial production systems (Danes share cleaner production techniques with Southern Africa, 2002).

¹⁴ This was a commitment signed at the Summit on Sustainable Development in September 2002 (Cleaner Textile Production Project SA, 2003:12-13).

5.4 ASSESSMENT OF INSTITUTIONS

So far in this chapter we have considered the services offered by the various institutions that are operating in the South African textile industry. Several of the institutions are responsible for implementing incentives financed by public money. It is evident that sufficient incentives are in place to cater for the needs of textile and clothing firms looking to acquire new technology and improve work organisation, quality, and skills; the question arises why these incentives are not used much by their intended beneficiaries. One explanation is that the removal of protective barriers and the implementation of the measures to help firms adjust did not take place in tandem. The latter lagged behind the former. This is partially attributed to lack of capacity in government institutions (Kaplinsky and Morris, 1999: 731). Almost every government institution has gone through restructuring¹⁵ in the last five years or so, leading to a lack of continuity and coherence in policy formulation and implementation. Institutions also suffered a high turnover of staff, which our interviewees believed slows collaborative work in the industry while new appointees learn the ropes. A need for better training and motivation of government officials in trade and investment promotion agencies as well as officials dealing with the implementation of incentives was also articulated. Industry commentators also mentioned the fragmented nature of the implementation process, i.e., the large number of institutions that a business has to involve to access the incentives offered. This calls for better coordination amongst institutions and concerted efforts to educate the intended beneficiaries about the services and incentives available, for example, the benefits offered by the performance-monitoring scheme of the duty-credit certificate programme.

Government's incentive schemes have not been sustainable and consistent; and capacity problems have impeded their smooth implementation.¹⁶ In addition,

¹⁵ The continuous restructuring at the DTI drew fierce criticism from trade unions, which cited many problems in service delivery (Wadula, 2000:1-2).

¹⁶ For example, the General Export Incentive Scheme was supposed to run until the end of 1997, but, by June 1997, government informed industry participants that it would end in July due to a lack of funds. The government's tax holiday scheme for new investors announced in 1996 was discontinued in September 1999. The Minister of Finance prefers to lower all taxes as an incentive rather than granting specific exemptions that complicate the tax structure (RSA, 2000: 267). However, President Mbeki, in his interview with the *Financial Times* on 26 November 2000, hinted at new tax breaks to be introduced by the Department of

firms say that they would rather have less variety and more certainty regarding investment and trade promotion incentives.

5.5 SUMMARY AND PREVIEW OF CHAPTER 6

In this chapter we have considered the role of the various institutions that are active in the South African textile industry. These institutions range from government departments and bodies, such as the Department of Trade and Industry, the Industrial Development Corporation and the South African Bureau of Standards, to industry associations, and non-governmental initiatives. The incentives and services on offer include both general (also available to other sectors) and sector-specific assistance. On the whole, it seems that sufficient assistance is in place, but that intended beneficiaries do not take up these offers on a significant scale. In this chapter we have highlighted some reasons for the scant use of incentives and services. In short, it comes down to the need to build better competencies, especially in government institutions, better marketing of services, better coordination of operations amongst institutions and taking care to provide consistent and sustainable incentives. Otherwise, policy initiatives intended to help firms add to the uncertainty in their competitive environment and raise their transactions costs, e.g. by having to consult a large number of institutions to benefit from incentives.

In Chapter 6 we explore the issues around the links between firms and institutions further. We move on to firm-level analysis and focus on the process of acquisition and implementation of new technology in South African textile firms. We also consider the consequences of this process and enquire about the significance of these institutions from the firms' point of view.

Trade and Industry. These conflicting messages create unnecessary uncertainty for businesses and undermine the credibility of government's incentive schemes.

CHAPTER 6

NEW TECHNOLOGY, ORGANISATIONAL CHANGE, AND FIRM LEVEL PERFORMANCE

6.1 INTRODUCTION

In Chapter 2, we have defined firms as *"behavioural entities, characterised by specific competences, largely embodied in their routines, and evolving over time, partly as the outcome of their internal learning and partly as a response to environmental changes."* (Dosi and Malerba, 1996: 4).

In Chapter 3 we have shown that the regional or national differences observed in the global textile industry can in part be explained by the behavioural choices of firms in these countries. When looking closely at these 'choices', the role of firm-level strategies, routines (old and new), learning capabilities and responses to the changing environment (to name but a few), enter prominently into the discussion. While we have maintained an industry-level perspective in Chapters 4 and 5, this chapter is firmly focused on firm-level analysis. Our purpose in this chapter is to gain a richer and deeper insight into the strategic and other decision processes in South African textile firms in the context of a rapidly changing competitive environment.¹ Of particular interest is the decision to invest in new technology, the process of acquisition and implementation, the implication for other strategies, organisational processes, routines and competences at all levels of the firm. The impact on its relationship with suppliers, customers and other institutions in the pipeline and in broader context, is also considered. We proceed as follows. To investigate these research interests, we have to ask a series of questions in a few broad categories:

- Given that the firms invested in new technology, we are asking: how much? Why? How? What was the nature of the new technology? What did it offer and what did it require in order to be used successfully?
- What was the outcome of the strategy to invest in new technology for the firms in the sample?

¹ This environment includes various government policy changes, rapidly changing macroeconomic conditions, increasing legal and illegal textile imports and changing customer demands.

- How can this outcome be explained?
- Can distinct categories of firms be discerned, which will inform further research in the form of case histories?

In Section 6.2 we report on the research methodology employed. Section 6.3 describes the general characteristics of the respondents. From 6.4 onwards we proceed as follows. For every broad section of the questionnaire we first discuss our expectations, based on the theoretical and empirical literature. This is followed by a presentation and discussion of the results of this research project.

6.2 RESEARCH METHODOLOGY

The means to seek the answers to the questions raised above were primarily a postal questionnaire survey, factory visits and interviews with role players in various institutions in the industry. The latter included interviews with clients of the textile firms. Secondary sources of information were also consulted.

6.2.1 The sample

The initial part of the study was done by means of a postal questionnaire (including a self-addressed, stamped envelope) sent out to 273 textile firms in South Africa.² The sample was purely a convenience sample in the sense that no attempt at random sampling could be made, since the primary requirement was that the firm should have invested in new technology in the period under review - 1994 to 1999. The year 1994 was chosen because it is the last year before the scaling down of protective import tariffs in terms of the Uruguay Round of the GATT agreement took effect (September 1995). The year 1999 is significant simply because it is the latest year for which data was expected to be available. The list of firms for the study was compiled after a series of interviews conducted with role players in the industry (the results of these interviews are discussed separately in a section on the role of institutions in the industry). The list was put together from a list of firms (including members and non-members) provided by the South African Textile Federation, a directory of textile firms

² The questionnaire survey was done between February and April 2000.

(Kompass) and suggestions by a consultant who is very well acquainted with conditions in the industry. The second part of the empirical study entailed factory visits and interviews at eight textile firms.³ Six clothing firms were also visited. The interviews lasted for two hours (on average) and were followed by factory visits, allowing opportunities for further questions and discussion. Interviews were conducted with senior management, including the managing director, financial director, marketing manager, production manager, and at some firms, the human resources manager. The fieldwork for this part of the study was done during November 2000. The information gained from the interviews and factory visits are used here to supplement the questionnaire survey data.

6.2.2 The questionnaire

The questionnaire includes 34 structured questions, spread over four sections (see Appendix 6.1).

The first section of the questionnaire (Section A) covers general attributes of the firms. Section B focuses on the new technology, more particularly, the nature of the new technology, the reasons for acquiring new technology and the process of sourcing and implementing the technology. Section C is devoted to organisational matters, including the effect of the new technology on work process organisation, the use of human resources, training, as well as internal and external networks. Section D deals with the results of the new technology in terms of the firms' original objectives and certain performance criteria.

6.2.3 Response

During discussions with industry experts, such as the Textile Federation, it was learned that the response rates for questionnaire surveys are notoriously low. It has been established by prior researchers that one is indeed fortunate to obtain

³ The factory visits were made possible as part of a larger study on the Textile and Garment industries in 11 of the member countries of the Southern African Development Community. Permission to use raw data from the interviews was obtained from Mr. L A Darga, Project Leader, Straconsult, Mauritius.

a 20% response rate to a postal survey in the South African textile industry. This was confirmed in the current study, which did not obtain the hoped-for response rate of 20%.

TABLE 6.1: QUESTIONNAIRE SURVEY RESPONSES

Return to sender (post box closed)	Not in textiles anymore	Not prepared to give confidential information	Completed	Not accounted for	Total
38	21	12	20	182	273

Thirty-eight envelopes were returned unopened, while 21 respondents wrote or telephoned to inform us that they were no longer in textiles. Twelve firms were not prepared to give the required information at all (Table 6.1). During the follow-up period, some firms indicated that they have not received the questionnaire, in which case it was faxed to the specific person that we have communicated with. After two and a half months of pursuit, twenty completed and usable questionnaires were received.

Although the response rate was not adequate to allow for any statistical inferences to be drawn, the process has been useful in several regards. The completed questionnaires, as well as our experience in the follow-up telephone conversations, allow us to:

- Use the information gained from the questionnaires to select the firms for further in depth analysis by means of case studies;
- Identify patterns that might be further investigated by linking the questionnaire content to the interviews with industry institutions and insights gained from other sources;
- Identify research questions that fall outside the scope of this thesis, but nevertheless need to be investigated further.

6.3 GENERAL CHARACTERISTICS OF RESPONDENTS

6.3.1 Age structure

The youngest firm to respond has only been in existence for one year while the oldest was already in business for 53 years. The average age of the respondents was 27 years, but there were four firms older than 50 years, some of which have changed ownership over the years. Only five firms were younger than 10 years.

6.3.2 Size distribution

Firm size in terms of employment (1999) ranged from only seven employees to 600, while the largest proportion of firms (45%) employed between 101 and 250 employees (Figure 6.1). Only 5% of firms fell in the very small category, i.e. with less than 10 employees. Turnover (1999) ranged from R2 million to R244 million, while the average turnover amounted to R68, 28 million. The largest proportion of firms (35%) had an annual turnover between R11 million and R50 million, while the next largest category (25%) was the firms with a turnover between R51 million and R100 million per annum (Figure 6.2). Two firms did not specify their turnover.

FIGURE 6.1: SIZE OF FIRMS IN SAMPLE BY EMPLOYMENT (N=20)

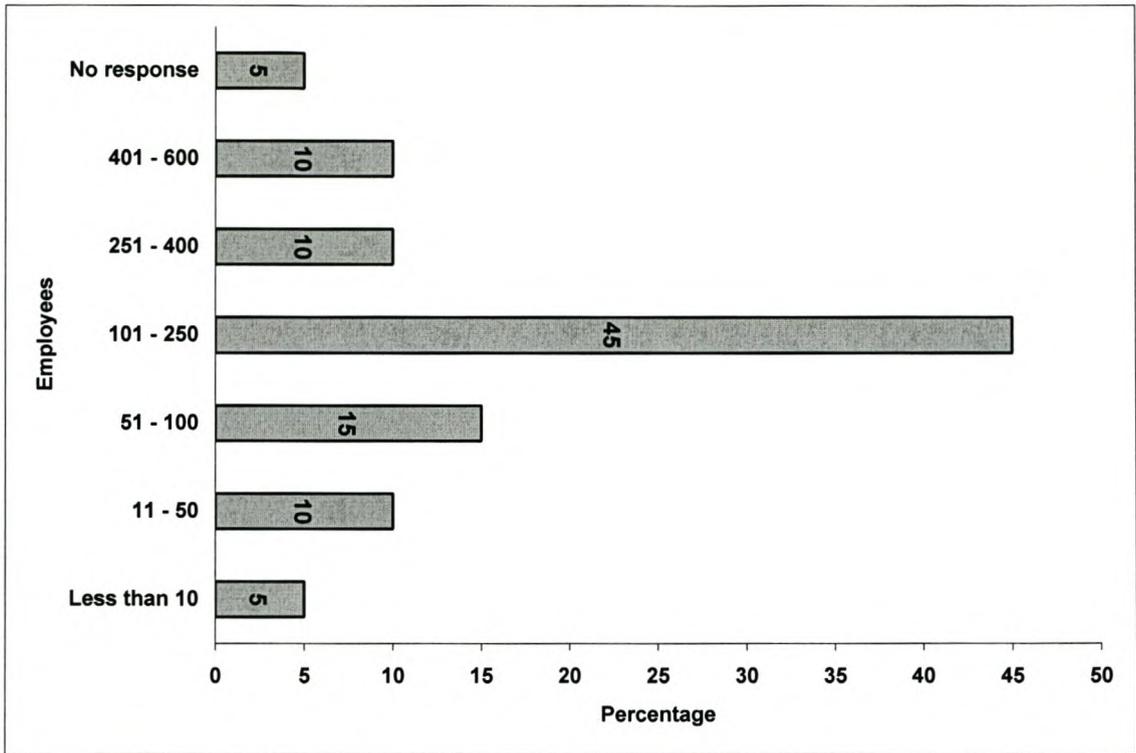
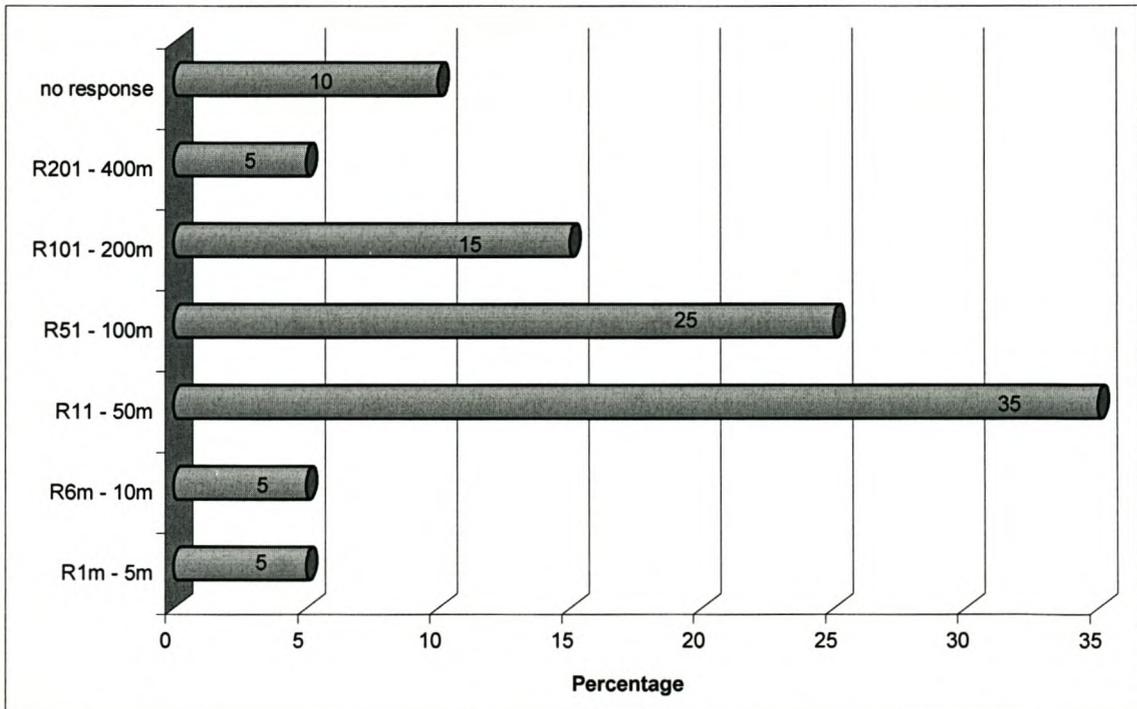


FIGURE 6.2: SIZE OF FIRMS IN SAMPLE BY TURNOVER 1999 (N=18)



6.3.3 Export orientation, regional location, and ownership structure

Fourteen of the respondents were exporters in 1999, while 5 did not export at all and one omitted the information. Seven of the respondents had no exports in 1994, so they must have started their exporting activities since then. Although the number of exporters has doubled between 1994 and 1999, most exporters export only a very small percentage of their turnover (Table 6.2). However, two exporters exported very large percentages of their exports (71 and 77% respectively). These are fairly large firms in terms of annual turnover and employment.

TABLE 6.2: EXPORTS AS PERCENTAGE OF TURNOVER (Number of firms)

Category	1994	1999
Less than 10%	3	6
10-19%	1	1
20-29%	1	4
30% and more	2	3
Total exporters	7	14

The respondents are located in the four provinces of South Africa that are known for their textile production activities. Three respondents are from Gauteng, South Africa's richest province in terms of Gross Geographic Product. Six firms from the Western Cape, South Africa's second richest province responded to the questionnaire. Eight responses came from Kwazulu-Natal province, while three firms from the Eastern Cape responded.

As far as ownership structure is concerned, half of the respondents are purely South African firms. Three firms have indicated that South African and Italian interests jointly own them, while 5 firms share their ownership with German and South African investors. South Africans and Americans jointly own the other two respondent firms (Table A6.1. in Appendix 6.2).

6.4 NEW TECHNOLOGY

The primary focus of this study is the implementation of new technology in a mature industry, i.e. the South African textile industry. *Implementation* in its

general usage means to 'carry a contract, decision, policy or plan into effect' (Pocket Oxford Dictionary, 1983:432). With respect to new technology this would conceivably include 'the acquisition of new equipment together with consumables; the undertaking of associated construction work - increasing floor loading, installing or upgrading services; the design of new or improved products, the development of new services; equipment installation, consultation, training, cost control, pilot production and testing, advertising, commissioning and handover.' (Rhodes & Wield, 1994:x). From a process analysis perspective, however, it is necessary to firstly pay attention to how the decision or policy being implemented came into being. It is possible that errors or omissions during this decision making stage could cause and compound problems in the implementation (in the narrow sense) stage. For example, if crucial players in the active implementation process were left out of the decision making process it may be hard to win their commitment later. Secondly, it is also possible that it might become evident after the active implementation stage that adaptations to the technology or organisational process could yield further benefits. Broadening the focus of implementation to include a 'before, during and after' perspective thus allows for a more continuous and dynamic learning which could be useful in future projects. In this study, the questionnaire sought to include these aspects and the case studies will continue this line of thinking.

6.4.1 The nature of the new technology

In Chapter 3 we have seen how the market for textiles and clothing has become ever more fragmented, with diverse preferences on the demand side requiring individually styled and differentiated products at affordable prices. This, and other factors, such as increased labour costs in developed countries, have put pressure on firms to become more flexible in production, i.e. to switch from reliance on mostly high-volume, standardised products and processes to a mixture of one-off, batch and high-volume production for different market segments. The introduction of a number of enabling technologies and organisational changes has had a remarkable effect on how firms go about their business in manufacturing in general, and in textiles in particular. Computer hardware and software developments are central to these changes. The next

section and Figure 6.3 are intended to show the role of these technologies from design to production, marketing and distribution of products.

6.4.1.1 *Linking all spheres of manufacturing: From CAD to CAM to CIM*

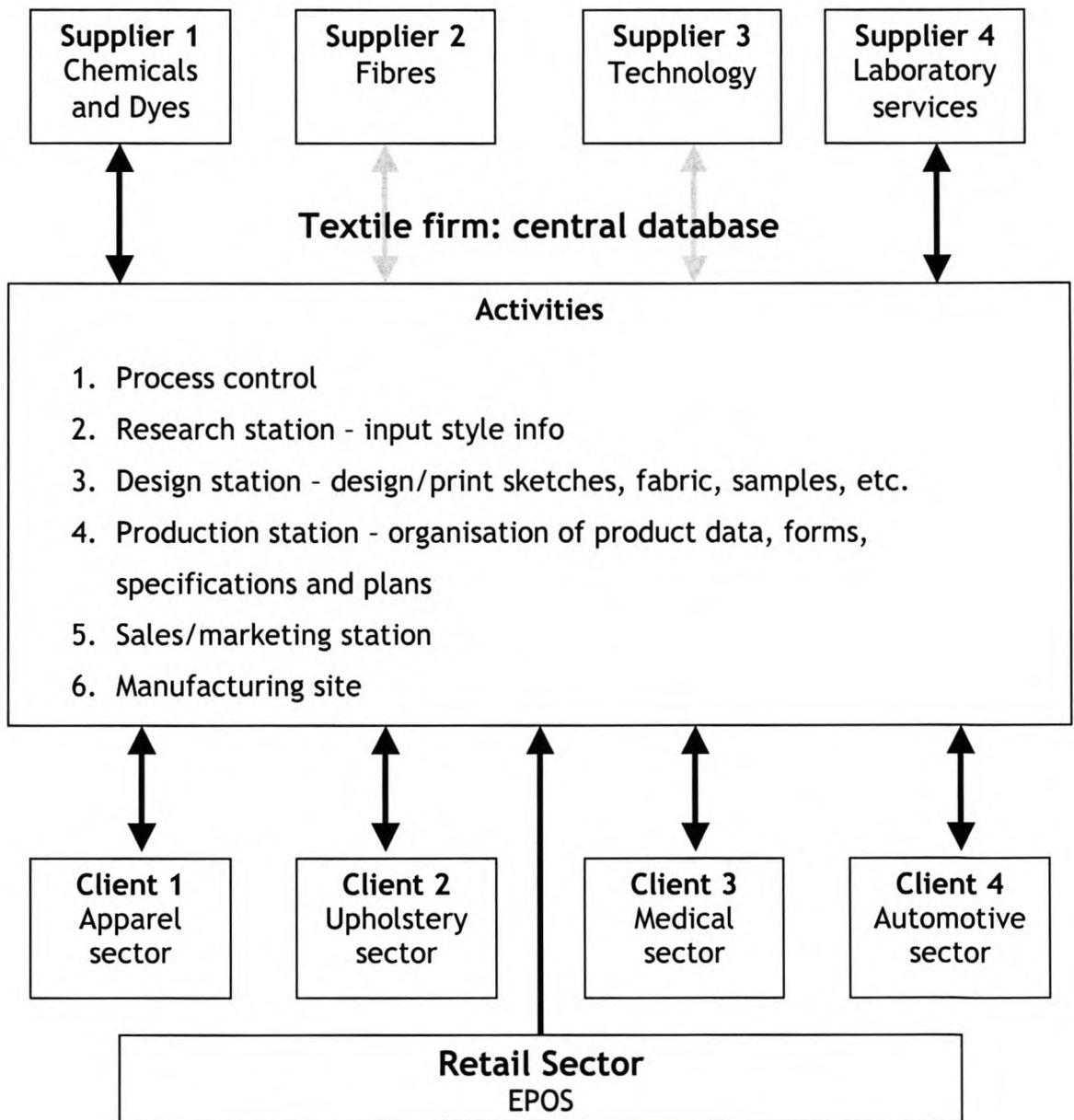
Computer aided design (CAD) involves the use of computer hardware and design software to model new textile ideas in 2 or 3 dimensional images on the computer screen. It enables firms to transmit designs to clients, to receive feedback and to compress a number of the original design processes. Computer aided manufacturing (CAM) involves the use of computer systems to control manufacturing equipment, making it easier and quicker to produce cost-effective one-off, batch produced and high-volume textile products. Computer integrated manufacturing (CIM) systems integrate the use of all the different functions of computers, including CAD/CAM, to enable fast, efficient and cost-effective textile manufacturing. CIM enables concurrent design and manufacturing, making use of Information and Communications technology and product data management systems, including Electronic data interchange (EDI) and electronic point of sale (EPOS) data transmission (Cresswell, 1998:14-19).

As can be seen from Figure 6.3, information flows between the various design, production and marketing stations of the firm, but also between the firm and suppliers as well as clients.

The transmission of more accurate and timely information through the whole organisation helps to alleviate one element of bounded rationality discussed in Chapter 2, i.e. the lack of sufficient information to make "optimal" decisions. However, this still leaves the second element, the ability of the information recipient to internalise this information and turn it into useful knowledge, unresolved. The latter depends on a host of factors, for example the extant knowledge and experience of the recipient of the information, the learning routines and culture of the organisation, etc. The question of learning capabilities is taken up again in the section on training.

Management and industrial organisational literature and practice have spawned a bewildering plethora of strategic concepts relating to these technologies, for example Total Quality Management (TQM), Quick Response (QR), Just in time (JIT) production and Continuous Improvement (CI). For our purposes we will deal with these concepts only in as far as they are relevant to technological and organisational change in textiles.

FIGURE 6.3: COMPUTER INTEGRATED MANUFACTURING IN A TEXTILE FIRM - A SIMPLE ILLUSTRATION



→ Transmission mechanisms (telephone, ISDN, fax, modem, computer, EDI)

6.4.1.2 *Benefits expected from CIM technologies*

According to Kaplinsky (1982, cited in Senker, 1984) it is impossible for users to calculate the exact benefits likely to arise from the use of CAD (or CAM/CIM for that matter), because the available benefits depend on the organisational context in which it is applied; and since gaining the full benefits depends to a large extent on reorganisation, it is impossible to forecast the future efficiency of a yet-to-be organised process (Rhodes and Wield, 1994:339). Nevertheless, from studies of systems already implemented, a list of potential benefits can be identified (Bessant and Haywood, 1988).

Expected benefits include economies of scope, deriving from the ability of firms to produce a wider range of products more efficiently as well as economies of time. The latter derives from improvements in delivery times and the advantage of receiving real time information from the market, allowing changes in designs to be made or production of products that sell well to be increased. This is particularly important in the seasonal and fashion end of the textiles and clothing market. Having better information on customers' needs, allows for a reduction in working capital tied up in stocks of raw material, work in progress and finished goods. Further advantages include improvements in quality, better machine utilisation, a reduction in rejects and reworks, increased levels of productivity and competitiveness. None of these advantages, however, will arise *automatically* upon purchase of the relevant hardware and software.

6.4.2 **Investment in new technology by sample firms: how much, why and how?**

Firms were asked to indicate how much they have invested in new technology during the period 1994 - 1999. The sub-sectors for investment included Fibre preparation, Non-wovens, Spinning, Weaving, Knitting, Auxiliary Equipment and Dyeing And Finishing. Table 6.3 indicates the breakdown of investment spending in these sub-sectors.

One respondent did not supply the amounts invested in new technology. From the table it can be seen that the largest share of the investment went to Dyeing

and Finishing, closely followed by Weaving and Spinning. The total amount invested for the 19 respondents add up to R123.9 million. Total capital investment in the South African textile industry between 1994 and 1998 was estimated to be R4 billion (De Voest, 2000: personal interview).

Respondents were asked to indicate whether their investment in new technology incorporated one or more of CAD, CAM, CNC and CIM. The purpose of this question was to identify a generic group of technologies that would make comparison possible. These technologies are usually (partially or wholly) embodied in textile machinery supplied under different brand names. Respondents were also asked to indicate on a 5 point Likert scale to what extent they were using the above mentioned technologies (1=not at all, 2=slightly, 3=moderately, 4=significantly and 5=fully).

TABLE 6.3: SUM OF INVESTMENT IN NEW TECHNOLOGY BY SAMPLE FIRMS: 1994-1999 (Millions of Rand)

Type of Machinery	Millions of Rand
Fibre preparation	17,6
Non-woven	16,3
Spinning	53,5
Weaving	59,5
Knitting	18
Auxiliary Equipment	12,5
Dyeing and Finishing	62,5
TOTAL	123,9

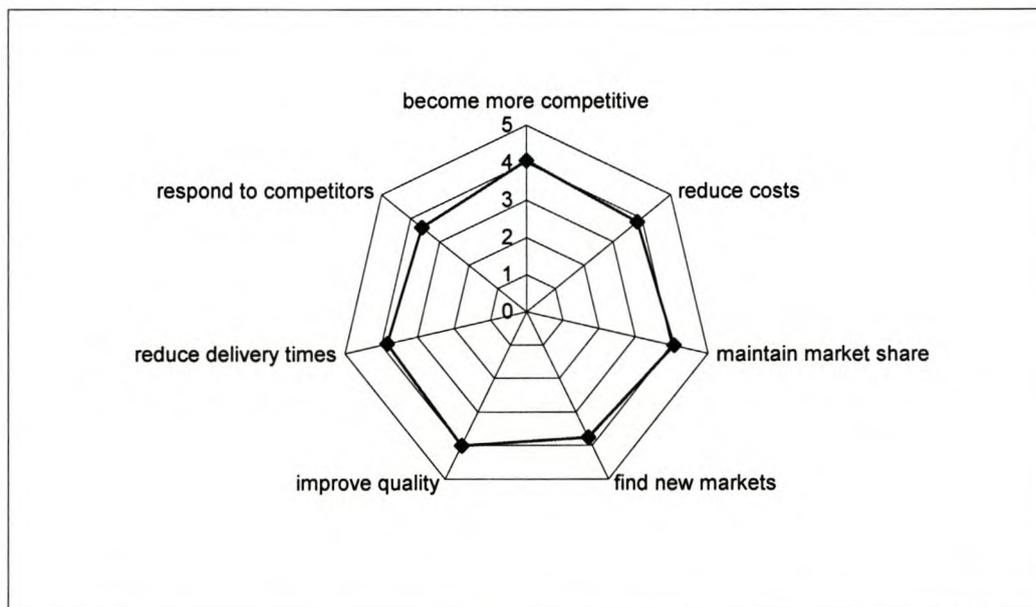
Of the different technology components, CAD was on average most extensively used, followed by CAM and CIM. However, as the relatively high standard deviations indicate, there was large variation amongst firms (Table 6.4). In fact, there were firms that had invested in these technologies and did not use them even moderately, while others utilised them fully.

TABLE 6.4: EXTENT OF USE OF TECHNOLOGY

Technology	Mean	Standard Deviation	Median	Mode	Number of responses
CAD	2.94	1.58	3	1	12
CAM	2.75	1.61	3	1	10
CIM	2.62	1.54	2.5	1	10
CNC	2.43	1.63	2	1	8

Note: 1=not at all, 2=slightly, 3=moderately, 4=significantly and 5=fully.

Respondents were asked to rate their reasons for investing in new technology in terms of their importance to the firm. A five point Likert scale was used, where 1=insignificant and 5=crucial.

FIGURE 6.4: REASONS FOR INVESTMENT IN NEW TECHNOLOGY⁴

To become more competitive was the most important reason for investment in new technology (Figure 6.4). Competitiveness has become an ubiquitous term, used in reference to nations, sectors, as well as individual firms. Following Salinger, et al (1999:11) we define *competitiveness* as " what ...firms enjoy when they understand how to combine the process of efficient resource transformation with strategic thinking on product design, firm organisation, firm linkages to suppliers and customers, inventory management, marketing, etc." This relatively high level of importance attached to becoming competitive is in

contrast with the findings of the Innovation Survey for South Africa (1996), where improving quality and reducing delivery times were rated more important than becoming more competitive.

To improve quality was rated slightly more important than finding new markets, maintaining market share and reducing costs. It is interesting to note in this regard that one of the best-known advantages of the technologies under discussion is its contribution to reduce delivery times. Yet, respondents had given it a relatively low priority as a reason for the investment in new technology. Responding to competitors was rated the least important. Although import competition is regularly cited (for example, in our interviews or in the press) as a severe threat to local textile firms, this was not seen as a compelling reason for investment in new technology.

It would seem then that the priorities of the respondents more or less conform to the priorities of the 'new competition' identified in the literature: quality, time, costs, but not to the flexibility priority [See for example, Best (1990)].

6.4.2.1 *The process of technology acquisition*

We have indicated earlier in this chapter that it is imperative that all the role players that are necessary to make the implementation process a success, be involved from the beginning. For this reason, the respondents were requested to indicate who was significant (on a 5 point Likert scale, where 1=insignificant and 5=crucial) in:

- the decision to acquire the new technology
- sourcing of the new technology
- implementing the new technology
- providing information about the new technology

In the decision to acquire the new technology, the General Manager/ Managing Director, the Board of Directors, the Marketing Manager, and the Production

⁴ Average rating for each reason shown by darker line.

Manager were identified as the most important role players (Table 6.5). This confirms two observations from the literature, namely:

1. that top management, specifically the Board of directors, be intimately involved in the process, and
2. that there be closer co-operation and co-ordination between the marketing and production functions.

However, the requirement for successful implementation, i.e. that *all* role players be involved from the beginning, is not satisfied. With the exception of consultants (who are usually an external partner), the role players rated least important, all relate to *labour* (Table 6.5).

Trade union representatives, workers in general and work place forums were all rated below two (slightly significant). Note that the standard deviation is relatively low, suggesting general agreement in this field. It must be borne in mind that textiles is a highly unionised industry in South Africa and labour relations law prescribes that management should collaborate with workers when deciding on investment in new technology. Labour legislation in South Africa also requires firms to establish work place forums, consisting of worker (not necessarily trade union members) and management representatives. The main purpose of work place forums is to facilitate communication and consultation and to involve workers in day-to-day management issues. This has never been a popular initiative⁵ and this view is supported by the rating given to work place forums (Table 6.5). Five firms omitted the information, which probably means that work place forums are not yet in place in those firms.

Since these technologies may fundamentally affect or alter the work process, the nature of work and the use of labour, one would have expected the Human Resources Manager to be an important role player in the decision to acquire these technologies. However, the results indicate just the opposite: the HR manager was rated the least important (1.31 on average). One explanation

⁵ Employers believe it dilutes management's decision-making prerogative and Cosatu, the trade union Federation fears that it would weaken their power base (Mittner, 1998: 39).

might be that if the technology were of such a complex technical nature that the HR Managers might not reasonably be expected to have a detailed knowledge of the new technology, they would not be closely involved with the decision process to acquire it. For example, in the aviation industry the HR Manager does not require an in depth knowledge of avionics. However, this does not tally with the notion that the use of ICT requires an integrated, systemic approach to all management functions in order to reap the best results. In fact the results on the significance of both labour in general and the HR Manager, contrast sharply with the perspectives underlying modern management practices, where

"Employee involvement is becoming an intrinsic part of the way organisations are functioning, primarily for the benefits to be accrued from employees' inputs to process inputs and design." (Drew, 1998: 457, emphasis added), and

"Global competitiveness, and technological development require the creation of new knowledge which is communicated to employees and which leads to continuous innovation. Traditional approaches to Human Resource Development are insufficient to meet the changing needs of the contemporary organisation." (Horwitz, 1999: 188).

The very low level of importance assigned to labour and the HR manager does, however, not come as a surprise in South African industry. Several other studies of South African manufacturing industries, including textiles, have found that management in most firms has an antiquated mindset as far as labour is concerned (Kaplinsky and Morris, 1999; Salinger *et al*, 1999; Reid, 1999a, 1999b and 1999c). This phenomenon is further discussed in the section on organisational change.

One firm reported that their foreign shareholders in Italy were very significant in the decision process to acquire the new technology.

TABLE 6.5: IMPORTANCE OF VARIOUS ROLE PLAYERS IN DECISION TO ACQUIRE NEW TECHNOLOGY

	Average evaluation of importance	Standard Deviation	Number of respondents
Board of Directors	4.12	1.16	17
General Manager/MD	4.10	1.04	19
Marketing Director	3.67	1.28	18
Production Manager	3.55	1.05	20
Finance Director	3.47	1.02	19
Other*	2.5	2.12	2
Trade Union Representative	1.67	0.90	18
Workers in general	1.58	0.71	17
Consultants	1.57	1.01	14
Work place forums	1.53	0.64	15
Human Resources Manager	1.31	0.70	16

*There were only two responses including other, i.e. shareholders in Italy and IT Manager.

In sourcing the new technology, the Managing Director (12), the Production Manager (9) and the General Manager (6), were the most important role players. Others included the Production Engineer (3), the Technical Manager (2), the shareholders in Italy (1) and the IT Manager (1) (Table 6.6).

Responsible for the implementation process were the Production Engineer (9), the Production Manager (9), the General Manager and the technology supplier (6). For three firms consultants were also important and for 1 firm the designer had an important role to play in the implementation process (Table 6.6). By combining the results of the previous three questions, an attempt can be made to establish whether there has been consistency and continuity in terms of the persons driving the implementation process. The Managing Director/General Manager and Production Manager/Engineer seem to be the crucial players in the process. This was confirmed during interviews and factory visits.

TABLE 6.6: RESPONSIBILITY FOR SOURCING AND IMPLEMENTATION OF NEW TECHNOLOGY (FREQUENCY)

	Sourcing	Implementation
Managing director	12	
Production manager	9	10
General manager	6	6
Production engineer	4	9
Other	4 ⁶	1 ⁷
Technology supplier	-	8
Consultants	-	3

In supplying information about the new technology, the management (17 crucial/very significant), and the suppliers of the new technology (16 crucial/very significant), were the most important contributors. One firm received very significant information from its shareholders in Italy and another garnered crucial information from international technical fairs (Table 6.7).

It has been documented⁸ that customers, such as the clothing sector down stream may work with textile firms in supplying information on textile technology that may best fulfil a particular need. One example is a CAD system that is compatible with that of the clothing manufacturer. However, in this study customers were rated on average as of only slight importance (less than 3, Table 6.7).

The demonstration effect of competitors having invested in new technology (perhaps reported in the local press) may provide information on new technology. Alternatively, in a technology network alliance, firms that would ordinarily be competitors, may co-operate to acquire information on new technology, thus reducing the transaction costs each has to shoulder. In this study, however, competitors were viewed as less than slightly significant (Table 6.7).

⁶ Technical Manager (2 firms), IT Manager and shareholder.

⁷ Designer (1 firm).

⁸ See for example various issues of Textile World.

TABLE 6.7: SOURCES OF INFORMATION ON NEW TECHNOLOGY IN ORDER OF IMPORTANCE

Sources	Average rating	Standard Deviation	Number of responses
Other*	4.5	0.70	2
Management	4.17	0.98	18
Suppliers of Textile machinery	4.05	0.99	20
Customers	2.29	1.04	17
Competitors	1.94	0.97	17
Industry associations	1.68	1.01	16
Consultants	1.68	1.25	17
Workers	1.62	1.20	16
Government Institutions	1.2	0.41	16

Note: 1=insignificant; 2=slightly significant; 3=moderately significant; 4=very significant; 5=crucial.

*Shareholder in Italy (rated very significant) and technical international trade fairs (rated crucial).

In Chapter 5, we discussed several institutions that are involved in the South African textile industry. These include government institutions, such as the Industrial Development Corporation and the Textile Division of the Council for Scientific and Industrial Research. We also looked at the contributions offered by industry associations, such as the Textile Federation. In the firm-level analysis, we are interested to know how much of these services on offer, are actually used by firms in the industry. One of the services on offer from government institutions and industry associations is the dissemination of information. As sources of information on new technology to the firms who completed the questionnaire, however, both government and industry institutions fared poorly (Table 6.7). In the section on external networks we consider why the services these institutions offer are so parsimoniously used.

Change management consultants seem to be an important part of the technology implementation process in other sectors and countries. However, amongst our respondents, they were not significant either in the decision to invest in new technology or as a source of information about new technology, and only important to three firms in the implementation process (Tables 6.5 and 6.7). A similar lack of significance of the services provided by consultants was found by

Kaplinsky and Morris (1999) in a study of the textile, clothing and automobile sectors in Kwazulu-Natal.

6.4.2.2 *Methods of technology transfer and possibilities for learning*

The firms were asked to report the methods of technology transfer used. The main purpose of the question was to establish what opportunities for learning came with technology acquisition. A secondary objective was to link a particular method of transfer with the competencies and complementary assets required to implement the technology in terms of the technology transfer agreement. Once it was established which methods of transfer had been used, these questions could be followed up in face-to-face interviews at the firm. Four firms reported that they had acquired the new technology through licensing, while four others acquired it by means of Foreign Direct Investment (FDI). Joint ventures accounted for 6 other firms and 7 received their technology in 'turn key projects'. Two respondents participated in a technology network alliance, while two firms wished their own inputs to be recognised. One firm boldly stated, "We looked at overseas market and copied". It must be noted that any one firm may have used more than one method of transfer; hence the total will not add up to twenty. It was expected that better learning opportunities are offered by FDI, technology alliances and own input in the development of the technology.⁹

6.5 LEARNING NEW COMPETENCIES, BUILDING NEW ROUTINES AND SWITCHING TRAJECTORIES?

The introduction of information and computer-based technologies in manufacturing has required different management competencies from those required under the previous, mechanised, mass production system. Whereas management functions in the past involved distinct and autonomous departments, the new CIM systems bring together these discrete functions, e.g. expecting design and production to work together very closely, and marketing to be involved right from the beginning of the innovation process. This requires a

⁹ Although FDI does not guarantee better technology access or knowledge transfer. Reid (1999b: 13) for example, reports that new Chinese investment in Kwazulu-Natal was characterised by rather outdated technology, low value added and appalling labour relations.

'systemic' approach, where effective internal co-ordination becomes crucial. It has happened before that a lack of co-ordination has led to the acquisition of CAD systems that were incompatible with the Computer Numerically Controlled machines used for quality control (Bessant and Haywood, 1988). It also requires that senior management be seriously involved in the decision to acquire the technology and that they have sufficient knowledge to judge the costs (including organisational changes required) and benefits for the firm. It is also imperative that decision makers understand clearly how this new technology will fit into their strategic objectives and how it will serve their needs in this regard.

These new technologies are often introduced in conjunction with new management techniques such as Quick Response, TQM or JIT production. Viewing all of this together, it is evident that a rethink on skills and the nature of organisational learning becomes necessary. If direct labour is viewed as a cost to be contained or reduced, their numbers will likely be reduced. However, this still leaves the decision about how to utilise the remaining workers, e.g. retraining for more flexible deployment, carrying out maintenance, gathering shop floor data, etc. In design, the introduction of CAD has meant that draughtsmen now had to learn to use computer systems and to understand the technicalities of design more thoroughly, thus acquiring new skills and increased power in the work place.

There remains also the consideration of the availability of skills, right through from the management level to the shop floor. This is, of course, influenced by the labour market in general and the immediate environment in which the firm is located.

In some instances, the implementation of these technologies has shown that involving labour in the decision making process about the new technology, generates better co-operation and commitment to the change process. In all instances, better communication skills have been required to ensure that accurate information is transmitted and understanding of processes is promoted. This includes the cultivation of internal and external networks to exchange information. The former would for example entail worker teams, motivational

groups or the work place forums, consisting of management and labour representatives, instituted by law in South Africa. External networks would include formal or informal networks with clients and suppliers, but also with other institutions such as government agencies, standards generating bodies, industry associations, training institutions and consultants. Finally, the actual physical organisation of work processes might have to change, involving different utilisation of floor space, for example, cluster or cellular set-up for production rather than assembly line configurations to allow more flexibility.

For South African textile firms, of course, such organisational change must be viewed in the context of the import protection regime that prevailed for most of its existence. Competencies and routines that were developed under such a regime, may not serve them best under a regime of trade liberalisation and fierce competition. For example, one of a firm's strategic competencies under the protective regime was to lobby the Board on Tariffs and Trade for further tariff protection. In the current climate, this is not a winning strategy. Firms thus need to get off from the Import Substitution Industrialisation (ISI) trajectory and engage with the new competitive pressures, i.e. whereas under protection they were competing on restricted market criteria, mostly price and product availability, such a form of supply-pushed production is no longer appropriate under the new competition where firms have to adapt to customer demands. One of the competencies they therefore have to learn is to "hear" their customers and to orientate production to demand-side imperatives (Kaplinsky and Morris, 1999:720)

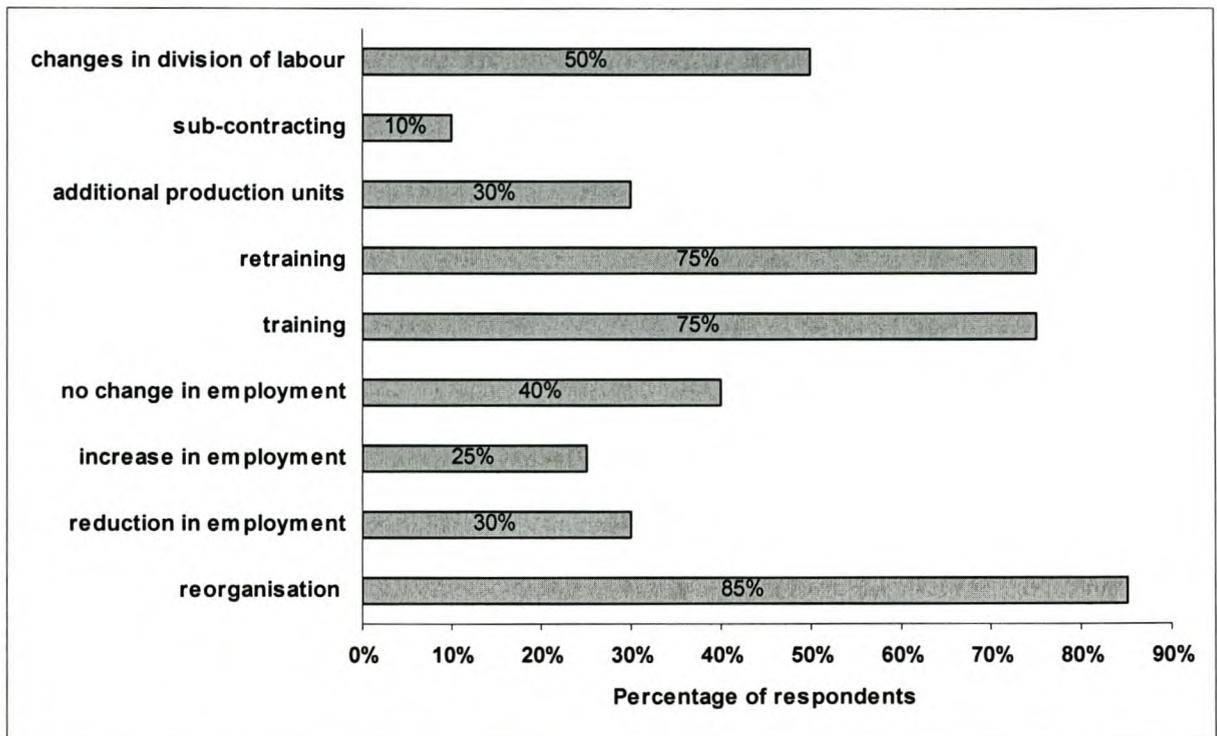
6.5.1 Organisation, skills development and networks

We have discussed in Chapter 4 the rationale for and the broad objectives of restructuring in the South African textile industry. It emerged, amongst other things, that the investment in new technology was central to the process of restructuring for many South African textile firms. In question C1, firms were asked to indicate whether their investment in new technology was part of a restructuring process. For the five brand new firms, established in the 1990s,

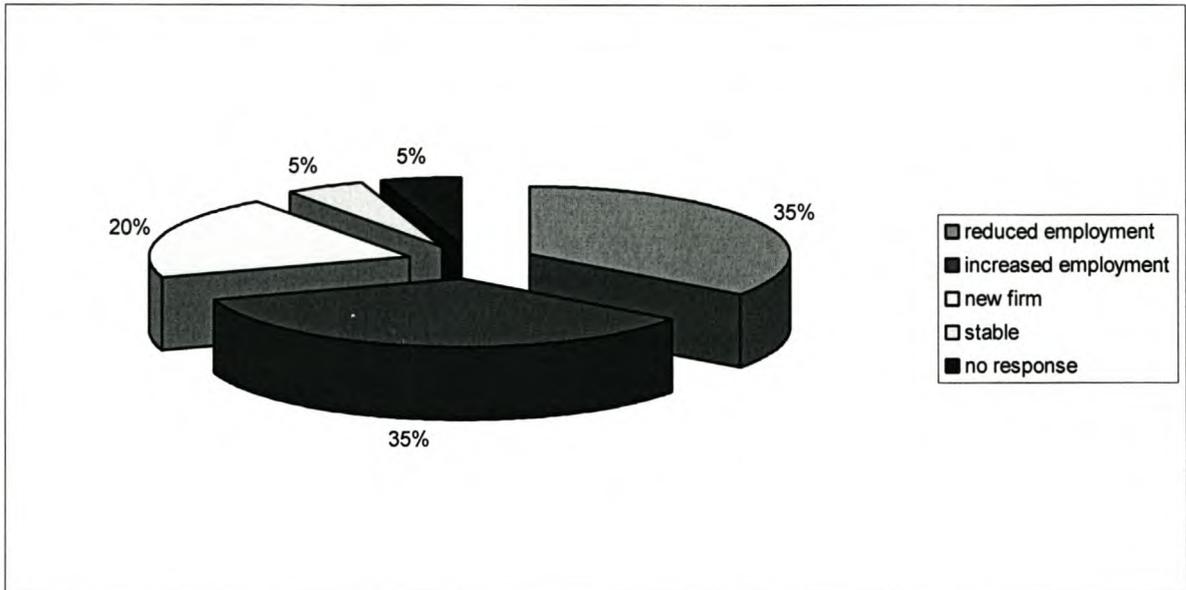
this question was, of course not relevant. Of the rest, 11 said that their investment in new technology was part of a restructuring process.

In question C2, respondents were requested to report on changes required by the implementation of the new technology.

FIGURE 6.6. CHANGES REQUIRED BY NEW TECHNOLOGY



The majority of firms (85%) reported that the new technology required a reorganisation of work processes, while 75% required training and retraining. Fifty per cent of firms had to orchestrate changes in the division of labour, while 30% acquired additional production units. As far as employment is concerned, 30% reported that they had to reduce employment, while 25% were able to increase employment and 40% required no change in employment (Figure 6.6.).

FIGURE 6.7. CHANGES IN EMPLOYMENT (1994-1999)

The changes in employment in Figure 6.6. refer to those caused specifically by the investment in new technology. Figure 6.7. illustrates the changes in employment derived from the employment figures provided by the firms in section A. Note that a bigger percentage (35%) had increased employment and further that 35% instead of 30, had reduced employment. Thus, not *all* changes in employment are attributed to the investment in new technology. (This is in agreement with the observations made for the textile industry as a whole in Chapter 4, Section 4.3.3.1.1.).

6.5.2 Sub-contracting

Only 10% of firms reported that one of the organisational changes caused by the new technology was sub-contracting. However, from the specific questions on sub-contracting, it emerged that firms were already in sub-contracting relationships before the implementation of the new technology.

Sub-contracting is a controversial issue, internationally and in South Africa. It has a negative connotation in the sense that it may be viewed as an avenue for exploitation by not adhering to acceptable standards regarding working conditions and wages. The most criticised version of sub-contracting is the

phenomenon of 'sweat shops'. In South Africa, organised labour turned out to be ambivalent on the issue. During negotiations between the government, industry and labour regarding South Africa's offer on the liberalisation of textiles to GATT, the unions included a provision that, in the case of retrenchments, following liberalisation, firms should seek to assist former workers in setting up their own manufacturing units. The supposition was that the retrenching firms should also be available as markets for the output of the new firms, through sub-contracting relationships. However, the Confederation of South African trade unions (COSATU) is also very critical of sub-contracting relationships in the clothing sector, for example.

In the questionnaire firms were asked

1. Whether they sub-contracted from large firms or from small and medium sized enterprises (SMMEs) and whether the suppliers were owned by former employees,
2. Whether the sub-contracting relationship was long term (in existence for more than five years), or intermittent and whether they saw potential for a longer term relationship to develop,
3. If they were themselves suppliers in a sub-contracting relationship, whether they supplied to large firms or SMMEs, were in a long-term relationship or saw potential for a long-term relationship.

Of the nine firms that were sub-contracting, three sub-contracted from large firms, two from small firms and four reported that former employees owned their suppliers under sub-contract. Two firms had sub-contracting relationships in existence for more than five years and four said that they saw potential for a longer-term relationship. One firm in Kwazulu-Natal said that they sub-contracted from a workshop for disabled people.

Of those firms who were suppliers in a sub-contracting relationship, five said that they supply to large firms and four to SMMEs. Seven already had long-term relationships, while another two saw the potential for a longer-term relationship. From factory visits it emerged that the majority of these sub-

contracting relationships were not very tight, i.e. not in the sense that relationships in an Italian industrial district are normally described (See for example UNIDO (2000) on relationships in Italian textile districts). Reid (1999b: 10) also reports that sub-contracting relationships in textile firms in Kwazulu-Natal were not very intimate: "*None of the respondents had relationships that were other than informal with their sub-contractors.*"

This lack of co-operation is unfortunate in the light of the larger markets opening up for South African textile and clothing firms. For example, under the African Growth and Opportunity Act (2000), clothing firms enjoy preferential access to the American market. American orders are normally far in excess of the volumes that South African exporters are used to providing. Hence, clothing manufacturers in the Southern African Development Community worry that South African textile manufacturers will not be able to supply sufficient quantities of fabric on time.¹⁰

6.5.3 Skills requirement, training and retraining

We have seen that the implementation of modern ICT in manufacturing requires different skills than in the previous age of mass production. The respondents to the questionnaire identified lack of worker skills as a significant obstacle to the successful implementation and utilisation of the new technology.

6.5.3.1 Past legacies, today's challenges

In South Africa any discussion on education or training has to take into account the legacy of the discriminatory policies applied during the Apartheid era. This is illustrated very vividly in the fact that 19% of the population over 20 years had no schooling, according to the 1996 national census. As is to be expected, these figures also have a racial bias: almost a quarter of Africans over 20 years of age have no education, compared to 10% of coloureds, 7% for Indians and 1% for Whites (South African Institute of Race Relations, 1999:110). This has serious

¹⁰ Interview with Jack Kipling, South African Clothing Industry Export Council, 20 November 2000.

implications for the pool of workers that textile firms can draw their employees from.

Given South Africa's history of racial discrimination, the new government has introduced legislation to redress the inequality. Examples of these types of legislation include the Employment Equity Bill (1996), requiring Affirmative Action in the work place for previously disadvantaged groups, i.e. blacks, women and disabled persons, the Labour Relations Act (1995), the Labour Relations Amendment Act (1998) and the Basic Conditions of Employment Act (1997). This means that the firms have to prepare their work force for the implementation and use of new technology in the context of the pressures regarding the management of diversity and the legacy of adversarial industrial relations under Apartheid. By and large, textile workers are drawn from the black communities.¹¹ Middle management is mostly white South African and senior management often comes from abroad or has been trained abroad. It has been argued that white middle management may feel threatened by the new labour legislation on top of the restructuring process, which already threatens their job security. Hence, they may be less than enthusiastic about worker participation and skills development (Kaplinsky and Morris, 1999).

6.5.3.2 *An overhaul of education and training policies*

In 1990, a Textile Industry Training Board survey of training needs concluded that there was a serious lack of skills in the South African textile industry right through from management to the shop floor. As far as management is concerned, the survey found that senior management in South African textile firms were relatively old and of an expatriate nature. The crucial problem was that there seemed to be a scarcity of younger managers ready and capable to fill the gap when the current managers needed to retire (Maree, 1995). In an interview with the Textile Division of the CSIR in April 1999, this concern was still raised. In this same interview and in an interview at the Industrial Development Corporation in March 1999, the concern was voiced that South African textile firms spent relatively little on upgrading the skills of their work

¹¹ In South African terms, black inclusive means African, 'Coloured' and Asian.

force and when economic conditions become hard, the training budget is one of the first to be reduced. However, as part of the restructuring process, firms in the industry, together with the Textile Industry Training Board had reconsidered their training needs and had started putting mechanisms in place to sharpen their training facilities. The latter had involved upgrading of in-house training facilities at firm level, too. During the 1990s, firms spent on average about R1 million per year on training (Industrial Development Corporation, 1999).

Just when the firms had their plans on-line for skills development, the government introduced the Skills Development Act, which compels all firms to contribute a certain percentage of payroll to the Skills Development Fund.¹² The idea was to get more broad based training, rather than only in the relatively larger firms. Also, the new system is to replace the apprenticeship system, which has fallen out of favour¹³. This is evidenced by the dismal enrolment and graduation figures. From 1994-1996, no apprenticeship contracts in textiles were completed, while this number was 9 in 1997 and 10 in 1998. There were 30, 48, 56, 60 and 75 apprenticeship contracts in operation during 1994, 1995, 1996, 1997 and 1998 respectively (SAIRR: 1999: 135).

In short, the new system works as follows:

With the restructuring of the South African education and training system, the National Qualifications Framework was adopted. This makes provision for the establishment of the South African Qualifications Authority to oversee the quality of output from the education and training system. Under this system, all sectors in the economy are grouped under different Sector Education and Training Authorities set up by the Minister of Labour in terms of the Skills

¹² Under the Skills Development Levies Act of 1999, a levy-grant system was introduced, which requires each employer to pay 1% of payroll to fund skills development. The South African Revenue service collects the skills levies. Twenty per cent of this revenue is paid into the National Skills Development Fund for training of the unemployed; the rest is paid to the sector authority for disbursement. Firms who already train their employees are entitled to reimbursement of expenses. There is no restriction on training at foreign institutions (Jafta & Jeetah, 2001:26).

¹³ Existing textile and clothing apprenticeship contracts will remain in place under the sector authority. New applicants for apprenticeships will be managed and quality assured by the sector authority. The apprenticeship system will remain in operation until a date to be determined by the minister, at which time all apprenticeships will become learnerships. A learnership is a structured learning programme that includes practical work experience and leads to an occupation-related qualification registered at the National Qualifications Authority. Such qualifications will thus be portable nationally.

Development Act. There is one sector authority for textiles, clothing, leather, and footwear. The sector authority has to register courses to be accredited by the qualifications authority. Industry representatives participate in the development of training courses for the industry through the relevant Standards Generating Body. All providers of training services must register and be accredited by the qualifications authority. The Textile Industry Training Board will now be phased out, while the Clothing Industry Training Board will remain as a training provider.¹⁴

However, the overhaul of the education and training system for the whole country caused major disruptions and required time intensive participation in committees by firm management and worker representatives. The industry is divided about the merits of this new system. Some would have preferred the old system, while others enthusiastically participate in the new system (Jafta & Jeetah, 2001: 26).

6.5.3.3 *Training and retraining in sample firms*

The firms participating in the current survey were requested to indicate whether they have had to train or retrain because of the introduction of the new technology and how much they spent on training and retraining between 1994 and 1999. They further had to indicate who was trained and by whom and whether the training was technology-specific or general.

In total R10 655 000 was spent on training (six firms did not give the information). For retraining an amount of R2.8 million was spent between 1994 and 1999. It must, however, be kept in mind that in-house training for which costing was not provided took place in several firms. These figures thus underestimate the training effort. It would, in any case be a serious omission to concentrate only on the quantitative aspect of training. Important questions need to be asked about the establishment of training needs at firm level, which criteria are used to select people for training, e.g. are there particular

¹⁴ Interview with David Bowen, director of SETA for textiles, clothing, leather, and footwear, 17 November 2000

attributes that persons should have to make them eligible for training, etc. Also, how are training outcomes evaluated, which measures or mechanisms are used to determine how and to what extent the transfer of knowledge and skills has taken place? How are all of these aspects communicated to trainees and training organisations?

Of our respondents, 14 reported that training was done by the technology supplier, while the same number reported training done by an internal training unit. Four firms had training done by consultants, three by a specialist training firm, two by a South African technician and one by the Textile Industry Training Board. No-one had training done by a South African University. One firm sent their trainees abroad for training. Fifteen firms reported technology specific training and five general training. In answer to the question who received technology specific training, nine firms reported that supervisors were trained, eight that machine operators were trained and ten that technicians were trained. Another six had middle management trained, three had lower management trained and one firm sent their designer overseas to be trained. Of those who said that they had received general training, five firms reported supervisors were trained, six had machine operators trained, four middle management, five lower management, and one technician.

Factory visits revealed well-equipped training facilities at leading firms, but, as we report in chapter 5, for the industry as a whole the picture is not as rosy. Also, other efforts by government to improve skills development had met with scant success in industry. A good example is the Duty Credit Certificate Scheme, discussed in Chapter 5. To take advantage of this measure, each applicant must participate in and achieve targets set by the Productivity Performance Monitoring Scheme and spend an amount equal to at least 4% of their annual wage bill on training. Reid (1999b and 1999d) found that the participants in the scheme were not very successful in achieving the expectations with respect to labour development. They also viewed labour market reforms as having had a negative impact in that:

- labour costs increased
- human resources management systems became costly and complicated

- it resulted in lower rates of employment creation
- it reduced confidence in the industry, and
- it led to an uncooperative work force. (Reid, 1999b: 12).

These sentiments were echoed by interviews in November 2000. One respondent asserted:

“ Sure, we contribute to the Skills Development Fund - it is funded by less job creation.” (my emphasis).

However, in both the current study and Reid’s surveys, a small majority was positive about labour development. A small percentage of firms in this survey viewed labour as an indispensable asset to the firm, while some participants in Reid’s survey believed that a properly structured industrial relations regime would help to minimise industrial and racial conflict in the industry (Reid, 1999b: 13).

One aspect that bedevils the decision to invest in skills development for firms is the incidence of HIV/AIDS, especially in Kwazulu-Natal. Visits to factories in Kwazulu-Natal revealed that some workers have been on paid sick leave for more than six months. Management has no idea when or if the workers will return. Because HIV/AIDS is not a notifiable disease in South Africa, management is not allowed to enquire into the cause of the illness. This increases uncertainty for the firm. Firms now also spend money on AIDS awareness training. Apart from the obvious loss of skills when people die, there is also the added and more frequent problem of absenteeism because workers have to attend more and more funerals.

6.5.4 Internal networks

In order to establish an integrated manufacturing system, improved internal co-ordination will be required. This suggests an enormous balancing act, connecting all aspects of the operation and finding mechanisms to communicate strategic objectives and plans to all 'players'. The organisational structures that have

developed over the past few decades have included various forms of 'management team efforts'. In the current survey, the respondents were requested to rate the following as mechanisms for internal co-ordination in their firms on a 5 point Likert scale, where 1=insignificant and 5=crucial:

- Worker teams
- Work place forums
- Management meetings
- Board meetings
- Motivational groups

Once again, worker related mechanisms did not fare very well. Worker teams and work place forums were rated on average less than moderately significant (Table 6.8). Management meetings and board meetings were considered most important mechanisms, followed by motivational groups, which were not quite accorded a 3 (moderately significant).

TABLE 6.8. MECHANISMS FOR INTERNAL COORDINATION IN ORDER OF IMPORTANCE

Mechanism	Average rating	Standard deviation	Number of responses
Management meetings	3.83	0.85	18
Board meetings	3.37	1.45	16
Motivational groups	2.93	1.09	15
Worker teams	2.83	1.20	18
Work place forums	2.77	1.06	17

Note: 1=insignificant, 2=slightly significant, 3=moderately significant, 4=very significant, 5=crucial

This outcome is similar to the results of a series of surveys in the textile sector in Kwazulu-Natal and the Western Cape, done by the Industrial Restructuring Project at the University of Natal:¹⁵

"The inclusion of labour in the managerial and planning process was also found to be poorly implemented. Essentially, no respondent had thus far attempted to pursue this goal seriously. The only respondent who claimed

¹⁵ Reported in Reid, 1999a, 1999b, 1999c, and 1999d.

to engage workers in this manner seems to have restricted the exchange to imploring workers to improve productivity levels.” (Reid, 1999b: 9).

At least in the current study there were a few firms who have successfully incorporated worker participation.

6.5.5 External networks

6.5.5.1 Tight versus dispersed networks

The idea that a firm is not an autonomous unit, acting independently from its environment, but rather forms part of a broader interactive network, is very prominent today. It is, however, not a brand new idea. In the work of Alfred Marshall at the turn of the 19th century, a great amount of attention is paid to the notion of an industrial district (e.g. in Manchester, Leeds, Birmingham and Sheffield in England). In the 1980s, the work of Piore and Sabel (1984), amongst others, renewed the interest in industrial districts, with particular reference to the so-called Third Italy. In the context of a district, the firm's network is localised and firmly embedded in its geographical location (thus, 'tight' in the spatial sense). This network may include suppliers of raw materials, energy and machinery, local government structures, education and training institutions, sub-contracting relationships and industry associations. At the other end of the spectrum is the so-called 'network firm' (admirably documented in the case of Benetton by Fiorenza Belussi, 1987 and 1992, and Belussi and Festa, 1990). This firm's network is geographically dispersed and enabled by modern-day information and communications technologies. This network would probably include suppliers of raw materials, intermediate inputs and textile machinery on several different continents, but also close relationships with international industry associations, distribution channels, sources of market intelligence and many more.

Most firms would probably have a combination of localised and dispersed network relationships. Curzio and Fortis (2000: 176) argue in the context of Italian industrial districts that in future *'the actual local networks will tend to*

transform themselves into specialised nodes, service centres for the long-distance transnational (European and global) networks, creating room for an extended and intensified division of labour which does not diminish the local context, but increases its value by means of different forms of specialisation and global links' (translated from the original Italian). The authors thus foresee a mutually beneficial integration of localised and dispersed networks.

As far as South African textile firms are concerned, there are no real industrial districts in the sense of the Third Italy. Although there is geographical proximity, firms tend to play their cards close to their chests. There seems to be a tradition of mistrust dating back to the nature of competition for the domestic market under the protective regime and the added isolation of the sanctions era (Kaplinsky and Morris, 1999: 730). It is, however, conceivable that South African textile firms have built up relationships that could be called networks with various role players, such as customers, suppliers and industry associations over time.

To establish the nature and dimensions of the external networks of the South African textile firms, they were asked to rate the importance of their relationships with the following before, during and after the implementation process:

- suppliers of raw materials
- suppliers of textile machinery
- local customers
- foreign customers
- the Textile Division of the CSIR
- the Textile Federation
- the Industrial Development Corporation
- Universities
- Technikons
- Consultants
- Textile Industry Training Board
- Others.

The idea was to gain a sense of how the dynamics of these network relationships have changed over the period of acquisition and implementation of the new technology. For example, which players were more important before, during and after the implementation process?

TABLE 6.9: RELATIVE IMPORTANCE BEFORE DURING AND AFTER IMPLEMENTATION OF NEW TECHNOLOGY¹⁶

	Before	During	After
Technology suppliers	12	14	13
Local customers	9	12	13
Raw material suppliers	9	12	11
Foreign customers	4	7	7
Industrial Development Corporation	2	3	1
Consultants	2	2	1
Universities and Technikons	1	1	1
Textek	1	1	1
Textile Industry Training Board	0	0	1
Texfed	0	0	0

It would be reasonable to expect that suppliers of textile machinery would be crucial in the whole process. If a prior relationship with the suppliers did not exist, it might be logical that such a relationship will develop during the implementation process and remain important after implementation. Indeed, technology suppliers have been rated the most important for the whole process (Table 6.9).

Suppliers of raw materials may include the suppliers of natural fibres, such as cotton, as well as the suppliers of manufactured fibres, packaging materials, dyes, chemicals, etc.

Because the nature of the technology is such that it enables integrated supply chain management, it would be necessary to involve suppliers of raw materials as well as customers in the process in order to set up a compatible system of exchange.

¹⁶ The frequency of being rated crucial or very significant.

The motto of the management techniques (e.g. TQM) that are meant to be used in conjunction with the technologies under discussion purports to put the customer first. From the textile firm's point of view, this would mean that the customer, e.g. clothing firms, be a very important part of the process of the implementation of new technology. After all, they will be using the products resulting from the use of the new technology. Studies by Maree (1995), Altman (1995) and the Swart Commission on Textiles and Clothing (1994) have all reported on the weak links and lack of co-operation amongst members of the textile pipeline, especially between textile manufacturers, the clothing sector and local retailers. Because some firms focus on the local market and others are export orientated, we have made a distinction between firms' relationships with local and foreign customers.

In this study, in contrast to the lack of co-operation with customers cited above, respondents have rated local customers as the second most important role players, while raw material suppliers came in third. Both have become more significant during the implementation process, while local customers gained even more importance and raw material suppliers became slightly less important after the implementation (Table 6.9). Foreign customers were also rated relatively important, becoming more so during and after the implementation process. This could, for example, be the case of exporters to the US, where it is the custom to work with suppliers in developing countries to ensure American standards in production.

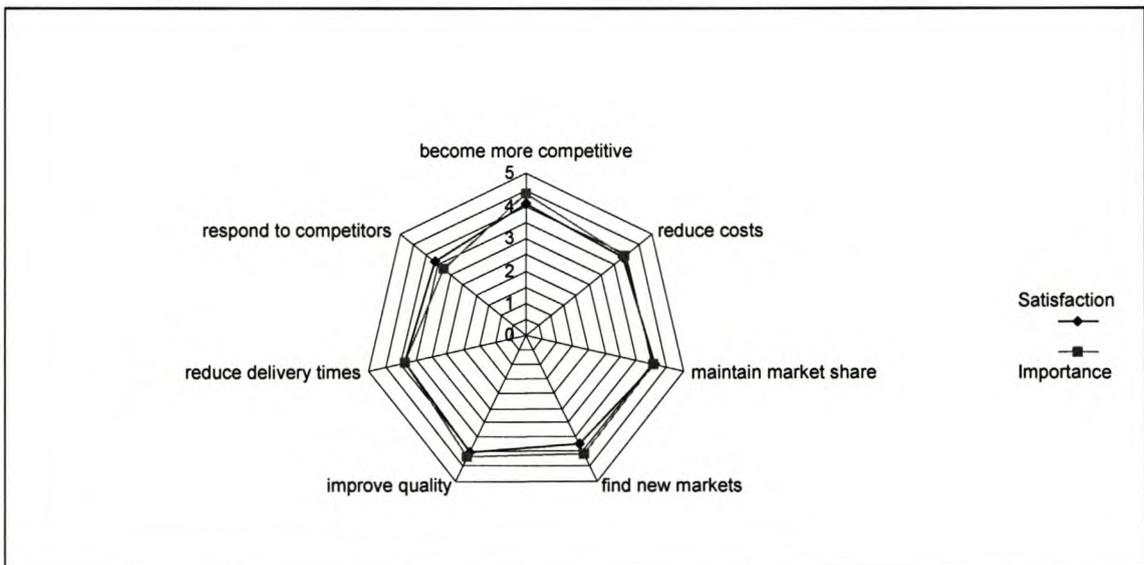
The rest of Table 6.9 underscores the weak links to other institutions, including the industry association, Texfed. Kaplinsky and Morris (1999:731) contend that these institutions have not successfully made the switch from an Import Substitution Industrialisation (ISI) trajectory to an outward-oriented one and have therefore not yet learned the competencies necessary to assist textile firms in their quest for competitiveness in the new competitive environment. Our interviews also revealed that firms are sometimes not aware of the services offered by these institutions, have a low opinion of the abilities of the institutions, or consider them irrelevant to their needs.

In maintaining generally weak links with customers and several government, industry and higher educational institutions, South African textile firms lose out on many opportunities for learning, e.g. by interacting.

6.6 THE RESULTS OF THE NEW TECHNOLOGY

In question D1, on the impact of the new technology, the respondents were asked to indicate to what extent their expectations expressed in question B5 (see questionnaire in Appendix 6.1) were met. The Likert scale used in this question had 1=not at all, 2=slightly, 3=moderately satisfied, 4=significantly satisfied and 5=completely satisfied.

FIGURE 6.8: RELATIVE IMPORTANCE OF REASONS FOR INVESTING IN NEW TECHNOLOGY AND SATISFACTION RATINGS



Note: 1=insignificant/not at all, 2=slightly significant/slightly satisfied, 3=moderately significant/satisfied, 4=very significant/significantly satisfied, 5=crucial/ completely satisfied.

As far as reducing costs, reducing delivery times, and maintaining markets are concerned, expectations were exactly matched, whereas for responding to competitors, expectations were even exceeded (Figure 6.8). The only performance gaps that remain are for becoming more competitive, finding new markets and improving quality. Although the performance gaps are relatively

small, it is possible that the firms' perception of their performance and that of their clients may differ. Kaplinsky and Morris (1999), for example, found that there was a vast unfavourable difference between the firms' perception of how well they 'heard' and responded to their customers and the opinion of the customers. Although in this questionnaire survey customers were not asked to rate the performance of textile firms, it emerged from interviews with clothing firms that quality, delivery times, consistency and price were bones of contention.¹⁷ In fact, as table 6.10 indicates, performance for the sample firms was quite mixed.

To give more specific content to the results of the implementation of the new technology, firms were asked in question D2 to give details of the changes in several output measures of performance. In case the quantitative details were too confidential or not available, firms were given an opportunity in question D3 to indicate whether their performance with respect to the same measures covered in D2, has increased, decreased or remained unchanged between 1994 and 1999.

If the expected efficiencies promised by the ICT technologies applied in textiles, the performance measures are expected to change as follows:

- The number of stock turns per year are expected to increase, while stock of raw materials (measured in weeks of input), work in progress (weeks of production) and finished goods (weeks of output) are all expected to decrease as better and timelier information make large stock piles superfluous.
- Throughput time is expected to decrease while the value added time should increase. Rejects and reworks as a percentage of output are expected to decrease.

¹⁷ Peter Gibbon (2002) documented the same complaint in an extensive study of clothing manufacturing in South Africa.

- As for deliveries, it is expected that the percentage of deliveries on time will increase, while the percentage of late deliveries will decline. The latter is divided into two measures: percentage of deliveries that is less than two weeks late and the percentage that is more than two weeks late.

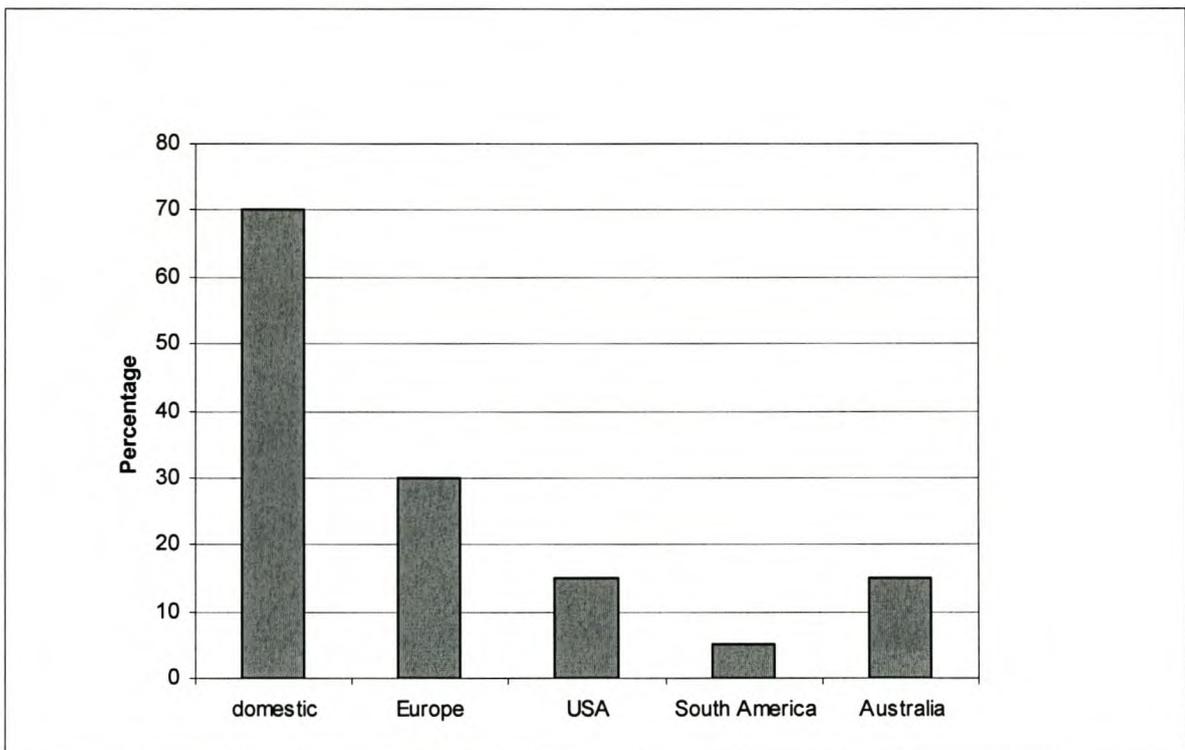
Four firms did not answer question D2 and D3. Only three firms were willing to give actual figures in response to question D2. Of these, one firm had made exemplary progress under new management:

- The number of stock turns increased from 2.5 in 1994 to six in 1999, while the stock of raw materials declined from 40 weeks to four weeks and that for finished goods halved from three weeks of output to 1.5 weeks. The work in progress figure for 1994 was not available, but for 1999 it was three weeks of production. Throughput time declined from six to two weeks. The percentage of rejects as a percentage of output, increased from 2 to 3 per cent. This is probably a temporary problem while workers learn to use the new technology. The number of reworks declined from 6 per cent of output to 5 per cent.
- In the percentage of deliveries on time, the firm has not made any improvements - it was 85 per cent in 1994 and in 1999. This is an area that needs to be improved, since it falls below the international norm of 90% deliveries on time. Also, clients in the United States demand on time delivery performance of 95% or better (Jafta & Jeetah, 2001:41). The percentage of deliveries more than two weeks late, declined from 5 per cent to 3 per cent.

TABLE 6.10: CHANGES IN OUTPUT PERFORMANCE (1994-1999)

Performance measure	Increased	Decreased	Unchanged
Stock turns per year	11	2	1
Stock: raw materials (weeks of input)	6	6	5
Work in progress (weeks of production)	1	8	5
Finished goods (weeks of output)	3	8	3
Throughput time	3	10	2
Value added time	8	2	3
Rejects (% of output)	2	9	4
Reworks (% of output)	1	9	4
Deliveries (% on time)	10	1	4
Late > 2 weeks	1	9	2
Late < 2 weeks	2	4	2

Firms seem to have fared best in reducing stock holdings and increasing the percentage of deliveries on time, but the picture is mixed.

FIGURE 6.9: RELATIVE IMPORTANCE OF MARKETS IN SAMPLE FIRMS

The domestic market is still by far the most important destination of textile output, rated crucial or very significant by 70% of firms. Europe and Australia are the next most important markets for the firms in this survey. However, during

the firm interviews, much enthusiasm was displayed about growing exports into the US market under the African Growth and Opportunity Act (AGOA) and into the EU market under the South Africa-European Union Free Trade Agreement. Several firms already had orders to supply fabric to clothing manufacturers exporting to the US. This included clothing firms in Mauritius, who would source fabric from South Africa in order to produce garments for export to the US.

Finally, in question D5, firms were requested to indicate whether their economic performance has improved, deteriorated or remained stable since the implementation of the new technology. Two firms did not answer this question. Thirteen firms indicated that their economic performance has improved, three that it remained stable and two that they have seen their economic performance deteriorate. One of these added by way of explanation: " it's a poor market - no profits".

6.7 FORGING AHEAD, MUDDLING THROUGH AND LAGGING BEHIND

There is much diversity in the outcome of the process of investing in new technology in the surveyed firms. We are, however, able to discern certain patterns based on the following criteria:

- firm behaviour in the process of acquiring and implementing the new technology
- the firms' use of resources and attitude towards labour
- the firms' response to the changing skills requirement
- the firms' response to the organisational changes required to best use the new technology
- the factors driving the firms' quest for competitiveness
- the firms' use of external networks
- the firms' performance indicators
- the firms' export orientation.

On this basis we are able to identify three categories of firms, namely leading firms, moderate adapters and laggards, the characteristics of which are summarised in Table 6.12. It is important to keep in mind that not all the

characteristics of a category need to apply to a *single* firm; we are constructing composite profiles of groups of firms. Firms are classified as leading, moderate adapters and laggards, measured against the 'ideal type' profiles, which are constructed based on the criteria for success distilled from the literature and this survey. The purpose is to identify the combination of factors associated with success under the conditions prevailing in the competitive environment of South African textile firms during the period under consideration.¹⁸

6. 7.1 The technology: impediments to successful implementation

Leading firms that had invested in new technology, had participated closely in the design and implementation of the new technology. In fact two firms had contributed their own input into the technology development process, while others were able to develop new products, such as improved denim fabric and sophisticated breathable laminated materials for sportswear.

Moderate adapters and laggards, however, have not seen significant results from their investment in new technology. What could possibly have been the obstacles to successful implementation of the new technology? Table 6.11 summarises the problems with the implementation as rated by the respondents.

TABLE 6.11: DIFFICULTIES IN IMPLEMENTING NEW TECHNOLOGY IN ORDER OF IMPORTANCE

Difficulties	Average rating	Standard deviation	Number of responses
Other ¹⁹	4.00	-	1
Skills levels of workers	3.89	0.87	19
Integration with older technologies	3.26	1.24	19
Modification of original technology	2.78	1.35	19
Internal co-ordination	2.58	1.30	20
Industrial relations	2.17	1.29	19
Insufficient demand for products	1.94	1.10	18

Note: 1=insignificant, 2=slightly significant, 3=moderately significant, 4=very significant, 5=crucial

¹⁸ The purpose is thus NOT to construct a taxonomy of firms that should hold for all firms and all times.

¹⁹ The time frame allowed for the implementation was too short

6.7.1.1 *Underestimating implementation time frame*

When a technology is relatively new to the implementing organisation and it does not have accumulated knowledge from previous implementation processes, it is possible that management may underestimate the time and effort it will take before the process yields the desired results. One firm had indeed rated this problem as one of the most important obstacles to the successful implementation of its new technology.

6.7.1.2 *Lack of skills*

With respect to the labour market, the implementation of the new technology may be hampered by the lack of skills at different levels of the organisation. In this survey, firms rated the skills levels of workers as an important impediment to maximising the gains from the new technology. This lament was also voiced during interviews, where low quality performance (such as high reject rates) was attributed to poor workmanship because of a lack of skills. Concerns about the skills of management were also expressed in interviews.

6.7.1.3 *Problems integrating new with older technologies*

Technically, the reorganisation of work processes to implement the new technology might require the integration of older technologies with the new. The new embodied technology invariably allows much speedier production, which might lead to bottlenecks where several processes, e.g. spinning, weaving, dyeing and finishing are involved. This problem was rated as fairly serious and its impact was illustrated on factory visits. For example, in one factory, drawing in of yarn is still done by hand, while high-speed machines do the processes before and after this activity. However, this firm is still agonising over the possibility that 15 workers will lose their jobs if a fast machine is bought to do the drawing in.

6.7.1.4 *Modification of original technology*

An old lament with respect to the transfer of imported technology is that the technology needs to be adapted to suit the context in which it is to be used. We have seen in Chapter 3 that by and large the textile technology developed in industrialised countries has the effect of reducing labour input. This is a pronounced problem for developing countries where unemployment is a serious problem and skills and education levels are generally low. Given the peculiar position of the South African textile industry in terms of the characteristics that define the industry in developed and developing countries (See Chapter 3), it is of interest to determine whether this is a problem pertaining to the South African textile firms as well. The firms in this survey gave this concern a relatively low rating (2.7), but this is not to say that it is not a problem for *some* firms (the standard deviation is 1.35)²⁰.

6.7.1.5 *Internal co-ordination and industrial relations*

These two factors were not given a serious rating as obstacle to successful implementation. Yet, leading firms were able to develop worker participation schemes and enjoy excellent relations with their workers. These firms were also able to increase employment.

Moderate adapters, however, have only tentatively started worker participation schemes, where, for example, they use workers in quality circles. They have also had to retrench some people. Laggards do not encourage worker participation, have poor worker relations and still view workers as a cost to be minimised. They have also retrenched workers in a cost reduction effort.

6.7.1.6 *Insufficient demand for the products produced with the new technology*

Apart from the uncertainty, which comes with the introduction of new products, firms may lack the market intelligence to estimate the demand for the products

²⁰ Two firms considered it crucial, while three more rated it as very significant.

they produce with the new technology. This may impede the production of sufficient quantities to reap the full benefits promised by the new technology. In the current survey, this was rated the least of the concerns of the firms (1.94), with a standard deviation of 1.10, which does not indicate very much variation amongst responses (Table 6.11).

6.7.2 Organisational changes and skills development

Leading firms have to a large extent completed the organisational changes necessary to best use the new technology. They are certified for quality (ISO 9 000) and environmental (ISO 14 000) standards and are committed to skills development practices such as multi-skilling and continuous learning.

Moderate adapters have made incremental changes to work organisation and have spent money on technology-specific as well as general training for personnel from the shop floor to middle management.

Laggards have made only superficial changes to work organisation and have done technology specific training, in most cases relying on the technology supplier to do the training. They have very weak links to training institutions.

6.7.3 Export orientation

Leading firms are more often than not exporters who compete in the global market on quality, reliability, consistency and short lead times, rather than price. They have established strong relationships in the supply chain and participate in the work of industry associations and the Sectoral Education and Training Authority. Overall, their economic performance has improved.

Moderate adapters are beginning to export, learning how difficult and costly it can be to break into the international market. They have, as yet, rather fragile links to external networks and compete on the basis of a mixture of quality, good delivery performance and price. Their economic performance has remained stable.

Laggards still long for the days of high import protection levels. As Reid (1999a: 15) puts it:

“The majority of the sampled industrialists indicated that they would rather revert back to the previous industrial policy regime and assume a net inward position.”

They are sceptical about external networks, compete primarily on price, and focus on the local market. Some of them have seen their economic performance deteriorate.

6.8 SUMMARY AND PREVIEW OF CHAPTER 7

In summary, although all firms in the survey had invested in new technology, not all of them had been successful in reaping the promised benefits. From our analysis, two broad problem areas emerge, i.e. the firms' behaviour with respect to labour and the apparent mismatch between the nature and requirements of the new technology and the organisational structure of management and production. Thus, strategies that worked well combined investment in new technology with human capital upgrades and organisational change, which favoured participation of labour in the implementation process. The latter was particularly important where investment in new technology was part of a restructuring process (as is to be expected in a mature industry trying to rejuvenate itself). Added to this was the expansion of perspectives from focusing on the domestic market to seizing export opportunities. This was, however, not an easy path to negotiate, especially with unstable exchange rates, rising interest rates, and slowing economic growth in our trading partners.

Having constructed three categories of firms, an important question arises, i.e. under which conditions will it be possible for a firm to move across categories?

To investigate this further, we present in Chapter 7 case histories of three firms:

1. Frame Textiles, which is almost as old as the textile industry in South Africa, currently the largest and leading firm. But, this was not always the case: in the early 1990s, this firm was in great difficulty. In financial year 1990, for example, the firm made a loss of R 320 million. How then, was the firm turned around?
2. Glodina, partially foreign owned, at the time of the postal questionnaire survey a moderately successful adapter. The firm is, however, currently in a profitability crunch, and being taken over by a German investor who is known for his tendency to buy struggling firms to either turn them around to profitability or sell them off piece meal. How did Glodina end up in this position?
3. The Coastal group, who at the time of the survey was still one of the textile firms with the most promise, attracting foreign investment and buying state of the art equipment. By November 2000, when the factory visits were done, Coastal had closed its doors. Why? What had happened to extinguish this promising firm?

TABLE 6.12: CHARACTERISTICS OF COMPOSITE FIRMS

CHARACTERISTIC	LEADING FIRMS	MODERATE APADTERS	LAGGARDS
TECHNOLOGY	Invested in new technology Participate in design of NT Virtually reap full benefits of NT	Invested in NT Use CIM moderately	Invested in NT Not using NT fully
LABOUR	Worker participation Increased employment	Worker participation slightly significant Retrenched workers Moderate use of worker teams for internal coordination	Poor worker relations Workers a cost to be minimised
TRAINING	Technology specific, General and multi-skilling Continuous learning	Technology specific and general	Technology specific Weak links with training institutions
ORGANISATIONAL CHANGE	Adaptation of work organisation Quality (ISO 9 000) Environmental standards (ISO14 000)	Incremental changes in work organisation	Superficial work process change
COMPETITIVENESS DRIVERS	Quality, reliability, consistency and delivery times rather than price	Mixture of quality, delivery times, but price still very important	Price
EXTERNAL NETWORKS	Supply chain management Industry association	Relatively weak links with external networks	Sceptical about networks
PERFORMANCE INDICATORS	Economic performance improved	Economic performance remained stable Managed to reduce stock holdings and improve delivery times, but quality measures and throughput times lagging	Economic performance deteriorated
EXPORT ORIENTATION	Export large percentage of output	Focused on local market but starting to export	Focus on domestic market

APPENDIX 6.1.

QUESTIONNAIRE

INTRODUCTION OF NEW TECHNOLOGY IN SOUTH AFRICAN TEXTILE FIRMS

SECTION A - FIRM PARTICULARS

A1 When was the firm established?

--	--	--	--

--	--

--	--

Y Y Y Y M M D D

A2 Ownership: Please select using X in the relevant box(es):
 South Africa
 Foreign (please specify)
 Both (please specify foreign ownership)
 Private company
 Public company
 Listed on the Johannesburg Stock Exchange
 Subsidiary of larger firm

A3 Size (Please supply the following figures):

A3a Turnover per annum: (in millions of Rands) 1994 R

--	--	--	--	--

 (If less than R1m, please use comma, e.g. R0,5m) 1999 R

--	--	--	--	--

A3b Employment 31/12/1994

--	--	--	--	--

31/12/1999

--	--	--	--	--

A3c Exports (in millions of Rands) 1994 R

--	--	--	--	--

 (If less than R1m, please use comma, e.g. R0,5m) 1999 R

--	--	--	--	--

SECTION B - NEW TECHNOLOGY

B1a Did your firm invest in new production technology in the period 1994-1999?
 Yes No

If NO, please answer question B1b. If YES, please proceed to question B2.

B1b Reasons for not investing in new technology: Please rate the following reasons in terms of their importance to your firm:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	1	2	3	4	5
The cost of new technology					
Economic uncertainty					
Political uncertainty					
High interest rate					
The value of the Rand					
The attitude of workers					
The cost of labour					
Other					

If "other", please specify.....

B2 Please indicate the value of investment in new production technology (1994-1999):
(in millions of Rands) (If less than R1m, please use comma, e.g. R0,5m)

Fibre preparation	R	<input type="text"/>					
Non Wovens	R	<input type="text"/>					
Spinning	R	<input type="text"/>					
Weaving	R	<input type="text"/>					
Knitting	R	<input type="text"/>					
Auxiliary Equipment	R	<input type="text"/>					
Dyeing/Finishing	R	<input type="text"/>					
Total	R	<input type="text"/>					

B3 Please indicate whether the new technology incorporates the following by placing an X in the relevant box (es):²¹

Computer Aided Design (CAD)	<input type="checkbox"/>
Computer Numerically Controlled Machines (CNC)	<input type="checkbox"/>
Computer Aided Manufacturing (CAM)	<input type="checkbox"/>
Computer Integrated Manufacturing (CIM)	<input type="checkbox"/>

B4 Please indicate to what extent your firm currently utilises the following aspects of the new technology:

1= not at all; 2= slightly; 3= moderately; 4 = significantly; 5= fully

	1	2	3	4	5
Computer Aided Design (CAD)	<input type="text"/>				
Computer Numerically Controlled Machines	<input type="text"/>				
Computer Aided Manufacturing	<input type="text"/>				
Computer Integrated Manufacturing	<input type="text"/>				

B5 Reasons for acquisition of new technology. Please rate the following reasons in terms of importance:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	1	2	3	4	5
Become more competitive	<input type="text"/>				
Reduce costs	<input type="text"/>				
Maintain market share	<input type="text"/>				
Find new markets	<input type="text"/>				
Improve quality	<input type="text"/>				
Reduce delivery times	<input type="text"/>				
Respond to competitors	<input type="text"/>				
Other	<input type="text"/>				

²¹ Definitions are given at the end of the questionnaire.

If "other", please specify.....

B6 Please indicate the importance of the following in the decision to acquire new technology:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	1	2	3	4	5
Production Manager					
General Manager					
Finance Director					
Marketing Director					
Trade Union representative					
Workers in general					
Work place forums					
Human Resources Manager					
Board of Directors					
Consultants					
Other					

If "other", please specify

B7 Who was responsible for sourcing new technology? Please select relevant box(es) using X:

- Managing Director
- Production engineer
- Production manager
- General manager
- Other

If "other", please specify

B8 Who was responsible for the implementation of the new technology? Please select relevant box(es) using X:

- Technology supplier
- Production engineer
- General manager
- Production manager
- Consultants
- Other

If "other", please specify

B9 Sources of information on new technology. Please rate the following in terms of their importance as sources of information on new technology for your firm:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	1	2	3	4	5
Suppliers of textile machinery					
Customers					
Competitors					
Workers					
Management					
Government institutions					
Industry associations					
Consultants					
Other					

If "other", please specify

B10 Methods of Technology Transfer: please select the methods used by your firm:

- Licensing
- Foreign direct investment
- Joint ventures
- Turn key projects
- Technology network alliances
- Other

<input type="checkbox"/>

If "other", please specify

B11 Difficulties in implementing New Technologies. Please rate the following in terms of their importance as hurdles in the implementation process:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	1	2	3	4	5
Integration with older technologies					
Skill levels of workers					
Industrial relations					
Insufficient demand for products					
Internal co-ordination					
Modification of original technology					
Other					

If "other", please specify.....

SECTION C - ORGANISATION

C1 Did implementation of the New Technology form part of a restructuring process for your firm:
 YES NO

C2 Did implementation of the New Technology require one or more of the following?
 (Please select by placing an X in the relevant box(es)):

- | | |
|---|--------------------------|
| Reorganisation of work processes on the factory floor | <input type="checkbox"/> |
| Reduction in employment | <input type="checkbox"/> |
| Increase in employment | <input type="checkbox"/> |
| No change in employment | <input type="checkbox"/> |
| Closure of one or more of firm's production units | <input type="checkbox"/> |
| Acquiring additional production units | <input type="checkbox"/> |
| Training | <input type="checkbox"/> |
| Retraining | <input type="checkbox"/> |
| Sub-contracting | <input type="checkbox"/> |
| Changes in division of labour | <input type="checkbox"/> |
| Other | <input type="checkbox"/> |

If "other", please specify

C3 Are sub-contracting firms:

- | | |
|---------------------------|--------------------------|
| Large firms | <input type="checkbox"/> |
| SMME's | <input type="checkbox"/> |
| Owned by former employees | <input type="checkbox"/> |
| Other | <input type="checkbox"/> |

If "other", please specify

C4 Are sub-contracting relationships:

- | | |
|--|--------------------------|
| Long-term (in existence for > 5 years) | <input type="checkbox"/> |
| Intermittent (on-and-off) | <input type="checkbox"/> |
| Potentially longer-term | <input type="checkbox"/> |

C5 If your firm is a supplier in a sub-contracting relationship, do you

- | | |
|--|--------------------------|
| Supply to large firms | <input type="checkbox"/> |
| Supply to SMME's | <input type="checkbox"/> |
| Have a long-term relationship with client | <input type="checkbox"/> |
| See potential for a long-term relationship | <input type="checkbox"/> |

C6 If implementation of new technology required training or retraining, was training done by (use X to select):

- Technology supplier
- Internal training unit
- Industry training board
- South African Technikon
- South African University
- Specialist training firms
- Consultants
- Other

If "other", please specify

C7 Was training:
 Technology specific
 General
 Both

C8 Please indicate whether the following received technology specific and/or general training by placing an X in the relevant box(es):

	Technology specific	General
Supervisors	<input type="checkbox"/>	<input type="checkbox"/>
Machine operators	<input type="checkbox"/>	<input type="checkbox"/>
Middle management	<input type="checkbox"/>	<input type="checkbox"/>
Lower management	<input type="checkbox"/>	<input type="checkbox"/>
Technicians	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

If "other", please specify

C9 Please indicate expenditure on training for the period 1994 -1999 in the following categories:

Training	R					
Retraining (to learn different skills for redeployment)		R				
Total	R		R			

C10 Networks: Internal - Please indicate the importance of the following as mechanisms for internal co-ordination in your firm:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	1	2	3	4	5
Worker teams					
Work place forums					
Management meetings					
Board meetings					
Motivational groups					
Other					

If "other", please specify

C11 Networks: External - Please rate the importance of your firm's relationship with the following BEFORE, DURING and AFTER the implementation of the New Technology by placing the **relevant number** in the **Before, During and After** columns:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	Before	During	After
Suppliers of raw materials			
Suppliers of textile machinery			
Customers: local			
Customers: in foreign markets			
Textile division of the CSIR			
Textile Federation			
Industrial Development Corporation			
Universities			
Technikons			
Consultants			
Textile Industry Training Board			
Other			

If "other", please specify.....

SECTION D - RESULTS OF THE NEW TECHNOLOGY

D1 Please indicate to what extent your expectations have been met in terms of the following:

1 = not at all; 2 = slightly; 3 = moderately; 4 = significantly; 5 = completely

	1	2	3	4	5
To become more competitive					
To reduce costs					
To maintain market share					
To find new markets					
To improve quality					
To reduce delivery times					
To respond to competitors					
Other					

If "other", please specify.....

D2 Please indicate how the following measures of your firm's production performance have changed from 1994 -1999:

	1994	1995	1996	1997	1998	1999
Stock turns per year						
<i>Stock:</i>						
Raw materials (weeks of input)						
Work in progress (weeks of production)						
Finished goods (weeks of output)						
Throughput time (weeks)						
Value-added time (weeks)						
Rejects (percentage of output)						
Reworks (percentage of output)						
<i>Deliveries:</i>						
Percentage on time						
<i>Late:</i>						
Percentage more than two weeks						
Percentage less than two weeks						

D3 If specific figures for the information requested in D2 are not available, please indicate whether you believe the following has increased, decreased or remained constant by placing an X in the relevant box(es):

	Increased	Decreased	Unchanged
Stock turns per year			
<i>Stock:</i>			
Raw materials (weeks of input)			
Work in progress (weeks of production)			
Finished goods (weeks of output)			
Throughput time (weeks)			
Value-added time (weeks)			
Rejects (percentage of output)			
Reworks (percentage of output)			
<i>Deliveries:</i>			
Percentage on time			
<i>Late:</i>			
Percentage more than two weeks			
Percentage less than two weeks			

D4 If the new technology has enabled you to find new markets, please indicate the importance of the following as actual new markets for your firm:

1=insignificant; 2= slightly significant; 3= moderately significant; 4= very significant; 5= crucial.

	1	2	3	4	5
The local market					
Southern Africa					
The rest of Africa					
Asia					
Europe					
America					
Other					

If "other", please specify.....

D5 Since the implementation of the new technology, has your firm's economic performance:

- Improved
- Remained stable
- Deteriorated

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Thank you very much for your time. Would you kindly supply the following information:
INDIVIDUAL COMPANY INFORMATION WILL BE KEPT CONFIDENTIAL.

Name of Respondent:

Telephone number:

Fax number:

E-mail address:

DEFINITIONS:

- Technology network alliance:** Where two or more firms that would ordinarily be competitors work together for the purpose of obtaining new technology.
- SMME's:** Small, Medium and Micro Enterprises
- CSIR:** Council for Scientific and Industrial Research
- CAD:** Computer aided design, which involves the use of computer hardware and design software to model new textile ideas in 2D or 3D on the computer screen.
- CAM:** Computer aided manufacturing, which involves the use of computer systems to control manufacturing equipment, making it easier and quicker to produce cost-effective one-off, batch produced and high volume textile products.
- CIM:** Computer integrated manufacturing systems integrate the use of all the different functions of computers, including CAD/CAM, to enable fast, efficient and cost-effective textile manufacturing. CIM enables concurrent design and manufacturing, making use of Information and Communications Technology and Product Data Management Systems.
- CNC:** Computer numerically controlled machines are used in computer aided manufacturing, to enable textile manufacturers to make products accurately, economically and to increase efficiency. CNC machines are controlled by computer software and enable automated production of textiles, such as fibres, yarns, woven, knitted and printed fabrics.

APPENDIX 6.2

TABLE A6.1

Name ²²	Year established	Region	Employment		Exports	Ownership Structure
			1994	1999		
TF1	1999	Gauteng	-	7	No	RSA
TF2	1947	Gauteng	302	250	No	RSA & Italian
TF3	1948	Gauteng	32	39	No	RSA
TF4	1953	Western Cape	-	280	No	RSA
TF5	1972	Western Cape	450	320	Yes	RSA & German
TF6	1968	Western Cape	105	180	Yes	RSA
TF7	1976	Western Cape	95	95	No	RSA
TF8	1985	Western Cape	60	250	Yes	RSA
TF9	1962	Western Cape	150	180	Yes	RSA & German
TF10	1965	Eastern Cape	400	600	Yes	RSA & Italian
TF11	1995	Eastern Cape	-	32	Yes	RSA & German
TF12	1990	Eastern Cape	52	71	Yes	RSA
TF13	1998	Kwazulu-Natal	250	135	Yes	RSA & German
TF14	1950	Kwazulu-Natal	800	500	Yes	RSA
TF15	1998	Kwazulu-Natal	-	75	Yes	RSA
TF16	1950	Kwazulu-Natal	320	200	Yes	RSA & German
TF17	1992	Kwazulu-Natal	232	235	Yes	RSA
TF18	1953	Kwazulu-Natal	No Response			RSA & Italian
TF19	1977	Kwazulu-Natal	350	250	Yes	RSA & American
TF20	1977	Kwazulu-Natal	300	240	Yes	RSA & American

²² TF = Textile Firm.

CHAPTER 7

TECHNOLOGY, ORGANISATION AND THE EVOLUTION OF THE FIRM: THREE CASE STUDIES

7.1 INTRODUCTION

In Chapter 6 we have constructed composite profiles of firms, which allowed us to classify them as leading, muddling through and lagging behind on the basis of certain criteria. In this chapter we want to peek *inside* the firm *over time* in order to investigate the behaviour of firms with respect to their:

- competencies, innovative activities, productive specialisation and organisational structure;
- strategic choices over time;
- relationships developed with suppliers and users. Although interaction with suppliers and users through the exchange of products, knowledge and people is important, the ways in which they influence the process of structural change (as in vertical integration and in long-term relationships) deserve particular attention;
- relationship with institutions, if any. Universities, industry associations, research organisations, financial institutions and the government affect structural change within the industry in various ways, for example, in providing human capital, research output, assisting in diffusion of new technical knowledge, etc.
- response to exogenous environmental factors, such as policy changes, demand side changes, natural disasters and changes in general economic conditions. The impact of these factors on the firm should, of course, also be taken account of.

Like Penrose (1959), we are interested in 'flesh-and-blood' firms, organisations of people with control over productive assets, but not over the environment in which they compete. The objectives are, firstly, to gain a better understanding of what firms do, why they make certain decisions, especially about technology; and secondly, to draw out those features associated with successful and less successful performance, and to study them in more depth than we have done in

Chapter 6. Although the primary focus of this study is the implementation of new technology, we want to illustrate in this chapter how the successful implementation of technology depends on factors such as simultaneous organisational change, the competencies of management and labour and the history of the organisation. We further want to illustrate the important role that individuals, e.g. entrepreneurs and managers, play in shaping firms and institutions. This is relevant for the historical as well as the analysis section. To meet these objectives, it is necessary for organisational studies, business history, and evolutionary economics to meet, as Dosi (2000:34) puts it. For this purpose we study the case histories of three firms: one that can be considered a leading firm, one with great potential (now in the process of recovery) and one who has failed since the initiation of this study.

We proceed as follows. First, we write up the case histories. Then we draw out differences and similarities amongst the firms, based on selected criteria, distilled from the literature. We start the analysis in each section with a brief explanation of the relevant concepts from the literature and then draw on the case studies under review to illuminate these issues further. The last section provides a summary and preview of Chapter 8.

7.2 CHRONOLOGICAL CASE HISTORIES

7.2.1 Frame Textiles

Frame Textiles is the oldest of the firms included in our case studies. In 1927 young Phillip Frame arrived in South Africa from Dresden, Germany. With his background and training in textiles, it did not take him very long to realise that the textile industry in South Africa was barely in its embryonic stage and that the country held vast opportunities (Glaser, 1985:28). His first venture was the establishment of a blanket factory in Durban in 1928. He considered Durban a good industrial location because of its proximity to the (then) Transvaal and Free State and the adjacent African market. The availability of harbour facilities and other infrastructure also counted in its favour. The first decade of Frame Textiles' existence also included ventures into shoe and underwear

manufacturing (in competition with imports from Japan and other Eastern countries). Natal Canvas Rubber Manufacturers (Ltd) produced 8 000 pairs of shoes a day, while Natal Underwear Manufacturers (Ltd) produced 15 million pieces of underwear a year to supply the men's, women's and children's underwear market, which previously relied entirely on imports. To ensure that the underwear factory could be independent of imports, Natal Knitting Mills (Ltd) was established to supply the knitted cloth required (The Frame Group, 1978:5).

In the late 1930s, Phillip Frame announced his belief in a policy of industrial decentralisation and, as a first step in implementing this policy, he established another blanket factory in East London. As this policy proved to be economically viable, additional blanket factories were established in the Western Cape and Transvaal. By the beginning of the Second World War, the enterprises of the Frame Group were operating under the name Consolidated Textile Mills Limited and comprised five blanket factories, the underwear factory and the knitting mill in Natal (The Frame Group, 1978:5).

Operations were seriously hampered by the war in that yarn supplies from Europe and the United States were cut off and those available from India and South America were prohibitively expensive. Shortages often resulted in plants remaining idle. This strengthened Phillip Frame's resolve to reduce reliance on fluctuating imported supplies. While supplying goods to the South African and Allied forces, Frame was nevertheless able to help fill the gap in the civilian market left by the lack of imports of textiles and footwear from Europe. Exports to neighbouring countries (Rhodesia¹, Malawi and Zambia) also took off. When the Rhodesian government, like the South African government, after the war introduced policies to favour local industrialisation, Frame established its first blanket factory outside South Africa at Bulawayo (Consolidated Textiles (Rhod.) Limited) (The Frame Group, 1978:5).

In the third decade of its existence, Frame Textiles faced fierce competition from imports, especially those from Asia, labour difficulties and the added

¹ Now Zimbabwe.

problem of acquiring textile machinery. The labour difficulties entailed finding trained technicians overseas and training local unskilled workers in the complexities of modern textile machinery. That is to say, *if* the machinery could be obtained: much of British and other European textile machinery had been destroyed and America's first priority was re-equipping its own textile industry. The waiting period for delivery from Europe and the United States was as much as five years. To circumvent this problem, Phillip Frame made a plan amounting to a joint venture between his firm and Lancashire Cotton Corporation of Manchester, England to establish a spinning mill at Ladysmith. The British firm had to supply the machinery and the company was called the Consolidated Lancashire Cotton Corporation Limited. The first yarn was produced in 1948. When Frame later acquired all the shares in the company, he changed the name to Consolidated Frame Cotton Corporation Limited (The Frame Group, 1978:6).

In the 1950s the group moved into the production of woollen, cotton and rayon piece goods, establishing Consolidated Fine Spinners and Weavers with a factory in East London. To meet the increased demand for yarn, a modern spinning mill was built at New Germany in Natal. Now the firm acquired two wool washeries and established another one at Pinetown. It also established its own buying office in London, tasked with sourcing raw materials and spare machine parts, recruiting personnel and gathering intelligence on developments in the textile industry overseas (The Frame Group, 1978:6).

The fourth decade was a further expansion phase. Major developments included the erection of a finishing plant (called Texfin) at Mobeni, Natal for bleaching, dyeing, printing, and finishing. The number of cotton mills in the group was expanded with the establishment of five more mills at a new location (New Germany). Further acquisitions were also made in the form of South African Woollen Mills Limited, Mowbray, and the Standard Woollen Mills Limited and Harris Cotton Mills Limited at Harrismith. Further cross-border expansions took place with the purchase of two more textile mills in Rhodesia and a large textile factory in Zambia. After Malawi gained its independence, Frame established a textile mill at Blantyre (The Frame Group, 1978:6).

The pervasiveness of Phillip Frame's influence is illustrated in the way his name has become embedded in educational and social structures. At the University of Port Elizabeth a department of Textile Technology was created and the Chair of Textile Technology was named after Phillip Frame. Various communities thought it appropriate to recognise his contributions.² (The Frame Group, 1978:7).

The growth phase continued into the fifth decade, while considerable investments were made in replacing old and obsolete machinery. The firm also realised its pioneering dream of building its own polyester fibre and filament plant, which came on stream in the fiftieth year of the Frame Group's existence. In this period import competition from the Far East was stronger than ever and the domestic economy was depressed, presenting the group with an extremely challenging trading environment. It nevertheless persevered and started to see export success, a strategic route that it only recently opted for (The Frame Group, 1978:7).

By 1978 the Frame Group employed 30 500 people, with affiliated factories and selling offices in Bloemfontein, Cape Town, East London, Harrismith, Huguenot, Jacobs, Johannesburg, Ladysmith, New Germany, Mowbray, Pietersburg, Pinetown, Port Elizabeth, Pretoria, Bulawayo, Salisbury (now Harare), Zambia and Malawi and a buying office in London (The Frame Group, 1978:8).

Phillip Frame turned 78 in 1978 and retirement was looming. The question of who his successor would be was an important one for the firm and industry and market commentators. The board of directors however, invited Phillip Frame to stay on at the helm of the company, which he did until his death on 18 January 1979 (Brown, 1979:242).

The last decade under Phillip Frame's leadership was a difficult one in South Africa's history. In the 1970s the industrial relations issue reached boiling point with trade unions actively resisting labour laws that denied the right of association (membership of a trade union) to black South Africans.

² For example, Phillip Frame Industrial Park (New Germany), Phillip Frame Industrial Township (Harrismith), Phillip Frame Chair of Textile Technology, Port Elizabeth and Phillip Frame Road (East London).

Massive strikes erupted in Natal, with Durban being the focal point³. Right in the middle of this turmoil was Frame, one of the largest employers in the country. The strikes had no immediate causes at the workplace and the strikers made no explicit demands, but this was a potent expression of the general dissatisfaction of black employees. These strikes were the impetus that initiated a new era in the South African industrial relations system (Bendix, 1992:338-339).

As part of the National Textile Manufacturers' Association (NTMA) Frame faced several wage disputes in the late seventies⁴ (Wage Disputes, 1978:447). The unions, however, could not resort to strike action, because African⁵ workers could still not participate legally and the union was too weak without them. After a hard-fought battle for higher wages, the dispute was finally settled to the reasonable satisfaction of both parties in November 1978 (Industrial Disputes, 1978:446).

The question of Frame's successor was not a clear-cut one to answer, since, in the view of market analysts and industry commentators, nobody in the family or the organisation seemed to be made of the same fibre as its founder. Phillip Frame himself solved the problem by specifying his successors in his will: a troika, whom he believed complemented each other's talents. They were Archie Berman, whose marketing and production skills market analysts praised, Selwyn Lurie, believed to be adept at accounting and Sid Peimer, the strongest on the plant and machinery side (in the eyes of market analysts and industry commentators at the time) (Frame Group. The committee of three, 1979:56). They were faced with rescuing the company's public image, which took a beating in the industrial relations battle, as well as improving customer

³ These strikes were of such significance that a commission (The Wiehahn Commission) was appointed in 1977 to make recommendations to change the country's labour laws. Its most revolutionary proposal was that freedom of association be granted to *all* employees. This meant that black trade unions could register and become legal. Most of the commission's recommendations were accepted by the government and are contained in the Industrial Conciliation Amendment Act of 1979 and subsequent Amendment Acts (Bendix, 1992:320-321).

⁴ One of Frame's fiercest critics was Federation of South African Trade Unions secretary, Alec Erwin (Labour tough line, 1980:1106). Erwin is now the Minister of Trade and Industry and works closely with the management of Frame and other textile firms to develop and implement policies to ensure the survival and growth of the textile industry.

⁵ The Industrial Conciliation Act of 1924 excluded African males from the definition of 'employee' and therefore barred them from legally participating in the industrial relations system (Bendix, 1992:319).

relations. The markets also expected a reversal of Frame's extremely conservative financial policy: the firm had no debt, substantial reserves and paid very parsimonious dividends⁶. The very specific terms of Phillip Frame's will, however, tied the hands of the managers, so that they pretty much had to follow the same policies as before.

For the first half of the 1980s, the company was tied up in two protracted court battles. Phillip Frame's widow and daughter contested his last will drawn up in 1974, wanting to re-instate an earlier will, signed in September 1967. Re-instatement of the 1967 testament would have far-reaching implications for the Frame Group. The earlier will stipulated that Frame's son in law, Max Ulfane, would become chairman of the Frame Board and Managing Director, and could only be removed by a unanimous decision by the administrators of the estate. The administrators included Ulfane, who was Phillip Frame's understudy and 'heir-to-the-thrown' until he opted to move to the UK, resulting in his removal from the will and control of the Frame Group (Textiles seeking survival, 1980:782). The second court battle was that of two different labour unions fighting for recognition on the premises of the different companies in the Frame stable⁷. Frame previously took a hard line with the unions and preferred to deal with the rather tame Textile Workers' Industrial Union as opposed to the more demanding National Union of Textile Workers (Glaser, 1985:30).

During this time, profitability in the group remained low and assets largely under-utilised. Share prices, however, rose on speculation that a take over could be on the cards, should the Frame family win the court battle. The share prices rose every time the case was supposed to be heard in court (the case was frequently postponed). The most likely candidate for the take-over bid seemed to be the Smith Group, through its subsidiary, Romatex (Ruffet, 1983:954). Another potential take-over bidder often mentioned was the Cape-based

⁶ On the back of these expectations, the market capitalisation of the four companies almost doubled to R51 million from R26.7 million. Consolidated Textiles shares traded at 265c compared to 132c before Frame's death, while Natal Consolidated rose from 275c to 525c. Natal Canvas reached 350c, up from 200c and SA wool was at 235c, compared to 130c (Frame Group. The Committee of three, 1979:56).

⁷ Frame's legal battle with the National Union of Textile Workers alone, involved 53 court appearances (Glaser, 1985:30).

clothing group, Seardel (both Romatex and Seardel would be significant in Frame's future, but not in the way envisaged in the 1980s).

Incidentally, both battles were settled in the same year (1985): Frame's family won theirs and agreements were reached with the Textile Workers Industrial Union and the National Union of Textile Workers (McNulty, 1985:117). It was now expected that Phillip Frame's conservative dividend policy would be relaxed and that some of the group's assets be disposed of.

A 500% increase in dividends was indeed announced in November 1985. A clearer picture of the group's asset base was also emerging after certain subsidiaries had been consolidated and associate interests formerly excluded from published accounts were now included. The results highlighted that the shares of the listed companies were still trading at a considerable discount to net worth. Even more alarming was the effect that the more realistic reporting of assets had on profitability ratios, now even lower than before. It was further estimated that many of the group's factories would soon need considerable upgrades (Glaser, 1985:113).

July 1986 brought the changing of the guard at Frame - the 'committee of three', who had by and large still carried on the traditions of Phillip Frame, departed. New blood in the person of Justin Schaffer, former MD of SA Nylon Spinners, took over from the troika. Schaffer's entrepreneurial talent was hailed as the change that was needed to rejuvenate the group (Glaser, 1986:96). Major changes were now to take place, from restructuring of holdings to that of operations and strategies, departing from routines employed in the group for years. These aspects are discussed in detail in the analysis section.

In 1987 the shares held by the Phillip Frame Trust were sold to institutions, such as Allan Gray, Sanlam and Southern Life in the largest single deal ever concluded on the Johannesburg Stock Exchange (at that time). As the new institutional shareholders were likely to be long-term shareholders, the management of Frame could expect to get the support they needed for their expansion and improvement plans (Kilalea, 1987:645).

The four listed companies in the Frame Group were restructured into Frame Group Holdings (the holding company) and Consolidated Frame Textiles (the operating arm). In 1988 Mervyn King, former judge and turn-around entrepreneur, was appointed to drive the turnaround at Frame. At the time of the departure of the previous MD the restructuring and resuscitating process was not yet complete, while the cost of the restructuring coupled with poor economic conditions and import competition drove the group's performance into negative territory. Restructuring needs had begun to eat into cash reserves and the group was no longer debt free. The consolidation of operations resulted in massive retrenchments of labour, which increased restructuring costs and pressure from trade unions to help resettle and/or retrain retrenched workers (Payne, 1988:107, 1989:106, Kenney, 1989b: 121). Total employment had dropped from 26 187 in 1985 to 19 146 at the 1989 year-end (McNulty, 1990a: 27). The results of the economic cool down and the higher interest rates in the latter part of the 1980s had forced Frame to return to a conservative dividend policy. The dividend had remained stable at 60c per share since 1986 (de Lange, 1989:67). The group continued to feel the costs of restructuring and expansion. Further consolidation had to entail shrinking, moving or disposing of 'non-performers' (McNulty, 1990a: 27). Apart from the obstacles mentioned above, the 1990 financial year also saw an escalation of the political violence in Natal and its spill-over into the workplace, badly affecting productivity levels (McNulty, 1990b: 108). The first three years of the 1990s were dismal years for the Frame Group. The domestic economy continued its downward slide, while import competition intensified and the combined effect of the depreciation of the Rand and high interest rates meant that the necessary capital expenditure at the group's plants came at a much higher than expected cost. The debt portfolio grew to more than R500 million by 1993, while losses of up to R1 million a day were incurred (Jones, 1997a: 1).

In 1990, Walter Simeoni (originally from Austria) was appointed as operations director, but it was as MD of Consolidated Frame that he, together with Chairman Mervyn King and deputy Chairman Roy Sable managed to pull off the turnaround that saw the group return to profit in 1994. We discuss the details of

the recovery programme in the analysis section. Frame maintained stable, but unspectacular growth between 1994 and 1997, while further consolidation and investment took place. In October 1996 Frame acquired 51% of Romatex, the second largest listed textile company in South Africa. Romatex, who has interests in cotton and wool fabrics, household textiles, floor coverings and chemicals, was experiencing difficulties in the turbulent times that the South African textile industry was facing and Frame was able to acquire the shares at a bargain price. Advantages for Frame included access to markets where it was previously not active, such as carpets and worsted fabrics and its strategic presence in the Western Cape province (Frame's stronghold is in Kwazulu-Natal province)(Jones, 1996b: 1; Jones, 1997a: 2). Although the 1997 financial year saw the completion of several of the projects in the recovery programme, the acquisition of Romatex meant that more structural changes were necessary to unlock the wealth-creation potential of its asset base, which now exceeded R1.3 billion (Thompson, 1997:114). Prospects for 1998 were also much improved due to healthy order books, a lower cost structure due to the new technology installed, smaller losses from Romatex and larger profits from the property division.⁸

Mervyn King left the Frame group to take up banking in 1998, while Roy Sable, previously deputy chairman, now became chairman and Aaron Searll, chairman of Seardel, South Africa's largest clothing manufacturer became deputy chairman. Walter Simeoni remained group MD (Jones, 1998a: 1). Under the leadership of this team, Frame continued to regain competitiveness in the 1990s, focusing increasingly on growing the share of output destined for exports (Claassen, 2001:1). In October 1999 the unbundling process was finally completed when Frame eliminated its pyramid structure and crossholding in Consolidated Frame Textiles. The latter was renamed the Frame Group and the cash shell of Frame Group Holdings was sold to a Johannesburg-based consortium, who has changed the name to Furnex Capital (Jones, 1999b: 1;Radebe, 2000:1). In 2000, in the light of the export growth opportunities

⁸ Because of all the unencumbered property holdings inherited from Phillip Frame's insistence on owning the property on which the firm operated, a property division was created to manage the vast property holdings and to lease those land and buildings that have become redundant after the 'down-sizing' exercise was completed. This has become a profitable division of the firm.

opening up under the Africa Growth and Opportunity Act, Seardel, who already owned some shares in Frame, decided that a merger with the largest textile manufacturer would stand it in good stead with respect to its export strategy. Frame shareholders were amenable to the idea of a merger with Seardel and Competition Commission approval of the merger was granted unconditionally in December 2000. The South African Clothing and Textile Workers' Union (Sactwu) did not oppose the merger, either. The Frame Group delisted on 8 December 2000 (PSG Online, 2001:154).

Frame gave the earnings of Seardel for the 2001 financial year a major boost (Matthews, 2003) and continues to do so. Frame's contribution to revenue for the 2002 financial year was 45% (up from 28% in 2001) and the textile division's operating profit increased by 65%, eclipsing the 24% increase achieved by the apparel division (Cape Business News, 2003:1-2).

7.2.2 Glodina Holdings

Glodina's roots go back to 1953 when three brothers, Sergio, Aldo, and Oscar Balladon, bought Dano Textiles, a printing and dyeing firm in Kwazulu-Natal. They immediately started expanding by buying 20 weaving looms in order to produce their own towelling (Korner, 2003:1). Both Aldo and Oscar received textile training in Europe. They named their towelling products after their mother, Glodina. Today Glodina is a household name in South Africa.

Glodina Holdings was founded in 1986 and listed on the Johannesburg Stock Exchange in 1987⁹. The company manufactures and markets household textiles such as towels, bathroom accessories, bedding and nappies. Its operational and wholly-owned subsidiaries include Dano Textile Industries and Textowel Weavers. Popular brand names include Black Label, Glodina, Glodina Beach and Royal Shield (Profile Media, 2003:218).

⁹ Glodina's history before its listing in 1987 is not publicly available; hence we concentrate our analysis on the history of Glodina since 1987.

The first year after its listing was an excellent one, despite the difficult times that the economy and the rest of the textile industry were experiencing. The company offered a dividend yield of 8,5% and a price earnings ratio of 4,7 compared to an average of 6 and 6,7 respectively for the textiles and clothing sector. Because of its quality products, demand remained strong, order books were full, and capacity was fully utilised 24 hours a day, seven days a week. The company was also starting to look at export possibilities and appointed an export consultant for this purpose (Venter, 1988:99).

Glodina's decision to move part of its operations to QwaQwa, a self-governing homeland,¹⁰ to reap the benefits of the decentralisation incentives offered by government resulted in unexpected difficulties, especially affecting production efficiencies. As a result margins for the 1988 financial year were down considerably, from 18,9% to 14,2% and return on capital fell from 21,2% to a lowly 13,4%. During the 1989 financial year the firm introduced its strategic plan to improve efficiency and productivity at both the Hammersdale and QwaQwa plants (Kenney, 1989a: 89). We discuss the details of this strategic plan in the analysis section.

Like other firms in the industry, Glodina was adversely affected by the political violence in Natal in the 1980s and early 1990s and the general uncertainty accompanying the process of political change in South Africa. Despite these uncertainties, Glodina continued with its capital expansion programme, estimated at R1.2 million. This added to its already high gearing¹¹, but it was hoped that the improvements in efficiency would lead to cost savings, which would offset the high interest burden in due time (Formby, 1990:96). The difficulties of the early 1990s, compounded by increased imports, culminated in a pre-tax loss of R3.2 million in 1992. No dividends were paid for the first three years of the 1990s. The firm, however, started to recover in 1993, ahead of the general economic recovery in 1994. The 1993 financial year saw the pre-tax loss

¹⁰ As part of the South African government's separate development plan, homelands were created along ethnic lines. Some of these, Transkei, Bophuthatswana, Venda, and Ciskei, opted for independence, while the rest remained part of South Africa, as self-governing homelands. Generous industrial decentralisation incentives were offered to firms who were willing to invest in these areas earmarked by government (Nkuhlu, 1987:35).

¹¹ Total interest bearing debt plus preferential share capital as a percentage of net asset value (Financial Mail, December 5, 1980:1215).

of 1992 turned into a profit of R3.1 million. The government's offer to the GATT to reduce tariff protection would also help the firm, because duties on its raw material, especially cotton yarn, would also now be reduced (Greig, 1994:80; Joubert, 1995:102).

Financial year 1996 was another difficult year, seeing pre-tax profits decline from its 1995 level of R6.8 million to R1.26 million. Apart from the general difficulties in the industry, Glodina experienced problems with the implementation of its capital expansion programme, which drastically affected production and stock levels so that the company was unable to service its order book (Connolly, 1997:50). R8.3 million was invested in plant and machinery, mainly on the installation of new weaving systems and storage racks, as part of the ongoing factory upgrade programme. During 1995 and 1996 a total of R22.5 million of capital expenditure took place. In 1998 the company was adversely affected by the higher interest rates imposed to mediate the impact of contagion from the Asian financial crisis. Economic growth was sluggish and consumer demand declined, but the management believed that the company was well positioned to survive the tough conditions. The interim results for 1998 showed another pre-tax loss and the firm was concentrating on improving productivity locally and considering producing in a lower-cost country. Results to June 1999 were again disappointing and the strategy of producing outside South Africa became a reality with the announcement that a 50:50 joint venture with Merspin, a textile producer listed on the Zimbabwe Stock Exchange, had been entered into. This was considered a strategic move into the regional pipeline, with the eye on the benefits that a larger regional market such as the Southern African Development Community promised. The lower production costs in Zimbabwe were also a serious consideration. In terms of the agreement, Glodina would establish a new mill (Gloweave) near Bulawayo, where products for export markets would be produced. The idea was to take advantage of the duty-free access to UK and US markets that Zimbabwe enjoyed at the time (Jones, 1999a: 2-5; Campbell, 1999:1-2).

During 1999 retrenchment of employees was deemed necessary to reduce manufacturing costs, while the firm's after tax loss for the year amounted to

R3.7 million. The management did not expect the firm to be profitable in the short to medium term, while margins remained under pressure (Dispatch Online, 1999).

The joint venture in Zimbabwe began in March 2000, but was plagued by start-up inefficiencies. Exports from the South African units increased relative to 1999, turnover increased by 11% and interest rates were lower, but the losses continued. Pre-tax profit to June 2000 amounted to R2.7 million (Van Rensburg, 2000:69). The second half of 2000 did not bring the expected return to profits as domestic retailing conditions continued to deteriorate and earnings declined further (Van Rensburg, 2001:56). By now the earlier unease about economic conditions in Zimbabwe had turned into serious concern and management felt obliged to make an abnormal provision for the full amount of the investment in Zimbabwe (R3.4 million). A large increase in provision for bad debts also added to the woeful results. The company's hopes were still focused on export growth (although it was not a beneficiary of the AGOA, which excludes direct textile exports) and cost reductions. The retirement of the chairman of the Board of directors was announced quietly (Jenvey, 2001a: 2-3).

Because of its continued poor performance and the weak prospects for a recovery in trading conditions, Glodina's shares took a beating on the Johannesburg Securities Exchange. The share price drifted from 48c in August 2000 to 20c in August 2001. This situation attracted the interest of Claas Daun, a German private investor, who is renowned for his strategy of buying struggling manufacturing companies and turning them around to profitability. In 2000 Daun bought up the 32% of Glodina, held by Ettington Investments (Inggs, 2001a: 1). In 2001 the German entrepreneur acquired the shares of key shareholders (notably the Balladon family) and made an unconditional offer to minority shareholders, but most of them elected to hold on to their shares. Daun became a member of the Board in November 2001, while his right-hand man in South Africa, Paul Schouten, was appointed Managing Director (Korner, 2003:1; Jenvey, 2001a: 1-2).

After the take-over by Claas Daun, Glodina has used a R35 million rights issue to finance a recapitalisation programme in order to return the firm to profitability. Although the turnaround has not yet been achieved, the extent of the losses incurred since 1998 has been declining, with headline loss per share reaching 43,9 cents at the end of the 2002, as opposed to 608,9 cents in the previous financial year (Payne, 2003:1).

In 2002, Glodina proposed a merger with Zorbatex, the towelling division of Hellierwood Holdings. The attraction was the complementary capacity that the merger would bring. Glodina later rescinded on the merger, citing 'material misrepresentation' in the financial statements of Hellierwood Holdings. This action resulted in an abnormal loss of R1.8 million (being the cost it had to incur for withdrawing from the merger) in the 2002 financial year (Jenvey, 2003:1).

During the early months of 2003, both Daun and Schouten had been buying up minority shares in Glodina Holdings. On during May 2003 their shares were sold to Daun's international company, Daun & Cie, who in turn sold to Kap Beteiligungs AG, a company controlled by Daun (Moneymax, 2003). We discuss the significance of this latest move in the analysis section.

7.2.3 The Coastal Group

Very little is known about the defunct Coastal Clothing whose shell investors from South Africa and Indonesia bought in 1995 to create the Coastal group with plans to become one of the leading fully integrated (from manufactured fibres and cotton seeds to garments) textile and clothing manufacturers in the Southern African region (Jones, 1996). Its vision was 'to clothe people fashionably by being globally orientated'. (Textile Federation, 1999:12). The Coastal Group was re-listed on the Johannesburg Stock Exchange in 1995. The group fully intended to start a renaissance in the South African textile industry, despite the scepticism of some in the industry (Jones, 2000). The Coastal Group was the holding company for four operating companies involved in the manufacture of polyester and cotton-based fashion textile products in Southern Africa. The group was also involved in cotton farming.

In the year of its listing the company was not operational and recorded an attributable loss of R1.26 million and a loss per share of 3,23c. The next year did not go much better, because the delivery of machinery for the finishing plant in Hammersdale did not take place and the firm remained non-operational. Funding (R51.3 million) for the restructuring of other plants in South Africa and Botswana, however, did arrive from Polysindo¹², the Indonesian majority shareholder, and prospects for the 1997 financial year looked promising.

In pursuit of their objective of growth and increased stakeholder wealth by strategic expansion and diversification, Coastal acquired 100% of De Nim Textiles (Hammersdale) and a 77% interest in Algo Spinning and Weaving Mills in Gaborone, Botswana during 1997. At the time of its acquisition by Coastal, De Nim was described as the leader in the production of denim fabrics in South Africa. The backward and forward integration of De Nim gave it strategic advantages in the areas of raw material procurement and the benefits accruing from garment exports. De Nim boosted the group's turnover from R300 000 to R214.9 million and turned a R2.2 million loss into a R16.1 million profit (Jones, 2000:1). Algo Spinning and Weaving produced quality denim fabrics for the Southern African markets. In keeping with the group's overall strategy these companies were to undergo major expansion programmes and structural and technical re-alignment in order to maximise their inherent growth potential. The expansion plan for De Nim aimed to increase production from 1.1 million meters to 1.8 million meters a month. The company also invested in two greenfields projects in Botswana and Hammersdale, South Africa. The new venture in Botswana (Haltek) would produce polyester fabric, while the Hammersdale venture was a finishing plant for polyester fabrics and garments, mainly men's suits and women's dresses. The Hammersdale plant was expected to produce three million meters of fabric per month (Bennett, 1998:1). Further plans included an \$8 million investment in 10 000m² of factory space at Prospecton, where a twisting project would convert imported yarn into fabric, as well as a clothing factory in Botswana to produce 6 million garments a year for the export markets. To increase its clothing manufacturing capacity, Coastal made a hostile

¹² Through its subsidiary, Texmaco.

take-over bid for rival South African clothing maker AM Moolla, but failed to acquire 51% of the shareholding and quietly abandoned the bid (Bennett, 1998:2).

In the company's 1997 annual report, the directors announced that implementation of their 'aggressive upstream and downstream expansions' will increase the total asset base from R400 million to R600 million by 2000. They would invest a further R100 million in the denim division to increase its flexibility and more than double its capacity. Plans were also underway to establish a joint venture in a neighbouring country, which would increase Coastal's cotton growing land by 20 000 hectares and double the yield (Jones, 1998b: 2).

In July 2000 De Nim, who employed 720 people at the time, was put in provisional liquidation after Coastal's bankers announced that no further funding would be advanced. Coastal's directors in South Africa struggled for months to salvage De Nim and safeguard the rest of the group, while promised funding from the Indonesian partner was not forthcoming. Having to raise funds locally increased the group's indebtedness. At the end of the 1999 financial year, the group's long-term liabilities stood at R212.7 million, up from R184.6 million in 1998, while current liabilities grew from R101 million to R233.7 million. A R21.1 million profit for 1998 was transformed into a R34.6 million loss in 1999. De Nim was the only fully operational and cash-generating entity in the group and its profits were used to provide funding for the greenfields projects in Botswana and Hammersdale. However, when these projects came on stream, their working capital demands far outstripped the cash that De Nim could provide in the absence of the funding promised by the foreign partner, Texmaco (Jenvey, 2000a: 2).

The Industrial Development Corporation (IDC) in South Africa became involved in a salvaging operation at Coastal on the condition that the promised funding for restructuring from the Indonesian partner would materialise. The hope was that a revived Coastal would be well-positioned to take advantage of the benefits offered by AGOA (Inggs, 2000:1).

However, the salvage attempts by the IDC were hampered by cash flow problems and the reality that the Indonesian partner was unable to supply the necessary funds. The final liquidation of De Nim and the demise of the Coastal group were brought to a head by a minor creditor (owed R2 million). Coastal's shares on the Johannesburg Stock Exchange were suspended on the 24th of October 2000. Its South African subsidiaries were liquidated on the 30th of October 2000, while applications to wind up the business of Algo Spinning and Weaving and Haltek were heard in the Botswana High Court during the same week (Inggs, 2000:1).

De Nim was sold to China Garments as a going concern. The Coastal Group Ltd was delisted on the 3rd of June 2002 (Profile Media, 2003:402).

The demise of the Coastal Group could not have come at a worse time for the South African textile industry, desperate to retain credibility in order to benefit from AGOA (Jones, 2000:1).

We now proceed to draw out similarities and differences amongst our firms, based on certain criteria relating to the behaviour of firms and the exogenous factors that influenced their behaviour and performance. In the analysis section we make use of the insights garnered from the literature (described in Chapter 2) to help us make sense of the rich and varied details in the case histories before us.

7.3 COMPARATIVE ANALYSIS: ENDOGENOUS FACTORS

It is imperative to bear in mind that our purpose here is to bring under the spotlight factors that could significantly influence the ability of firms to acquire and implement new technology successfully. In this section we first introduce the notion of routines in relation to what firms do and then ask four broad questions:

- What did the firms in our case study strive to achieve in the short and long term?

- How did they go about the business of achieving these objectives?
- What was the role of individuals (such as entrepreneurs and managers) and institutions in this process?
- How did factors external to the firm influence the behaviour and performance of the firms in our case study? (This last question is answered in section 7.4).

In the analysis it becomes evident how routines permeate the activities of firms over time and how they evolve as circumstances change.

7.3.1 Routines and Learning

Firms clearly have a multitude of routines, some more complex and dynamic than others, as we have explained in Chapter 2. For our current purposes, our analysis focuses on three kinds of routines that have been developed, used, re-used and abandoned over the history of the firms in our case study:

- Standard operating procedures (embodied and expressed in productive activities and technologies);
- Routines that determine the investment decisions of the firm (e.g. the rules governing its growth and decline);
- The deliberate search procedures of the firm (Research and Development to discover new ways of doing things, e.g. improve technology, introduce new products or find new markets or sources of inputs). These processes are sometimes also called 'learning' and are summed up as the firm's *dynamic capabilities* in the evolutionary economics literature (Cohendet and Llerena, 2003:275).

Various selection mechanisms act on routines over time. In the competence-based approach to the theory of the firm, these mechanisms are broadly divided into external ('natural selection') mechanisms, i.e. market forces and the internal selection mechanisms, introduced and practised by management (Cohendet and Llerena, 2003:277). Such a stark dichotomy, however, ignores the possibility of feedback between these two types of selection mechanisms.

Examples from our case studies show that there is in fact continuous signalling going on between these mechanisms and it is the task of the manager/entrepreneur to recognise and interpret the signals and act on it. Sometimes such signals attract the attention of *outside* entrepreneurs and the firm may become the target of a take-over bid (e.g. Daun with Glodina, Frame with Romatex and others). One of the most important selection mechanisms in a market economy is the financial institution, which in its decisions to make available additional capital facilitates firm growth and survival (Garnsey, 1998:534).

Developing, adapting and changing routines require the acquisition of information and knowledge across the firm, which implies a learning process and the need to develop mechanisms to learn and unlearn continuously. The business management literature tends to portray this learning process as neat and systematic, as the following sample illustrates:

"A learning organisation is not built by irrational principles; rather, very systematic and concerted efforts are necessary to create and nurture it". With this background, Mohanty and Deshmukh (1999:314) propose the following process:

- An organisation chalks out a manufacturing strategy and identifies a set of strategic manufacturing initiatives.
- The organisation formulates real time action plans based on the strategy above and commits resources to various initiatives.
- The organisation makes conscious efforts towards improving the quality of decisions. These efforts are basically the drivers of a learning organisation.

But, as our case studies illustrate, the firm does not start with a clean slate, but with an existing knowledge base embodied in the individuals in the firm. This includes the tacit knowledge that individuals bring with them to the firm and that they acquire as they become more acquainted with the workings of the firm. According to Penrose (1959:53), 'learning changes the productive opportunities of the firm in ways unrelated to changes in the environment.' To

benefit from such learning one has to be open to the possibility that one's own perception of competence may be vastly different from what an external selection process considers competent. For example, in 1981 the Frame Group saw itself as "a vast, dynamic and multi-faceted organisation. Its products must be competitive in quality and price and to achieve this, the organisation must be efficient in all respects." The tone of this statement was quite contrary to the views that market analysts at the time held about the group: "...the under-utilisation of assets, reflected in the abysmal profit returns as well as excessively high current ratios, indicated quite the opposite." (Thompson, 1981:1122). Useful learning here would thus require taking this feedback into account and adapting routines on the basis of new knowledge.

Learning mechanisms can be organised in an informal and a formal way. We discuss formal organisation of learning under the section on labour. The organisation of R&D is discussed under search routines (Section 7.3.1.3).

Developing and establishing routines as habits is a notion that at least one of our firms encourages in so many words. The following quote from Aristotle repeatedly appears in Frame's documentation: "We are what we repeatedly do. Excellence, therefore, is not an act, but a habit." (Frame Annual Report, 2001:2). As president of the South African Textile Federation, Simeoni is also establishing this notion in the consciousness of the industry association's members (Simeoni, 2002: 1-2).

7.3.1.1 Standard operating procedures: productive activities and production strategies

Frame initially started out with a specialisation in blanket production and dominated this market for decades. After a period of diversification into various markets, which ranged from footwear to underwear and floor coverings, the firm is now a fully vertically integrated organisation. The organisation comprises 13 divisions, covering short staple and worsted spinning systems, processing fine wools and blends as well as cotton and cotton blends (Frame Annual Report, 2001:1). As part of the Sear del stable Frame also has access to the clothing

sector. Thus, while the firm was a generalist with little integration during the Phillip Frame era, it can now be described as a streamlined, integrated organisation. Production technologies comprise circular knitting, weaving and non-woven technologies.

Glodina has always had a specialisation in household textiles, but has over the years expanded the range of products on offer, as we report in the innovation section.

Coastal's aim was a fully integrated pipeline from raw materials to garments, which in the end, did not materialise. Its broad production strategy was to use De Nim as a fully functioning, cash generating entity, while it was trying to get the green fields projects off the ground and restructure the other acquisitions.

7.3.1.2 *Investment routines*

Phillip Frame's investment routine was twofold: with respect to dividend policy and financing of investment. Routines are seldom stated so explicitly, so we quote at length. He spelt out his investment routine as follows:

"The policy of the group has always been – after paying taxation and reasonable dividends – to create reserves in order to provide the funds required for modernisation, development and expansion. In the first place, 40% of the profit of a company must be allocated for taxation. Secondly, at least 25% of the company's profits must be provided for renewing, replacing and modernising plant and machinery. A company is therefore left with about 35% of its profits with which to pay dividends and to create reserves to meet emergency and recession periods and for further expansion." (Brown, 1979:242). Frame's insistence on acquiring everything on cash terms, including land and buildings, has a strong path dependency related to his German origin. He lived through the financial difficulties of the German economy in the 1920s, and this apparently instilled in him a permanent aversion to debt (Glaser, 1985:29). When he died the Frame Group had no debt whatsoever.

The management troika that succeeded Phillip Frame continued to apply this routine, to the dissatisfaction of many a commentator in the financial press. However, given the group's low profitability, and the extreme difficulty of improving the situation in the face of the economic decline of the early 1980s, management could not justify abandoning this conservative stance in favour of external financing. As one analyst put it: "In this regard, the Frame Group seems to have carefully positioned itself between a rock and a hard place." (Wilson, 1982:1091).

As noted earlier, the troika abandoned Phillip Frame's investment rules in order to raise the dividend 500%. However, under the new management, led by Mervyn King, the firm increased its debt considerably to finance capital expenditure. Because of the sharp increase in debt and the higher interest rates, the firm was forced to return to the previous conservative dividend policy (de Lange, 1989:67).

Glodina for most of the 1990s followed a very conservative dividend policy and this situation still continues: the firm has not paid any dividends for the last five years – with good reason, since the firm has been languishing in the red over this period (Jenvey, 2003:1).

Coastal also opted for a conservative dividend policy in the 1997 financial year, despite a rise in earnings, because of the demands that expansions put on cash holdings (Jones, 1998b). Eventually, it was cash flow problems that brought Coastal to its knees and into final liquidation.

7.3.1.3 *Search routines, innovativeness and the acquisition of new technology*

In this section we first consider the firms' search routines, especially the organisation of R&D, followed by the innovative activities, and finally the nature of investments in new technology (These aspects are summarised in Table 7.1).

Frame has its own R&D division in-house, but it also cooperates with other firms and institutions such as the South African Bureau of Standards (SABS) with respect to research on quality and environmental certification. Frame also has a group of very experienced people with science degrees, who serve on the firm's R&D council. These researchers produce hundreds of new products per annum, of which the firm estimates, about 20% are commercially viable (Frame Annual Report, 2001:2).

Glodina's strategic focus is on technological renewal from R & D, but also new technology, which it buys in (Greig, 1994:80). The firm has its own in-house R&D division, but also makes use of services of other institutions such as the SABS for quality and ISO 14000 related research (Glodina Company Portfolio, 2003).

Coastal's arrangement of R & D was fully tied-in with that of its foreign technology partner. The firm further relied on the competencies of its technology and equipment suppliers (Payne, 1999:1-4).

Under Phillip Frame the firm's innovative activities focused on product innovations in order to exploit new market opportunities, especially in areas that were previously supplied by imports. The Frame of the last 25 years or so needed to be innovative in terms of products, process technologies and organisation in order to survive and grow in a fast changing environment. For example, we have elaborated earlier on the changes in consumer preferences, especially those rewarding environmentally friendly manufacturing processes. Mindful of the need to comply with environmental requirements (especially to grow exports to developed countries), Frame embarked on a major technological development project in a joint venture with Benninger, a Swiss machine manufacturer. The aim was to develop a new indigo denim plant that would treble Frame's production capacity and outperform other denim technologies in terms of cost effectiveness and environmental concerns. Frame invested R80 million in this plant that would be the first of its kind in the world.¹³ The fabric

¹³ A second one has since been established elsewhere (Interview with Frame's management, 17 November 2000).

produced with the aid of this technology¹⁴ would be superior to the output of traditional denim technologies, but Frame would have to take the responsibility of being the pioneer, carrying the costs of teething problems and the training required to handle the leading-edge technology. This alliance and the technology resulting from it can be considered competence enhancing, as opposed to competence destroying in the sense that it was complementary to the competencies developed under Frame's rejuvenation programme of the preceding years and the investment in other new technologies.¹⁵

The new indigo denim plant at Frame took longer than expected to work smoothly. This was partly foreseen, because of the revolutionary nature of the technology, which entailed some unpredictability. The difficulties with the chemical complexities of the process technology were foreseen, but there were also mechanical difficulties, which the Frame management and their alliance partner did not foresee (Frame Annual Report, 1999:2).

During the 2000 financial year Frame invested R80 million specifically to take advantage of the opportunities offered by the AGOA, and had planned to invest a further R200 million in order to improve productivity, cost-effectiveness and capacity. Simeoni aims to be ready to take advantage of the increased demand for fabrics produced in Sub-Saharan Africa when the AGOA exemption, which allows least developed countries to use fabric from any country to produce clothing for the US market, lapses in 2004 (Inggs, 2001b: 1).

The 2001 and 2002 financial years saw further technology upgrades and expansion. Capital expenditure in 2001 amounted to R95 million¹⁶ (including some overruns from the previous financial year), while another R75 million was

¹⁴ The new process uses advanced chemical technology, precision engineering and unique computerised control and monitoring systems. (Lourens, 1997:32)

¹⁵ These new technologies include 140 state-of-the-art air jet weaving looms, a modernised open-end spinning plant and the latest ring-spinning technology (Frame Annual Report, 1999). The air-jet weaving plant replaced 400 older machines and would manufacture 50% of the group's output of woven fabric (Jones, 1997b: 1).

¹⁶ The lion's share of the investments went into a new spinning mill, upgrading of winding and spinning mills in New Germany, a new continuous mercerising range for wide width fabric at Texfin, a new denim finishing range and fully automated packaging line, a fully automated fitted sheet machine at Frame Manchester, a complete fibre preparation, needle punch and thermal treatment plant at Fibretex and a major hard and software upgrade to link group activities more effectively (Frame Annual Report, 2001:2).

spent in 2002. Another R120 million in capital expenditure has been budgeted for the short-term. The commissioning and implementation of the technology invested in during 2002 once again encountered problems and delays, which negatively affected the firm's delivery times. The international textile suppliers were unable to meet the firm's pre-determined performance parameters during and after commissioning, with a domino effect that ended in less than adequate performance by the firm. The group MD considered this experience the pain that comes with progress (Frame Annual Report, 2002:3).

Glodina's innovative activities focus on new product development to enlarge existing markets and/or enter new ones. Examples of design innovations include the industrial strength, warp-knit towel (Marathon) aimed at the hospitality industry, an upmarket sheeting range, as well as the Glodina Beach range of towels (Glodina Company Profile, 2003:1).

Coastal's redeeming feature with respect to innovativeness relates to the recognition of a new or better source of inputs. Coastal saw a gap in the market for polyester fabric produced in Southern Africa and its exclusive access to imported yarn through its Indonesian connections, gave it an edge over other competitors (Msomi, 1999:1).

Investment in new technology at both Frame and Glodina included hardware and software, which enabled computer integrated manufacturing (CIM) and better handling and distribution. ICT also allowed entrance to e-commerce, and virtual market places, such as the trading houses and other e-commerce ventures described in Chapter 4.

Both Frame and Glodina believe in clean production and have made the necessary investments to minimise environmental damage. In addition to the environmentally friendly denim plant, Frame is also ISO 14000 certified and is involved in the clean production programme in South Africa (details are discussed under the section on institutions). Glodina had, for example, invested in electrical boilers, which use less energy and generate less negative externalities than conventional coal-fired ones (Environmentally friendly steam

deal, 1998:2). Glodina's production processes are also compliant with ISO 14 000 requirements (Glodina Company Profile, 2003:1).

7.3.1.3.1 *New technology and the error of over-optimism*

Errors of over-optimism according to Kirzner (1997:43) occur when a market participant expects to be able to complete a plan, which cannot be completed (at least not in the timeframe assigned to it). Of this Coastal is a prime example. Whereas it took Frame two and a half years to develop and implement their new environmentally-friendly denim plant, Coastal expected its green fields projects to be operational within a year, while they were simultaneously involved in expanding and restructuring other operations. This was a tall order indeed. As it turned out, the ambitions of the Coastal management were not fulfilled. When De Nim was sold in October 2000, much of the new equipment needed for its turnaround was still in its plastic packaging (Jones, 2000:1)

TABLE 7.1. ROUTINES, INNOVATIVENESS AND NEW TECHNOLOGY

CRITERIA	FRAME	GLODINA	COASTAL
Search routines (R&D)	In-house & Joint venture; SABS	In-house and buy-in; SABS	Foreign technology partner
New technology	CAD/CAM Denim plant; problems with implementation; did not consistently upgrade machinery	Clean production Problems with implementation	Delays in delivery and implementation of new technology
Investment routines and strategies	Phillip Frame (Cash rule, reserves, low dividends) Later management's departure from these rules	Lapses in focus and foresight Bounded rationality	Lack of focus Reliance on foreign partners
Innovativeness	Process and product innovation	Product innovation	Source of raw materials
Production strategies	Specialisation versus diversification/ generalisation	Specialisation in household textiles	Fully integrated pipeline from raw materials to garments

The lesson from the Coastal experience seems to be not to attempt to advance on too many fronts at once, but to use existing firm capabilities as far as possible since it takes time to build new ones. New expertise can be bought, but the experience of working together must still be built, a fact emphasised by Penrose (1959:52) and discovered by Coastal in Botswana and Glodina in Zimbabwe.

7.3.2 Long-Term and Interim Objectives

7.3.2.1 *Long-term objectives*

In the economics literature there has been much debate about the objectives of the firm. Is it profit maximisation as assumed by the neoclassical theory, or satisficing or a combination of other objectives such as market share, size, etc. for which profit is an underlying, implicit requirement? (See for example Ricketts (1987), for a comprehensive overview of the issues).

We report here on the long-term (over-arching) objectives of the firms as publicised by their leaders (Summarised in Table 7.2).

Against the background of the changing international trade environment and changing policies in the domestic economy (see exogenous factors below), Frame defines its overarching objective as 'becoming a competitive textile manufacturer by focusing on training people, deploying the latest technology available and providing the highest level of service to its customers.' (Frame Annual Report, 1997:2). Looking back at the history of Frame, this seems to have been an ever-present long-term strategy, although it was not voiced in these exact words.

Glodina's long-term objective is to 'become a quality competitor in a highly competitive niche market' (household textiles).

Coastal wanted to be the largest fully integrated textiles and clothing manufacturer in Southern Africa and it had aspirations of being one of the largest in Africa, too.

To achieve their long-term objectives, firms formulate short-term or interim objectives, which one could view as building blocks on the road to the long-term objectives. It is these interim objectives that we consider next.

7.3.2.2 *Interim Objectives*

By interim objectives we mean the focus of the firm in the short - to medium term en route to achieving the overall long-term objective. The firms often had multiple aims and their priorities changed over time. For example, while at Frame, Phillip Frame placed much store in market share and the size of his empire¹⁷, accepting low profitability in pursuit of this goal; the appointment of Mervyn King brought a clear focus on profit, rather than size. In fact, the downsizing and rationalisation strategy introduced by King streamlined the empire left by Frame to four business units under a holding company (de Lange, 1989:67). Each of the business units was expected to be profitable in its own right.

Glodina has tried to achieve its long-term objective by focusing on the interim strategies of modernising equipment, extensive staff training and niche marketing. The company chose to concentrate on technological developments to help it remain competitive when import competition intensifies because of trade liberalisation. Chairman John Balladon believed that " Only the fittest will survive." (Joubert, 1995: 102). Glodina at times displayed a lack of strategic focus, with its strategies and priorities changing from one reporting period to another (often every six months at the interim reporting stage). For example, the strategic decision reported in the interim results to June 1999 was to reduce stock levels by lowering production output and clearing excess stock at lower prices (Despatch Online, 1999). This was in contrast to the strategic intent

¹⁷ In this pursuit he was successful: at the time of his death, industry sources maintained that the Frame Group was the biggest single maker of blankets in the world and the largest textile concern in the southern hemisphere (Fiford, 1984:32).

published six months previously: although price was important in consumers' spending decisions, Glodina was not prepared to compromise on quality and would strive for improved productivity through the entire business in order to lift margins (JSE Handbook, 1998). Although the oscillation in focus may be seen as lack of direction on the part of management, it could also be interpreted as having learned to respond flexibly to internal and market conditions. The important point, however, is to consider the selection mechanisms, in particular, the feedback from the markets. Market analysts, as we have pointed out, play an important signalling role in bridging the gap between the firm's internal selection mechanisms (in the minds of management) and the external selection mechanisms of the market. In the case of Glodina (as with Frame earlier – section 7.3.1) there was a wide gap between what management believed was acceptable performance for the firm and the view of analysts in the market. For example, in response to management's assessment in the 1998 financial results that the current losses were acceptable under the difficult economic conditions, one analyst bluntly suggested that management should resign, since losses should never be treated as acceptable so acquiescently (Rutherford, 1998:88). As it turned out, better days did not arrive and the firm had to be rescued by an outside investor. Under the current management, Glodina continues to focus on maintaining its reputation and market share in the domestic market and to break into the global market in certain niches (we discuss the details of the marketing strategy in Section 7.3.4).

Although Coastal's ten-year strategic plan placed performance as the top priority or main objective, the majority of communications by top management, notably its Managing Director, Rajen Pillay, seemed to be focused almost exclusively on growth, i.e. achieving a desired size relative to other competitors in the African region:

'...Pillay believes Coastal is poised to become one of the largest fabric producers in Africa with an output of 56 million m² per year (Payne, 1999:2).

'...the group acquired a 77% interest in the Gaborone-based Algo Spinning and Weaving Mills. These acquisitions are a continuation of the Group's objective of

growth and increased stakeholder-wealth by strategic expansion and diversification.’ (Chairman’s statement, Coastal Group, 1997, quoted in JSE Handbook, 1997:144).

‘Rajen Pillay, the group managing director, ...claimed that the Coastal Group would soon become one of the main textile groups in the country, boasting the most state-of-the-art technology.’ (Jones, 1996:1).

TABLE 7.2: OBJECTIVES AND GROWTH STRATEGIES

CRITERIA	FRAME	GLODINA	COASTAL
Firm’s objectives	Margins Market share Maximising profits Sales Growth (1990s) /expansion (size versus performance)	To be quality competitor in niche market (household textiles)	To be largest integrated textile and clothing firm in Southern Africa
Growth strategy	Organic growth Greenfields projects Mergers & acquisitions Downsizing/rationalisation	Acquisition, organic growth Joint venture Merger Take over	Acquisition Greenfields projects Joint venture

The firms’ objectives are operationalised into strategies, which influence their growth paths and structure, and eventually industry structure. These aspects are the focus of the next section. The growth strategies of the three firms are summarised in Table 7.2.

7.3.3 Growth Strategies, Growth Paths and Organisational Structure

According to Penrose (1959) a firm’s growth is a cumulative, evolutionary process, reflecting path dependency (Garnsey, 1998:526). Variation and uncertainty, however, make growth paths of firms unpredictable. Firms faced with similar external conditions may still end up on different growth paths and achieve different outcomes. It is these diverse outcomes and the decisions that underlie the outcomes that will be the focus of our analysis in this section.

7.3.3.1 *Growth strategies and organisational structure*

Garnsey (1998: 530) points out that a firm's growth path is seldom a straight line from inception to maturity. There are various possibilities on this road, which is characterised by uncertainty. These possibilities include early failure¹⁸, an early plateau (in the absence of further stimuli to growth), organic growth and expansion through green fields projects, mergers and acquisitions. Some firms also experience growth reversal and downscaling through de-merger or restructuring processes and closure of some plants or subsidiaries in an attempt to ensure the future survival of the organisation.

The start-up conditions for Frame, Glodina and Coastal differed considerably. Whereas for Philip Frame the South African textile industry was virtually a clean canvas on which he could put down his vision for the industry, both Glodina and Coastal entered when the industry was already well-established. Further, while Frame grew up under an increasingly protective trade regime and Glodina joined under this regime, Coastal entered the industry when the pendulum was swinging the other way: the South African government had begun to reduce the protection. Whereas the founders of Frame and Glodina had training and experience in textiles, the founder of Coastal came from an auditing background and had to rely to a very large extent on the expertise of his foreign partners.

Frame's growth path consisted of green fields investments, organic growth and mergers and acquisitions. Mergers and acquisitions offer the opportunity to infuse new blood and capital, acquire new competencies and capabilities and even to change the culture of the new organisation over time. We discuss only some of the most significant mergers and acquisitions in Frame's history. In February 1982 Frame acquired its biggest rival, Natal Cotton and Woollen Mills (NCWM), and gained virtual control (90% share of production) of the blanket industry (Frame Group. Additional Cover, 1982:824). This was a potential problem of overcapacity for Frame, because local demand was declining in a

¹⁸ The business management literature abounds with data indicating the high rate of failure of new firms; as many as half of them fail within the first ten years of their start-up (Garnsey, 1998:551).

cooling economy and exports into Africa was not feasible for political reasons.¹⁹ The NCWM acquisition, however, held a major promise with respect to product innovation. In the light of consumer preferences for blankets becoming more sophisticated, NCWM had been concentrating on higher quality acrylic rather than rayon blankets, which are lighter and finer. Introducing fur-pile blankets, which were at the time only available through imports, was also an option (Frame Group. Additional Cover, 1982:824). Like the NCWM take-over, the Romatex take-over afforded Frame the opportunity to increase its own size and gain access to product and geographical markets where it was previously not active. It was also an opportunity for the management to apply their expertise and experience acquired in the recent restructuring and rejuvenation of Frame to another venture as expressed by Brian Connellan, the chairman of Romatex:

"in the last six years Romatex has not produced a return on assets above the weighted cost of capital. It was unlikely to do so in future and the only way to create shareholder wealth instead of destroying it was a deal with a party that could bring rationalisation benefits to a combined business". (Jones, 1997e).

Frame's merger with Seardel, the largest clothing manufacturer in South Africa, offered several benefits, of which the most important must be the strategic avenue it provided to benefit from preferential access to the US market under AGOA (direct textile exports are excluded from AGOA).

Glodina's growth strategies included both organic growth and attempts at establishing joint ventures and mergers. It is in these last two cases that the firm's management was seriously hampered by bounded rationality when they made these strategic decisions. Firstly, in the instance of taking the decision to pursue a joint venture with Merspin in Zimbabwe, the benefits seemed to outweigh the disadvantages by far. It was only further down the line when the seriousness of the economic and political problems in Zimbabwe became evident, that the management of Glodina realised that under the circumstances the expected benefits from the deal will not materialise and they accepted the

¹⁹ Zimbabwe, for example imported 3 million blankets from Japan out of reluctance to trade with Apartheid South Africa (Frame Group. Additional Cover, 1982:824).

costs (R3.4 million) of pulling out of the joint venture. Secondly, after the take-over of Glodina by Claas Daun, a merger with Hellierwood subsidiary, Zorbatex, a towelling product manufacturer, which would have complemented Glodina's products, was proposed. The advantages to Glodina included lower input costs in Ladysmith, new plant and equipment, lower borrowings and an established export record (Jenvey, 2002:1-2). It was only after an offer had been made and an agreement had been entered into that problems with the financial status of Zorbatex emerged and Glodina's management reneged on the deal, incurring a cost of R1.8 million.

Both Frame and Glodina have experienced growth reversal and restructuring. Whereas Frame's restructuring culminated in a return to profit that has been sustained for almost a decade now, Glodina is still in the process of recovery.

Coastal Textiles in our case studies is an example of early failure after a brief honeymoon period (1997-1999) when they managed to show a profit and started to gain recognition in an industry, which was initially quite sceptic about the wisdom of the goals they had set for themselves (Payne, 1999:1-3). Coastal chose textiles at a time when perceived prospects for the industry were dismal, but Pillay was able to convince foreign shareholders of the export potential under quota-free access conditions from Southern Africa, as well as the advantages of good infrastructure and low energy costs in South Africa. Pillay himself perceived it as a major challenge to bring to fruition his vision of Coastal as the largest integrated textiles and garment firm in Southern Africa. Delays in implementing the investment on the part of his foreign partners (initially because of the uncertainties around the transition to a democratic system of government in South Africa) severely tested Pillay's access to resources in the start-up phase. (Bennett, 1998:1-3)

Coastal's growth strategies consisted of takeovers and investment in green field projects. Considering the time-span of the firm's existence (1995-2000), "too much, too soon" sums up the growth strategies of the Coastal Group.

In sum, each firm's growth path led to changes in its organisational structure and put varying demands on the competencies of its management. We consider these aspects next.

7.3.3.2 *Organisational structure and managerial competencies*

When Phillip Frame died, he left behind a veritable web of cross-holdings in companies, which he himself believed would take three generations to disentangle. The organisational structure was so complex that the new management had to design a dedicated computer programme to help unravel the threads amongst the individual companies. An important concern was to avoid double counting of assets (Glaser, 1985:29). It eventually took two decades to streamline the structure of the Frame Group.

While the Frame management was tied up in court, things were going badly wrong back at the firm. After the departure of the troika, the new management of Frame made public some of the mistakes that had been allowed during the first half of the 1980s:

Foreign exchange losses of R15, 1 million, and obsolete stock worth R5 million had to be written off (Glaser, 1987:34). Under the late Phillip Frame – and continued under the triumvirate –, the company had acquired a manufacturing orientation that paid little attention to the need for good profit margins. In pursuit of turnover and market share, margins were cut to the bone and extraordinary long terms extended to debtors. For example, at the end of June 1986, the Natal Consolidated's debtor's book amounted to R256.6 million, equivalent to six months' outstanding debt on R544.9 million annual sales (Glaser, 1987:34). The new directors found 'a serious lack of communication and considerable tension between managing directors, senior managers and other employees and an absence of meaningful management information upon which effective decisions could be made.' They also discovered that 'an absence of market research and sales forecasting, coupled with a lack of communication between the manufacturing and sales departments...often resulted in unproductive machine utilisation.' (Glaser, 1987:35). Even worse, an imbalance

between the various sections of plant resulted in weaving capacity far outstripping the group's ability to dye and finish cotton fabrics; 'product was sold at unrealistically low prices, which often did not recover the full costs. This resulted in certain sectors of plant capacity becoming grossly oversold.' (Glaser, 1987:35). One of the perceived drawbacks of the Frame Group of the late 1980s was its lack of vertical integration. Its output was quite diverse and sold in large volumes, trying to compete on the basis of low margins. Its investments in new technology in order to increase value-added were viewed as 'more-of-the-same', since its competitors were also implementing capital expenditure programmes with the same objectives in mind (McNulty, 1990:27). Thus, the structure and strategic focus of the firm had to change. This state of affairs clearly needed better management competencies and some entrepreneurial action (which we deal with in the next section).

Glodina had experienced similar problems during the 1990s, suffering from low productivity, dwindling staff morale and erratic performance with respect to quality, delivery times and customer services. Since the Daun take-over, staff morale and productivity at Glodina are much improved. Rejects are down from 12 - 15% of output to about 2 - 3 % (Jenvey, 2002:1-2).

Coastal's South African management, though successful in attaining promises of funding from its foreign investors, did not recognise and act on a pattern of promises and delays starting from the very inception of the firm. Notably, the first delay occurred during the start-up phase, and the last delay in the transfer of funds was the straw that finally broke the camel's back (Bennett, 1998:2; Inggs, 2000:1).

7.3.4 Selling the Firm's Output: Marketing Strategy and Focus

All three of our firms had their eye on the export market, but for two of them the domestic market was initially the most important outlet for their products. Domestically, Frame has moved from staples for the African market (such as blankets) to more upmarket fabrics and household textiles (Kenney, 1989:121). As domestic and foreign competitors succeeded in chewing into Frame's market

share, the company embarked on an aggressive and costly marketing strategy. This started paying off in 1990 when Frame started clawing back market share (McNulty, 1990:26). Glodina initially focused on the domestic market alone, while Coastal aimed at import substitution as well as export growth.²⁰ In this section we study the experiences of the firms in the case study with respect to their marketing strategy and focus (Summarised in Table 7.3).

7.3.4.1 *Switching to export orientation*

To be competitive in the modern economy requires a much closer relationship between strategic planning and marketing than ever before, whether the firm competes only in the domestic market or also internationally. However, when the firm enters the international arena, it has to deal with a larger number of more diverse competitors and market conditions, and has to confront a multitude of decisions (Vernon-Wortzel and Wortzel, 1997:301).

In the opinion of some industry commentators²¹, South African textile firms have no option but to cultivate export markets if they want to survive. Frame has taken several steps that positioned it favourably to increase exports both directly and indirectly. Its direct exports entail mainly household textiles, which it markets through various channels under its own brand names. Indirectly, its merger with Seardel gives it the opportunity to grow indirect exports by supplying fabric for Seardel's clothing exports. Frame was also quick to work with Mauritian clothing manufacturers to supply the necessary fabrics, which will allow them to fulfil the large orders from American clients under the AGOA.²² According to Frame's MD, Walter Simeoni, breaking into the US market had been a huge learning curve, which required adapting to exacting quality standards and agreeing to 'flexible partnerships', which gave American companies the right to cancel orders even if all their requirements were met (Inggs, 2002a: 1-2).

²⁰ Coastal intended to take away more than half the share of imports in the 100g/m² to 120g/m² and the 160g/m² to 220g/m² weight ranges from Taiwan and Korea (Payne, 1999:2).

²¹ Interviews with Jack Kipling, South African Clothing Industry Export Council and Martin Viljoen, South African Textile Industry Export Council, 20 November 2000.

²² Interview with Frame Managing Director, New Germany, 17 November 2000.

Frame's exports of household textiles (curtains, draperies and bed-linen) has increased on the back of the Rand's depreciation in the short term, but in the longer term, it is the companies attention to quality, design and service that is starting to pay off in a very competitive environment. In the UK market, for example, Frame's products compete for market share with at least 50 other producers, some of them Brazilian firms, who have also benefited from the depreciation in their currency (Claasen, 2001:1).

In 1996, Glodina's management committed to an export strategy, initially targeting the industrial (hotel) market in the UK and Germany. At the same time, they launched a new sheeting range for the small up-market niche in the domestic market (Jones, 1996a: 1). Glodina's sales team has set a target to raise the percentage of output aimed for the export market to 20% by December 2003 (Inggs, 2002a: 1-2). R5 million of the recent rights issue was spent towards new equipment for export orders (Inggs, 2002). Daun's position as international textile entrepreneur²³ should be able to open up doors to Glodina's exports. Daun believes the Glodina brand could be repositioned for exports to offset the low growth prospects and import competition in the domestic market (Glodina throws in towel to German buyer, 2001:1).

7.3.4.2 *Marketing mechanisms and strategies*

By marketing mechanisms we mean not only the means to make customers aware of the firm's products, but also the sources of market information that the firm utilises. The market information includes intelligence about consumer tastes and preferences as well as information about competitors' strategies and products.

Our firms have used both traditional mechanisms (such as sales offices and sales agents) and electronic age methods, such as company websites and virtual market places on the Internet.

²³ The South African interests contribute about R3 billion to Daun's worldwide operations, which span Germany, France, Hungary, the Czech Republic, Portugal, Canada, the US, China and Uzbekistan (Bolin, 2003).

Frame was probably the first South African textile firm to establish its own buying and selling office in London (in the 1950s). This was followed by the establishment of sales offices in other Southern African countries. Frame regularly participates in domestic and international exhibitions and prefers one-on-one contact with customers, rather than working through foreign agents or government-sponsored trade missions.²⁴

Frame has its own website, but also plays a part in joint industry efforts, such as the virtual market place offered by the South African Textile Industry Export Council (details of other virtual market places are discussed in Chapter 5).

Glodina also participates in exhibitions, uses sales agents, has its own website and is a member of the South African Textile Industry Export Council (SATIEC). Glodina's participation in the Living Space Exhibition in Cape Town, for example paid off in significant orders from Dubai and the UK (Inggs, 2002a: 1-2).

Coastal, by its management's own admission, has lacked a comprehensive marketing strategy (Gordon, 2000:2). Since De Nim was the only properly operational entity in the lifetime of Coastal Holdings, it is fairly safe to assume that the latter continued with the marketing strategies already in place at De Nim. Coastal had its own website and made use of sales agents in foreign countries, as well as the market networks of its foreign partners (Bennett, 1998:1-3).

Firms also create awareness of their brands by participating in public events and sponsoring fundraising events for charity. Glodina and Frame have done this for a wide range of charities. Coastal, through its subsidiary, De Nim, sponsored an annual charity event, coinciding with their race day at Greyville Race course, Kwazulu-Natal. Focusing on denim, a prize was awarded to the best 'denim dressed' (Denim Derby, 1997:3).

²⁴ Interview with Marketing Director of Bergriver Textiles, subsidiary of Frame, 13 December 2000.

TABLE 7.3. ENDOGENOUS FACTORS: MARKETING STRATEGY AND FOCUS

CRITERIA	FRAME	GLODINA	COASTAL
Marketing mechanisms and sources of market information	Sales offices, exhibitions, agents and word of mouth E-commerce	Marketing consultant, sales offices, agents and exhibitions E-commerce	Had a website Denim derby Lack of comprehensive marketing strategy
Export	Strategic focus since 1970s	Major export drive from 1996	Garment production solely for export
Domestic market	Yes	Yes	Yes

7.3.5 The Role of Entrepreneurial Talent and Labour

Since at least two of the entrepreneurs in our case histories have had a relationship to labour which is difficult to categorise, yet had an important influence on the culture of the firm, it makes sense to combine the entrepreneur and labour in this section of the analysis (Summarised in Table 7.4). The entrepreneur's role is, however, not limited to his²⁵ relationship to labour.

7.3.5.1 *The role of the entrepreneur*

Like Schumpeter (1928), Penrose (1959), Kirzner (1997) and others (see for example Garnsey, 1998:527), we are interested in individuals (especially the entrepreneur) as change agents. As Garnsey (1998:528) underscores " ...the immediate impact of their actions is visible at the micro-level and can set off cumulative processes that work through to further levels of system aggregation." In our case studies, the influence of Philip Frame in the early history and the revolutionary effect of Claas Daun on the South African textile industry of the latter part of the twentieth century are of particular interest.

Through the histories of these firms runs a common thread, sometimes more visible than at other times; this is the thread of discovery, solution and renewal,

²⁵ There were no female entrepreneurs in our case histories.

spun by the hand of the entrepreneur. Over time the entrepreneur played different roles, fulfilling almost all of the descriptions assigned to him in the literature on entrepreneurship. As the firms adjusted to changing circumstances, these entrepreneurs were required to act, e.g. to make better use of 'tacit knowledge' acquired by human resources in the firm, to make judgemental decisions to meet the challenges of economic change, to force through new developments and to restructure property rights in the light of new information (Ricketts, 1987: 277).

One of the most important tasks facing our managers and entrepreneurs in the case of Frame and Glodina was to change the culture of the organisation; 'but a company does not easily change its culture. In everything it does, it carries the imprints of the entrepreneurs that created it' (Glaser, 1985: 29). In the case of Frame the ingrained culture was considered an autocratic one and "no matter how much its ownership and direction change, autocratic roots cannot easily be made to yield democratic fruits" (Glaser, 1985: 29). The central question asked in the market was: 'is the Frame group really changing?' (Glaser, 1985:28-30). Following the interim period in which the troika still carried on along the lines laid down by Phillip Frame, it was the task of Mervyn King and his team to overcome the rigidities of the past. This meant changing the culture of a 66-year old organisation, where many of the management and employees spent their careers (McNulty, 1990:26-27). King had a legal background, having acted as legal advisor for Frame in Phillip Frame's era, but had been a non-executive director at Frame for a few years before his appointment as Chairman. Market analysts questioned his operational abilities, although he became known as a turn-around entrepreneur: "King is an excellent conceptualiser about structures and acquisitions, but can he do operational conceptualising?" (Kenney, 1988:30). The departing MD, Justin Schaffer, was renowned for his operational ability and observers were worried that his departure would leave a vacuum that King would not be able to fill. Schaffer's departure was precipitated by a difference of opinion with the Frame board on three essential issues:

- Whether the business should be centralised or decentralised²⁶;
- Whether to merge with another textile manufacturer; and
- Whether to dispose of a strategic unit within the group.

King's intention was to decentralise and require each company, with its own chief executive, to focus on its core business. His plan had three core elements: cost base, quality, and service, which he emphasised should be put into action, rather than talked about (Kenney, 1988:31).

As it turned out, King's ability to conceptualise around structure, and his knack for picking able teams were sufficient to put the Frame Group on the road to restructuring and recovering. That he picked Walter Simeoni, with vast experience in textile manufacturing and a decidedly entrepreneurial flair, as operational director was to remain one of the most fortuitous decisions for the group. Walter Simeoni is now the group MD of the Frame Group, the President of the South African Textile Federation, Vice-President of the International Textile Manufacturers' Federation and former Chairman of the Cotton Manufacturers' Association in South Africa (we discuss his role in these organisations under the section on institutions).

In the end, King's role could be characterised as that of a catalyst for change when the firm most needed it (Kenney, 1988:31).

Like Mervyn King at Frame, Claus Daun, chairman of Glodina, also believes in decentralisation, treating each of his companies as independent business units with its own chief executive officer. Daun's main role, after identifying the latent opportunities in a newly-acquired business, is to recapitalise the business and then find a suitable management team. He has a good sense of what he wants to see in a manager and can be exacting in his demands: "when management starts talking about the weak economy and tough trading conditions, I know it's time for a motivational boost or new appointment" (Inggs,

²⁶ The old guard under Phillip Frame had favoured decentralisation, despite the founder's penchant for control.

2002c: 2). Daun holds 10 textiles²⁷ companies in South Africa, under the umbrella organisation, Courtheil Holdings. Daun's group in South Africa had a turnover of R2 billion, followed by the Frame Group, the second largest textile group at R1.6 billion in turnover for 2001 (Inggs, 2002c: 1). His other interests in South Africa, such as cotton farming, automotive leather, automotive components, and furniture complement his textile holdings to an extent (Inggs, 2002a: 1). Daun is well respected in the industry for his superb understanding of the global textile world, his eye for the investment potential in South Africa and his successful turnaround track record to date (Bolin, 2003).

While the management at Frame struggled to change the culture that Phillip Frame had built up over more than 50 years, the management of our youngest firm, Coastal, was battling to build a cohesive culture over operations that were geographically spread out and consisting of established and green fields projects. It did not help, either, that the firm had an absentee majority shareholder.

An interesting observation is made in the literature regarding the role of outsiders (Penrose, 1959) and immigrants (Ricketts, 1987). "Immigrants will look on established procedures with a new perspective, well aware that things may be done differently; the very act of migration suggests energy and ambition; while the costs of incurring the disapprobation of those inconvenienced by change will be lower for the outsider" (Ricketts, 1987: 45). Penrose (1959:54) emphasised the different perspectives of outsiders, enabling them to see opportunities and bottlenecks easier than incumbents. Grindley (1993:67) adds that outsider status means that such a person is not bound by traditional ideas and would be much bolder in introducing new ways of doing things. There are certainly parallels to be drawn between the immigrant/outsider status of Phillip Frame and Claas Daun and their perception of the investment potential and opportunities offered by the South African economy. Phillip Frame had recognised the potential of the South African economy during his first visit to the country and for the rest of his life remained committed to pursuing the

²⁷ These include, amongst others, Unispin, Da Gama Textiles, Spilo, the Fabric Library Group, all Anglovaal's textile subsidiaries (of which Gelvenor Textiles has been the most spectacular performer), Table Bay Spinners, Court Fabrics and Home Fabrics (Inggs, 2001a: 1-2).

opportunities for growth offered by the Southern African region. Daun is very explicit about his strategy to invest in countries where the perception is worse than reality. As an outsider, however, he is less likely to remain passive about government policies that he perceives as detrimental to industry or the economy as a whole. Whereas South African business people may be reluctant to criticise government, Daun, though circumspect in his approach does not shy away from voicing his disapproval (Dispatch Online, 2002:3). Walter Simeoni, on the other hand, was able to bring about successful restructuring at Frame, perhaps because he was not part of the old guard, and hailing from Austria with an extensive past in textiles, brought a different approach to the firm.

7.3.5.2 *The entrepreneur, interdependence and influence on the structure of the industry*

Illustrating the 'interdependence' of the firms and the impact of some individual agents on the industry is the case of De Nim, the subsidiary of Coastal Textiles. Before being sold to Coastal, De Nim belonged to Claas Daun, who had now taken over Glodina. Daun had recapitalised De Nim and returned the firm to profitability, amongst other things building a strong foothold in export markets²⁸ and acquiring strategic alliances. An alliance with Levi Strauss, for example, included a 3 to 5 year growth programme for both companies (Jones, 2000:1).

Daun's influence on the structure of the South African textile industry has been the subject of considerable speculation and debate in the industry and the media. Some analysts believed that the aim was to consolidate the South African textile industry into two or three large entities with the critical mass to bargain with the retailers. To date there has been little concrete evidence to support this view. Daun's companies are aimed at different market segments and are expected to be profitable as autonomous business units. Obviously, group synergies between yarn suppliers and fabric manufacturers in the group are to be expected (Glodina throws in towel to German buyer, 2001). However, the

²⁸ De Nim's exports contributed 38% to turnover and were mainly destined for Europe, Australia, Central Africa, Canada and the USA. The biggest growth in exports was expected to be generated in the American market (Jones, 2001).

unbundling process²⁹ that created the opportunity for Daun to acquire, for example, the textile firms formerly in the Anglovaal stable and the streamlining of Frame and other textile groups contributed to a textile industry that is now leaner and in the hands of entrepreneurs who have the expertise and energy to take it to an era of global competitiveness, according to Walter Simeoni, president of the Textile Federation (quoted in Cohen, 2002:1).

7.3.5.3 *Labour*

The experiences of our three firms with respect to labour are varied, complex and intriguing. While the labour relations issues are inextricably intertwined with the political history of South Africa, it is possible to discern patterns of influence created by strong individuals over time, especially at Frame, and to a lesser extent at Glodina. Phillip Frame ran the business autocratically and paternalistically. The business was very labour-intensive, and although wages were low, job security was high. Many employees indeed, spent all of their working lives in the company. Phillip Frame's paternalistic approach to labour was manifested in his attempts at improving working conditions in the Frame factories, which included the provision of in-house training, as well as medical and savings facilities at a time when such facilities were not the norm in factories. The firm also offered recreational facilities and supported sports teams such as netball and football. Frame's establishment of management liaison committees, which included worker representatives, predated the government's attempts to introduce such committees in lieu of trade unions by several years (McNulty, 1990b: 26; the Frame Group of Industrial Organisations, 1978:22-29). It was a major challenge to change from this paternalistic mode of behaviour to a situation where the firm could deal with organised, independent trade unions as equals in the work place. As noted, it took a long protracted battle in the courts to win recognition for trade unions at Frame. Yet, over time the relationship between management and the trade unions has changed from being adversarial to one of mutual respect and cooperation. Just like the French employers and employees in the experiences recounted in Chapter 3, here, a

²⁹ During the Apartheid era, and especially with disinvestments and sanctions in the 1980s, ownership in the South African manufacturing sector had become concentrated in large diversified conglomerates with complex cross holdings. The 1990s saw a voluntary unbundling of this conglomerate structure (Smith, 1992:471).

common threat (import competition) encouraged cooperation between management and trade unions, to the extent that they now work together to devise a survival and growth plan for the industry. Better relations with the trade union are evident from the reduction in man hours lost through industrial action and stay aways by 87% to 2 316 during the 2001 financial year (Frame Annual Report, 2001:2).

Perceptions about Daun's relationship to labour are mixed, as witnessed by the statements of some market analysts, for example: "Daun buys cheap and has no allegiance to labour." (Quoted in Inggs, 2001a: 1). All Daun's companies, however, are unionised and he emphasises that his uncompromising stand on profitability has saved far more jobs than it has cost, citing the 19 000 jobs he has salvaged by saving South African companies on the brink of collapse (Inggs, 2002:3). Upon take-over at Glodina, Daun made it clear that a joint effort by management *and* labour, as well as restructuring and re-alignment would be required to save the company. The message to labour was quite blunt: cooperation from labour was of the essence to avoid a repeat of his only failure to date: Mooiriver Textiles. This company's financial situation was so dire and the negotiating position of labour so intractable that saving the company proved to be beyond Daun's power and 800 jobs were lost³⁰. The union at Glodina expressed their willingness to work with Daun and the new management to turn the company around (Inggs, 2001a: 3).

All three our firms have had problems with the skills of workers at different stages of their development, but especially when they were expanding or introducing new technology.

Although all three have invested in training, Frame seems to have been the most consistent in developing and upgrading the skills of its employees and management. During 2001, Frame's major training centres facilitated 10 138 training opportunities, a considerable increase on the 5 926 the previous year.

³⁰ Some of these jobs were relocated to the Eastern Cape when parts of Mooiriver Textiles were integrated with Da Gama Textiles (Inggs, 2001:3).

The firm has also appointed an additional professional to be responsible for management and career path development (Frame Annual Report, 2001:2).

TABLE 7.4. ENTREPRENEURIAL TALENT AND LABOUR

CRITERIA	FRAME	GLODINA	COASTAL
Entrepreneurial talent	Phillip Frame Walter Simeoni	Brothers Balladon Claas Daun	Claas Daun (De Nim) Rajen Pillay
Labour	Liaison committees, trade union struggle for recognition, worker benefits (health, savings, training, green areas)	Trade union Training Low staff morale	Trade union Training skills and productivity problems in Botswana

In 2002 the Frame Training Centre was converted to the Frame training College under the motto "Indawo Yoku Fundela"³¹ (Frame Annual Report 2002:2). Other opportunities for learning at Frame are facilitated by the green areas, where worker teams meet regularly to share ideas, discuss and solve problems.³² Glodina's training efforts are concentrated on general competencies at all levels, as well as technology-specific training. Coastal seems to have been less proactive, responding to bottlenecks created by the lack of skills only when they occurred (Msomi, 1999:2). The firm's management seems to have had a shorter-term perspective on skills building.³³

³¹ Place of Learning.

³² Interview with Frame Managing Director and factory visit, 17 November 2000.

³³ At the Coastal subsidiaries in Botswana, workers went through a four-week training programme before starting employment. This did not seem to be part of an overall skills development strategy (Msomi, 1999:2).

TABLE 7.5. LONG-TERM RELATIONSHIPS AND INSTITUTIONS

CRITERIA	FRAME	GLODINA	COASTAL
Long-term relationships	Suppliers and Customers	Suppliers and customers	Technology partner De Nim's relationships before takeover
Institutions	University of Port Elizabeth, Textile Federation, Employers' Association, SETA, International Textile Manufacturers' Federation, SATIEC SABS Natal University DANCED	Textile Federation, SETA SA initiative of German Business, Africa Association, SA German Chamber of Commerce and Industry, SATIEC, SABS	IDC Textile Federation Botswana Development Corporation

7.3.6 Long-Term Relationships: Suppliers, Customers, and Institutions

Although inter-firm relationships have always been important, they took on increased importance in the face of rapid technological change and intensified global competition. The 1990s were characterised by the emphasis placed on strategic alliances, as exemplified by this quote from an Olivetti executive:

"In the 1990s, competition will no longer be between individual companies but between new, complex corporate groupings. A company's competitive position no longer (solely) depends on its internal capabilities; it also depends on the type of relationships it has been able to establish with other firms and the scope of those relationships." Financial Times, 29 May 1990, quoted in Vernon-Wortzel and Wortzel, 1997:61).

To the importance given to the relationship with other firms, we may also add the relationships that the firm has built with other institutions, such as education and training institutions and industry associations (These relationships are summarised in Table 7.5).

Financial institutions for example, are important selection mechanisms in the market process. Although all three firms were dogged by working capital constraints, Frame and Glodina (albeit by means of a take-over) managed to resolve their cash flow problems. Coastal on the other hand, saw poor financial planning and unexpected delays in transferring funding on the part of its foreign partners result in the demise of the firm. Coastal's relations with financial institutions were sullied by allegations of impropriety against both South African directors and its foreign partner³⁴.

The Frame group is vertically integrated and is thus closely involved with its suppliers of raw materials and yarn, except in the case of cotton, where government regulations do not allow textile firms to source cotton outside South Africa before all local cotton has been taken up (see Chapter 5). Frame's relationships with technology suppliers are mixed. With some suppliers it has a history of coordination and even joint ventures (as reported under innovations), whereas others simply supply a particular technological need when required.

Coastal was integrated from cotton growing to garment manufacturing and could source raw materials for manufactured fibre products through its Indonesian connections.

Frame's relationship to customers under Phillip Frame was in a sense paternalistic: he often took a hard line with customers, but in tough times the firm acted as banker, e.g. debtors were allowed much leeway in payment terms (McNulty, 1990b: 26). Frame and Glodina have experienced deterioration in their relationship with customers when difficulties at the firm resulted in an inability to fill orders or sub-standard delivery performance. Both firms have since then

³⁴ Allegations of fraud and corruption were levelled at both Coastal and its foreign partner. In the case of Coastal subsidiary (De Nim) irregular payments into the accounts of Coastal directors were investigated by the liquidator. These payments were made at a time when funds to pay the salaries and wages of employees were not available and the management was struggling to find the funds to salvage the other companies in the Coastal group (Jones, 2000:1). In the mean time, Coastal's foreign owner, Polysindo, was under investigation in an Indonesian banking controversy, where it was alleged that the company's subsidiary, Texmaco, received loans amounting to \$1,3 billion from Bank Negara Indonesia after intervention by the former president, Suharto. The bank is state-run (Jones, 2000:1).

significantly improved their relationships with customers (Glaser, 1987: 34-35; Connolly, 1997:50).

Both Frame and Glodina's investment in ICT enables them to improve their relations with suppliers and customers through better communication, real-time access to designs and specifications and better delivery performance.

Frame has had a long association with the University of Port Elizabeth, as we reported in the firm's history, and has over the years also developed a constructive relationship with higher education institutions in Kwazulu-Natal. For example, it has used the research expertise of the staff at the Industrial Restructuring Project at the University of Natal to help develop a strategic plan for the industry. Together with DANCED, a Danish government sponsored clean production programme in South Africa, Frame worked with the pollution research group at the University of Natal on the "Waste Minimisation Programme". This linkage resulted in a significant saving in material usage (Frame Annual Report, 2002:3).

We have already referred to the links that both Frame and Glodina have to the South African Bureau of Standards and the South African Textile Industry Export Council. In addition, both firms participate in the skills development work of the Sectoral Education and Training Authority (SETA) for Textiles, Clothing, Leather and Footwear. As members of the regional employer associations, the firms work with the trade union (SACTWU) under the auspices of the SETA. This collaboration has resulted in a rolling three-year Sectoral Skills Plan for Textiles, Clothing, Leather and Footwear. Skills development plans at firm level are supposed to be aligned to this industry plan (Sear del Annual Report, 2002:2).

Under the leadership of Walter Simeoni, MD of Frame (acting in his capacity as head of the Cotton Textile Manufacturers' Association), the textile industry is funding a training course for customs officials to deal with illegal imports. After a long process of deliberation and negotiation with the department of Customs and Excise, a training course was finally approved and implemented. The most important aim is to enable customs officials to identify 'textile substrates and

finishes as well as link them to the appropriate tariff headings' (Textile industry will fund customs course, 1998).

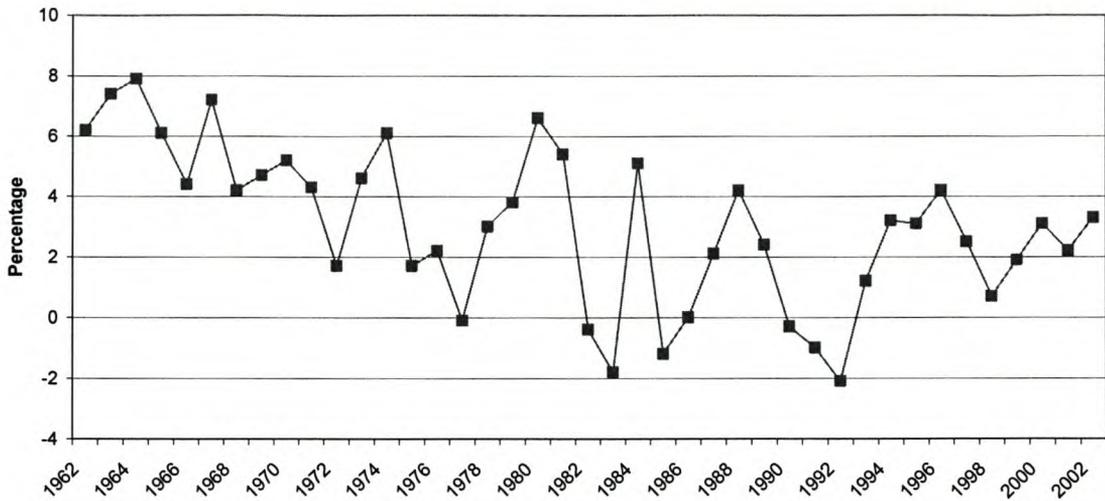
As president of the South African Textile Federation, Simeoni is also in a position to steer the objectives and the competencies of the industry association from focusing on lobbying government for import protection to helping members attain the skills and competencies to be competitive in the global market place.

With his stature in the global textile world, and his work at the South African initiative of German business, the Africa Association and the South African German Chamber of Commerce and Industry, Claas Daun is well placed to broaden Glodina's access to global knowledge and opportunities.

Coastal had a favourable relationship with the Botswana Development Corporation, who was willing to invest in its ventures in that country. Coastal was also a member of the South African Textile Federation and was able to use the services of the Industrial Development Corporation (IDC) when it needed salvaging. The relationship with the IDC was, however, short-lived when allegations of financial impropriety against the directors of Coastal surfaced (Jones, 2000:1).

7.4 EXOGENOUS FACTORS IN THE COMPETITIVE ENVIRONMENT

Although we have sporadically referred to instances where exogenous factors, such as the interest rate, inflation and exchange rates influenced the firms in the textile industry, our purpose here is to draw the main arguments together in order to summarise the impact of such factors and the firms' response to changes in such factors.

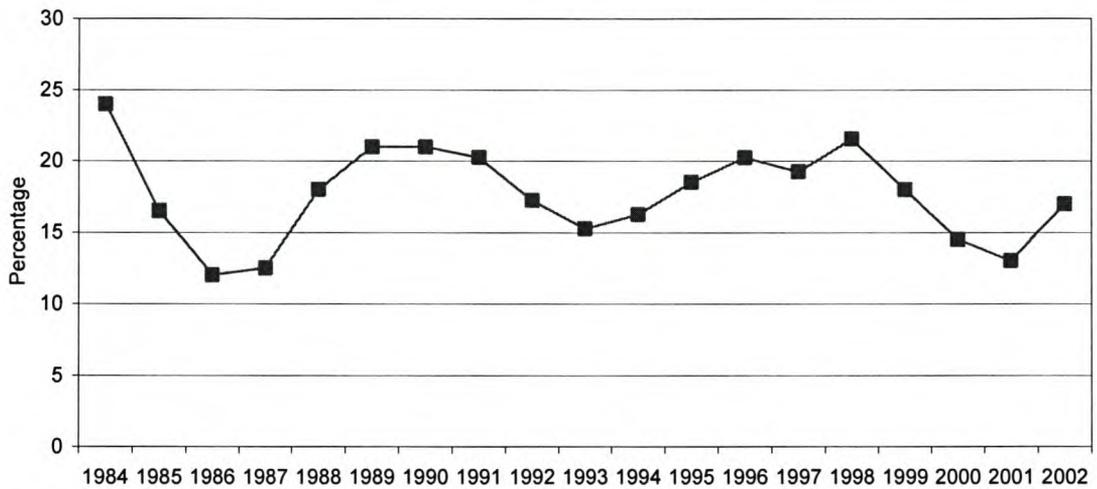
FIGURE 7.1. REAL GDP GROWTH - SOUTH AFRICA (1962-2002)

Source: South African Institute of Race Relations (2001:425); South African National Treasury (2003).

7.4.1 General Economic Conditions

The recession of the early 1980s (see Figure 7.1), coupled with high inflation rates had severe effects on the fortunes of the textile companies. Recession had a dampening effect on consumer spending and inflation caused input costs to spiral (Fiford, 1985:115).

Until the middle of the 1990s, the domestic market was the most important one for domestic firms, given the anti-export bias that developed in the South African economy during the Apartheid years (McCarthy, 1992:456). Changes in the domestic economy thus had a profound impact on the performance of the firms in our case study. For example, the worst period in terms of performance for Frame coincided with the recession between 1990 and 1993 (Figure 7.1), while Glodina and Coastal were similarly affected during downswings in the economy.

FIGURE 7.2. PRIME OVERDRAFT RATE - SOUTH AFRICA (1984-2002)

Source: South African Institute of Race Relations (2001:439); South African Reserve Bank (2002).

The spillover effect of the Asian crisis of 1997/98 brought lower economic growth for South Africa (0.7%) in 1998 and 1.9% in 1999. This slowdown in economic growth (Figure 7.1), coupled with the higher interest rates (Figure 7.2) squeezed the purchasing power of consumers and thus, the demand for textiles and clothing, amongst other things.

7.4.2 Exchange Rate Movements

Depreciation of the Rand is, by and large, advantageous for exports, but foreign buyers are aware of currency depreciations and expect to pay less. So, the South African producers are often price takers in the export market and do not receive the full advantage of the depreciation. Strategically, several textile firms aiming at growth through exports proceeded from the assumption that the Rand will continue to depreciate. The Rand's appreciation in the last quarter of 2002 and the first months of 2003, now forces them to rethink this assumption and to focus on more sustainable competitive edges (Enslin, 2003:1). Also, as the local

currency appreciates, imported textiles and textile products become cheaper, enticing customers to buy imports rather than domestic products.

South African textile producers import man-made fibre products, chemicals and dyes, as well as machinery. In some cases the cost of buying and maintaining machinery in the second half of 2001 was 40% higher than anticipated (Cohen, 2002:2). Investors in imported capital goods are doubly penalised when the depreciation takes place in the presence of high or rising interest rates. Both Frame and Glodina are experiencing mixed results because of the fluctuation in the external value of the Rand: while they benefit from imported inputs being cheaper, their strategic imperative of export growth is hampered significantly when the Rand appreciates.

7.4.3 Industrial Policy

Both Frame Textiles and Glodina were influenced by the government's industrial decentralisation policy and incentives with undesired results. Glodina elected to set up a production plant at QwaQwa, a self-governing state in order to gain access to the generous incentives offered by the government to induce industrial decentralisation. Labour was also cheaper in these areas. Unfortunately, Glodina experienced labour problems and installation of the machinery at the new plant created hold-ups and inefficiencies (Kenney, 1989:88-89). Frame, on the other hand, did not benefit from the incentives, because it already had an established plant in the designated area. Its competitors,³⁵ however, could fully benefit from the generous incentives, which seriously impacted on Frame, making its cost structure untenable (Frame Group. Running for cover, 1990: 81). Following similar reasoning to Glodina, Coastal decided to settle in Botswana because of that country's investment incentives and relatively cheap labour. Coastal's operations in Botswana were negatively affected by a lack of skills, resulting in inefficiencies, delays and higher training costs (Msomi, 1999:2).

³⁵ Mostly foreign (Taiwanese, but not exclusively) investors. Because of the nature of the policy, which made the incentives available for seven years in a particular designated area, with initially no restrictions on access in different homelands, foreign investors did 'homeland-hopping' –uprooting their factories when the incentives expired to relocate to another homeland, with obvious results for the sustainability of investment and employment (Nkuhlu, 1987:36-38).

Of our three firms, Coastal, investing in 1995, was the only one who benefited from the tax holiday offered under the new supply-side measures introduced by the Department of Trade and Industry, the details of which have been discussed in Chapter 4.

7.4.4 Trade Policy and Customs Performance

Changes in South Africa's trade policy had been discussed extensively in Chapter 4. Suffice it here to highlight the most important aspects that had an impact on the firms in our case study.

Frame's dismal performance in the late 1980s was partially blamed on the reduction of certain tariffs in 1986 and the long period of waiting for the report of the Board of Trade and Industries (now the Board on Tariffs and Trade). The sharp depreciation of the Rand since 1985 was evidently not sufficient to improve competitiveness (Payne, 1988:107). In response to imports of low-cost cotton fabrics, Frame's products were upgraded 'somewhat' (Payne, 1989:106). Uncertainty linked to the delays in finalising government's trade policy has been a problem for the firms in our case study at various points in time. Apart from the example given above, similar delays were experienced in the process of developing a long-term strategy for the textiles and clothing sectors in the late 1980s and the beginning of the 1990s. Industry leaders were openly critical of government's handling of the restructuring of trade and industrial policy. Mervyn King of Frame opined: "...it is not possible to change industry which has been driven by policies involving strategic stockpiling, import replacement and 'do-your-damndest' attitude to becoming an international competitor (overnight)" (Textile Industries Dyegest Southern Africa, 1990:2). The excruciatingly long wait for a decision regarding the extension of the Duty Credit Certificate Scheme will also not go down in history as the high point of government-industry relations (Details are discussed in Chapter 4).

Frame in particular, absorbing about 40% to 50% of the South African cotton crop, was disadvantaged by the protection afforded to the local cotton growers. South African textile producers are forced by law to take up the entire South

African cotton crop before they may import. In addition, cotton growers receive protection by means of an import tariff on imported cotton. Frame in some years thus faced severe increases in the price of local cotton (as much as 38% in 1990, adding between R30 and 40 million to Frame's costs) (McNulty, 1990b: 27) and delays in other years when the local crop was insufficient, because of the way that import deliveries are to be structured³⁶.

Although the South African textile industry has always faced import competition from the East, the reduction in protection in terms of South Africa's GATT offer in the 1990s saw an intensification in import competition. This, coupled with surges in illegal imports and counterfeit goods, had a severe impact on Frame especially. Frame has had to contend with copyright infringements on various occasions, sometimes quite blatantly. For example, it found a direct copy of its own designs amongst samples of prints on offer by a textile agent from the East (Jones, 1998:1). This is a problem for South African textile firms, especially since they lack cheap raw materials and labour and have to compete through design excellence and service. When designs are stolen, that advantage is lost.

On the positive side, increased export opportunities under bilateral, regional and multilateral trade agreements are opened up (as discussed in Chapters 3 and 4).

Within the regional context and the Southern African Development Community, in particular, South African textile firms want government to pay attention to education and training issues in the region. The trend to date has been that South African firms lose skilled employees to employers in the rest of the region, who are able to pay more for skilled workers, because their wages for lower-skilled workers are much lower than in South Africa. According to Walter Simeoni of Frame, all firms in the SADC regional grouping should be subject to the same rules: "While training and human resources development is vital for every industry, it is only of value if all within SADC are subject to the same basic rules." (Jones, 1998b: 1).

³⁶ South African cotton buyers must take delivery of imported cotton in twelve instalments, spread over 12 months (IDC, 1999: 31)

Both Frame and Glodina, who have started to make some gains in export growth, will be facing extra costs and efforts to comply with increased security measures attached to exports into the US market. Some American retailers have made sourcing apparel from Africa contingent upon satisfying US-approved security measures in the whole pipeline through production to transport (Inggs, 2003:1). Export markets are difficult enough to break into, making the option of exiting very costly. These firms will thus have to find cost-effective ways of complying with the additional requirements.

7.5 SUMMARY AND PREVIEW OF CHAPTER 8

It is convenient to summarise in terms of the objectives we have set in the Introduction. These were to understand better what firms do (expressed in their routines and strategies), why they make certain decisions (their objectives and motivations), and to identify features associated with successful performance, as well as failure. With the aid of insights and conceptualisation from evolutionary economics, business history and organisational studies, we are now able to summarise our findings.

In Chapter 2, with reference to path dependence, we have highlighted some questions raised in newer studies, e.g. how do firms choose paths? Is it possible to escape from particular paths? Do paths cross? From our case studies, we are able to discern some answers to these questions, although generalisation from these studies is of course not suggested. Still, it generates insights and links that can be followed up on sufficient scale in future research to be able to draw general lessons. We combine the activities of firms over time, for example with respect to technology and organisation to describe the evolutionary path of the firm.

Choosing paths: the initial start-up conditions, the background, perceptions and objectives of the entrepreneur are all very important building blocks, which are instrumental in constructing a firm's path over its lifetime. The initial decisions form the foundation, while a multitude of interactions amongst many individuals inside and outside the firm build the rest of the path. The firm's routines,

strategies, competencies and the exigencies of the market (or the broader environment) all have a role to play in shaping the firm's path. The long path of Frame and the relatively short path of Coastal have demonstrated this for us.

Changing paths: rejuvenation, restructuring and business process re-orientation are some of the methods applied by firms to alter their paths. Sometimes, as in the case of Frame, the process is successful, while in other cases, such as Coastal, these efforts ended in failure. Sometimes the retirement or death of its founder creates the opportunity for the organisation to change its path. But, as we have seen in the case of Frame, this is a difficult, time-intensive process because the firm is usually so permeated with the influence of the founding entrepreneur. It was only by the third set of new managers that enough time had elapsed for new approaches, routines and strategies to be introduced at Frame.

Crossing and merging paths: mergers and acquisitions, industry dynamics and the role of the entrepreneur are all very important in bringing about crossing and merging paths.

Paths cross in many ways, for example, when joint ventures are established for specific purposes, or when relationships are entered into with suppliers and customers. Paths merge when earlier separate entities become one through a merger or take-over. This brings together the histories, competencies and routines of two organisations, offering both opportunities and challenges, as we have shown in section 7.3.3. on growth strategies. Crossing paths seem to have a temporary nature, while merging paths have the potential to become more permanent.

Although the external competitive environment was the same for our firms, their responses to that environment and the nature of their internal circumstances (knowledge base, organisational structure, competencies, routines, etc.) made for varied outcomes. Firms differed in the emphasis that they placed on particular objectives, had multiple aims over time and emphasised different interim objectives, depending on the circumstances.

In every major change that the firms wanted to effect, time seems to have been very important – time to learn to work together, time to develop routines, time to recognise false trails and learn from errors. On the other hand, it is sometimes necessary to 'force through' changes in an environment where excessive inertia could be catastrophic. There is thus a need to strike a balance between exploiting an existing situation and what it has to offer and exploring new opportunities. A caveat that the Coastal history teaches us is not to try and 'leap ahead of competitors without having strong capabilities in the area or truly understanding what is needed, armed with little more than conviction' and optimism (Grindley, 1993: 64).

According to Nelson and Winter (1982:110) an evolutionary theory of the firm should try and explain the ongoing interrelated processes of change in technology and organisation. While our analysis is more descriptive, rather than explanatory, the outcome does illustrate the complexity of the co-evolution of technological and organisational change. If we consider the time and effort that the restructuring processes in our firms had taken, and the problems that all of them had in organising their production, labour use, and distribution activities so as to reap the benefits of their investment in new technology, then our analysis with respect to organisational change in firms seems to be in agreement with Nelson (1994:246):

"...organisational innovation may be much more difficult than technological innovation. Changes in articulated strategy may be easy, *but to revise structure to meet those changes, and, especially to put in place new core capabilities,* may be extremely difficult." (Emphasis added).

Equilibrium versions of the theory of the firm seem to assume that actors in the market process already know what their role is, and furthermore, exactly what they must do within a given set of constraints to achieve optimal results (Kirzner, 1997:10). As many documented business histories and indeed our own case studies testify, this is an approach that largely abstracts away the many search and learning processes that firms have to engage in to make sense of

their circumstances, identify their options and take and implement decisions under conditions of bounded rationality.

Whereas the literature on selection mechanisms that act on routines usually assumes that these mechanisms are either internal to the firm (e.g. management decisions) or external to the firm (e.g. market forces), our case studies illustrate that there is a continuous feedback effect between these mechanisms. Market analysts, for example, publish views on the performance of a firm, signalling approval or disapproval and so influence external decision makers, such as potential investors, but also the management of the firm.

Firms' performances wax and wane over time as their environments change and they select certain responses to these changes. Their adaptation need not be optimal in order for them to survive. This ongoing change and response observed in the history of firms brings us to the conclusion that evolutionary biologists (and others) have been expounding for years:

"...there's never such a thing as a permanent or final or optimum adaptation of a lifeform to 'the' environment. Except in the most protected and static surrounds, there must be an endless chain of adaptations." Sagan and Druyan (1993: 95-96).

Chapter 8 summarises and concludes the study.

CHAPTER 8

SUMMARY AND CONCLUSIONS

8.1 INTRODUCTION

The overall aim of this study was to gain an understanding of the behaviour of firms in the process of introducing new technology as a means to become more competitive in a changing environment. To pursue this aim, the approach followed in evolutionary economics was chosen.

Evolutionary analysis is concerned with explaining the development of 'something' over time in terms of how it got there. In evolutionary economics, analysis usually takes place at three levels: the industry, the firm, and the broader environment, which includes institutions.

The 'something' that we focused on broadly in this study, was the South African textile industry. In particular, we wanted to investigate the implementation of new technology in a mature industry, i.e. the South African textile industry. This chapter summarises our findings and concludes the study.

Instead of a chapter-by-chapter summary, we next draw out themes that recur throughout the study.

8.2 SUMMARY OF FINDINGS

In Chapter 3 we have established that the global textile industry faces tremendous challenges, such as changes in technology, the trade regime and consumers' tastes and preferences. Two challenges in particular are perceived as major threats to the survival of textile firms. The first is the phasing out of the World Trade Organisation's Agreement on Textiles and Clothing (ATC) by 1 January 2005. The conclusion of the implementation of the ATC will change the competitive landscape for textile exporters, eliminating the secure market access based on quotas. The second is China's production capacities in textiles,

which are perceived by many as a looming disaster for other textile producers worldwide. Those suffering from the 'China Syndrome' believe that Chinese textile exports could obliterate almost all other textile exporters. These changes impact on the structure of the industry through the responses of the firms, but these responses in turn influence trends in the industry. For example, technological progress influences firm behaviour and the direction that the industry takes. The direction that the industry takes, e.g. diverting to non-apparel textiles, in turn, influences the direction of future technological change.

In Chapter 3 we have also argued that considering only the aggregate picture could be misleading and potentially harmful, should policy be based on such observations alone. Having established the need for further analysis at industry and firm level, the belief that aggregate trends conceal much diversity was indeed borne out by our findings.

Our analysis at the global, country-specific and firm level shows that the responses of firms to the challenges created by their changing competitive environment can be divided into two broad categories. First, they used their own resources and those of their industry associations to lobby their respective governments for further import protection. This response was prevalent in many countries, such as the United States, France, India, and South Africa, and to a lesser extent, also in Italy. In some countries, such as in France in the 1970s and early 1980s, this approach led them not to invest in the latest textile technologies that would have enabled them to remain competitive (as it did in the case of Italian producers, where investment in new technology was a very important survival and growth strategy).

The second category of responses includes a number of strategies employed to face the challenges and use the changing environment to their advantage. This included taking the competition to low-wage countries by relocating to these areas, product and market diversification, innovative marketing strategies, and increased attention to environmental, quality, and social responsibility concerns. The latter gives European and some South African firms an edge over firms in low-wage countries that have not yet begun to integrate these aspects into their

production processes. Above all, investing in the new technologies available to textile firms, created important opportunities for rejuvenation and growth. Various strategic opportunities for textile firms were opened up by technological developments on four fronts, namely:

- Modern textile machinery where the trend is to increase speed and efficiency;
- Incorporation of information and communications technology;
- The development of new and hybrid inputs, such as intelligent fibres with novel uses, and
- Innovations in organisational and management practices.

Our analysis (especially in chapters 4, 6 and 7), however, shows that none of the benefits promised by the new technology will materialise automatically upon purchasing the new hardware and software. From our analysis, two broad problem areas emerge, i.e. the firms' behaviour with respect to labour and the apparent mismatch between the nature and requirements of the new technology and the organisational structure of management and production. Thus, strategies that worked well combined investment in new technology with human capital upgrades and organisational change, which favoured participation of labour in the implementation process. The latter was particularly important where investment in new technology was part of a restructuring process (as is to be expected in a mature industry trying to rejuvenate itself). Added to this was the expansion of perspectives from focusing on the domestic market to seizing export opportunities. This was, however, not an easy course to negotiate, especially with unstable exchange rates, rising interest rates, and slowing economic growth in South Africa's trading partners. Considering the role of institutions, some important observations can be made:

- Institutions, e.g. industry associations, display a degree of inertia even when it is obvious that the needs of their members have changed. The American and European clothing and textile industry associations continued to lobby their governments for protection against imports, although sentiments in their constituencies had changed in favour of freer

trade (Chapter 3). Likewise, in South Africa the Textile Federation was relatively slow in changing its competencies developed under an imports substitution regime to serve members that faced trade liberalisation and needed to become competitive exporters (Chapters 4, 5 and 6).

- In the South African textile industry, firms made very little use of the services offered by the various institutions, e.g. government departments, research, training and education institutions active in the industry. The reasons for this phenomenon varied from firms being unaware of the services to a belief that the services were inadequate or the procedures to access the services were too cumbersome (Chapters 5 and 6).
- Those firms that were able to benefit from effective relationships with various institutions built these links over time by means of meaningful participation and in some cases were able to influence the direction of institutional evolution, e.g. in training institutions and the Cleaner Production initiatives (Chapters 5 and 7).

Chapters 6 and 7 further emphasise the important role that individual change agents, such as entrepreneurs and managers, play, not only in the technology implementation process, but also in shaping the growth path of firms, and eventually in industry dynamics.

Our conclusion is thus that investing in new technology is a necessary but not sufficient strategy for successful rejuvenation of firms in a mature industry. Complementary changes, such as in organisational structure, use of human resources, product, and market mix and supply chain relations, are of crucial importance, too.

8.3 SUGGESTIONS REGARDING THE THEORY OF THE FIRM

Combining the findings of the empirical work in Chapters 6 and 7, three suggestions with respect to the theory of the firms from an evolutionary perspective are identified:

- Selection mechanisms and feedback effects. Selection mechanisms are usually assumed to be internal to the firm (e.g. management decisions) and external to the firm (market mechanisms). Such a strict dichotomy, however, ignores the continuous feedback effects between internal and external mechanisms. Our case studies have illustrated how the views of market analysts, for example, influence the share price of firms, signalling approval or disapproval to management. The decisions that management makes and the information that they choose to make public, on the other hand, influence the views of market analysts, investors, and other financial market decision makers.
- Choosing, changing, crossing, and merging paths. While the notion of path dependence has received plenty of attention in the literature, extending the metaphor to exploring the dynamics of paths over time has not. In this study we have, firstly, paid attention to how firms choose paths, observing that the initial start-up conditions, the background, perceptions and objectives of the entrepreneur are all very important in constructing the firm's path over time. The initial decisions form the foundation, while the rest of the path is built on a multitude of interactions amongst many individuals internal and external to the firm. The firm's path is further shaped by its routines (and ability to adapt and develop routines), strategies, competencies, and the demands that the broader environment makes on the firm. Secondly, the possibility of changing the firm's path arises through restructuring and rejuvenation processes, and sometimes through the retirement or death of the founder(s). This is often a difficult, time-intensive process, because of the organisational culture created by the founding entrepreneurs and the presence of inertia and uncertainty. Thirdly, crossing paths may occur through the establishment of relationships with customers and suppliers (e.g. joint development of specific products or machinery), while paths may merge through mergers and acquisitions. The latter is a more drastic change, bringing together the histories, routines, and competencies of the two or more organisations. This offers the chance of continuing on an altered path, if the process is successful, or the demise of the new entity if not.

- Unlike firms in equilibrium versions of the theory of the firm, firms subject to bounded rationality in an evolutionary world do not know exactly what their constraints are and what they must do to make optimal decisions. As in many documented business histories, the firms in our case studies went through learning processes, often of the trial-and-error variety, changing their objectives over time and sometimes even losing sight of their objectives. Their performance varied over time as circumstances changed and they employed different strategies to deal with the new circumstances. Our case studies illustrate that firms facing the same external competitive environment, could, through their attempts at adaptation, experience diverse outcomes.

8.4 COMPLEMENTARITY BETWEEN COMPLEX MODELS AND MICRO-LEVEL ANALYSIS

In this study a micro-level of analysis was chosen. We contend, however, that detailed micro-level analysis is a useful complement to aggregate, and complex models in economics. Micro-level analysis complements complex models in two ways. The first is a conceptual contribution in the sense that relationships and patterns discerned from industry and firm level studies could help to specify and test such relationships in complex models. Secondly, if anything, the rich details that such micro-level analysis generates could serve to anchor complex models and their assumptions a little better in the real world.

8.5 MODERN TEXTILES AND PAVITT'S TAXONOMY

With everything that we have learned about the modern textile industry, we are now in a position to reconsider the place of this industry in Pavitt's taxonomy.

In Keith Pavitt's taxonomy of industries, classified on the basis of their innovative activities (See Chapter 2), the textile industry is classified as supplier-dominated. Ke (1995: 56) concurs with this view:

"...the textile-apparel industries have mature products and have experienced more discrete technological progress. This industry group is essentially a recipient of new technologies developed by capital good industries....All notable technological changes in the industry, from innovation of newer machinery such as open end spinning, air jet and water jet shuttleless weaving to automation in textile mills and computer-aided design in apparel plants, are initially made by capital goods industries. Final products by this industry do not make perceptible technological contributions to other segments of the economy. Besides the technology embodied in new or upgraded equipment, proportionally less investment has been devoted to technological progress."

When we consider the nature of technological developments in the modern textile industry, the organisation of R & D and the integration of the industry, as described in this thesis, we see a picture of an industry that no longer fits comfortably into the supplier-dominated category as described by Pavitt (1984) and Ke (1995) quoted above. To be more specific, the difference lies in the following characteristics of the modern textile industry:

- The cutting edge R & D that takes place in the textile industry (see Chapter 3 for examples);
- The organisation of R & D no longer suggests reliance on suppliers only. Successful firms in the modern textile industry have their own R & D facilities in-house, but also combine their efforts with other institutions and firms, such as suppliers of machinery, testing laboratories and standards bodies, as well as education and training institutions. Some alliances are for specific purposes, such as joint development of a specific machine and others are of a long-term nature.
- The products and technological breakthroughs of the textile industry are used in other, often high-tech industries and innovations in textiles make important contributions to other sectors of the economy, e.g. in the medical field as well as in geotextiles. Aviation fabrics are used, for example, in NASA space missions and the textile industry is poised to

contribute new fibres to replace optic fibres in communication (as explained in Chapter 3).

- The multi-disciplinary nature of R & D in the textile industry; R & D in textiles still include the traditional sciences such as chemistry and engineering, but the field has expanded to include also biotechnology and economic and management sciences, amongst others.
- Because of the development of strategic alliances and a much more integrated pipeline, the boundaries between the domain of the supplier and the textile manufacturer have become blurred. Some yarn and fabric producers do their own fibre development and production, while others enter into joint ventures with manufactured fibre producers and machine producers. Also, since the advent of integrated supply-chain management, enabled by developments in modern information and communications technology, textile manufacturers have the potential to develop much tighter networks with their suppliers and customers.

We therefore conclude that the challenges that firms in the textile industry have faced over the last twenty years or so, and their responses to these challenges have shaped a modern textile industry that is now in the developed countries, and in competitive pockets of the industry in the developing countries, only a distant cousin of the one Keith Pavitt described in 1984.

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