DEPARTMENT OF TRADE
AND INDUSTRY

DEPARTMENT OF TRADE AND INDUSTRY
POLICY SUPPORT PROGRAMME

International Competitiveness And Value Chains in Selected Manufacturing Sectors Study
Code: A.1.006

FINAL REPORT ON BROAD SECTORAL TRENDS OF THE PAST FIVE YEARS IN THE AUTO COMPONENT SECTOR

MAY 2001

Submitted by

Justine Barnes
University of Natal: Industrial Restructuring Project

AGORA' 2000 S.r.l.
Management Consultants
Via Germanico, 172
I-00192 Rome - ITALY
Tel.: +(39) 063 241 719 - Fax: +(39) 063 216 915
E-mail: agora2000@ agora2000:it

DRA-development cc
Development Researchers & Policy Analysts
59 Rosebank Avenue, Roseglen, Morningside
Durban 4001 - SOUTH AFRICA
Tel.: +(27-31) 208-4112 - Fax: +(27-31) 202-8437
E-mail: astavrou@iafrica.com

AGORA' 2000 S.r.l.
Management Consultants
Via Germanico, 172
I-00192 Rome - ITALY
Tel.: +(39) 063 241 719 - Fax: +(39) 063 216 915
E-mail: agora2000@ agora2000:it

DRA-development cc
Development Researchers & Policy Analysts
59 Rosebank Avenue, Roseglen, Morningside
Durban 4001 - SOUTH AFRICA
Tel.: +(27-31) 208-4112 - Fax: +(27-31) 202-8437
E-mail: astavrou@iafrica.com

ACKNOWLEDGEMENTS

The **European Union** through the **Department of Trade and Industry's Policy Support Programme** provided the principal funding for the writing of this research report. The financial support received from the European Union is sincerely appreciated and hereby acknowledged.

At an academic level, special thanks need to be directed towards my colleagues at the Industrial Restructuring Project, especially Sean Gannon who helped with fieldwork preparation and Sean Ellis who helped generate some of the tables and figures for the report. Mzwakhe Shoba of the Automotive Directorate in the Department of Trade and Industry also helped with the primary research by contacting automotive component manufacturers in the Gauteng on behalf of the IRP. This support was greatly appreciated and is hereby also acknowledged. The views expressed in this report are solely those of the author, however, and as a result all responsibility for its content lies with the author alone.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Based on extensive firm-level research using non-financial performance indicators to gauge the competitiveness progress of the industry, the key findings presented in this report reveal that the domestic automotive components industry is, on average, moving in the right direction in terms of adherence to world class manufacturing principles. This is revealed through the use of the same "market driver" measurement system used by the Industrial Restructuring Project in three previous automotive components industry competitiveness reports compiled for the Department of Trade and Industry. This market driver approach analysed the competitiveness progress of the surveyed South African based automotive component manufacturers in terms of their cost control, internal and external quality, external (value chain) flexibility, operational flexibility, human resource development and innovation capacity.

Critically, the industry appears to be improving its competitiveness at a fast pace, thus suggesting that it does have the propensity to "catch up" to the continuously improving frontier of international competitiveness, with significant improvements recorded for most of the market drivers explored. Cost control and internal and external quality are significantly improved, whilst external flexibility, operational flexibility, human resource development and innovation capacity findings reveal positive, but less substantial improvements.

Key measures exhibiting impressive average improvements are customer return rates (77.3%, 1997-2000), internal reject rates (35.6%, 1998-2000), total inventory holding (27.8%, 1997-2000), absenteeism (29.4%, 1997-2000) and output per employee levels - in real, inflation adjusted terms (27.7%, 1994-2000). Those measures that have remained largely unchanged or that have deteriorated are lead times (0.2% improvement, 1998-2000), research and development (R&D) expenditure (3.5% improvement, 1998-2000) and manufacturing throughput times (1.8% deterioration, 1998-2000).

Whether the South African automotive component manufacturers can achieve world class performance standards is still, however, questionable. There is a significant gap between the average operational performance standards of the South African based firms and that of the international firms included in the survey, whilst the leading firms in the domestic automotive components industry have also yet to achieve the performance standards of the leading international firms. For example, for the three key measures of total inventory holding, customer return rates and absenteeism the gap between the average performance standards of the South African based firms and that of the international firms in 2000 was 19.5%, 151.7% and 17.0% respectively.

Whilst the leading South African firms are generally performing at levels ahead of the international average, the magnitude of the gap between the best performing South African based and international firms is often as large the gap between average performance levels. This is one again illustrated by using inventory control, customer return rates and absenteeism rates as examples. The difference between the South African and international upper quartile figures for these three measures was 6.1%, 62.2% and 33.9% respectively.

In addition to these comparative findings, the overall competitiveness trajectories of the upper and lower quartile figures suggest that for certain key measures a level of performance convergence is occurring in the domestic industry. This convergence is apparently being driven most strongly by the lower quartile of firms that are rapidly catching up to the performance standards of the average and leading performers in the South African automotive components industry.

Based on the extensive firm-level data collected, some key reasons were identified as potential blockages to the industry's competitiveness progress. These pertain to extremely weak second and third tier domestic suppliers, weak capacity to change initiatives at both the management and labour level and low levels of capital investment. Despite these shortcomings, the general prognosis for the industry appears to be extremely positive. As revealed in Section 1 of the report, a large number of the surveyed firms are now very successful exporters; whilst the general economic trajectory of the firms is also very positive, as highlighted in Section 2. Not only have employment levels at the surveyed firms increased by 10.9% from 1999 to 2000, turnover levels in inflation adjusted terms have increased by 17.5%. This marks the most positive annual change recorded at the surveyed firms over the last seven years (i.e. since 1994). Significantly, moreover, profit margins before tax are once again showing a positive trajectory, after a number of years of declining levels.

Despite the very positive economic prognosis for the surveyed firms, the findings are skewed by the significant performance divergence that is taking place in the industry. The upper quartile of firms are presently improving their output levels by substantial levels, whilst the lower quartile of firms are still struggling to maintain their existing output levels.

In summary, the findings presented in this report are positive on two fronts. At the operational competitiveness level significant recent progress has been recorded amongst surveyed South African firms, whilst at the economic level, the firms are looking increasingly healthy, after a number of years of decidedly lethargic performance. Despite the competitiveness progress made, the 27 South African based automotive component manufacturers are, on average, still performing at levels well behind the average for the group of 21 international firms included in the study. Much of the recent economic success of the industry is not therefore a direct result of operational competitiveness, but rather MIDP linked export incentives, the devaluation of the Rand against major currencies and the recent upturn in the South African automobile market. The DTI's supply side support for the automotive components industry consequently needs to be consolidated to ensure that further competitiveness progress is made and that performance standards match that of the international competition. Whilst this will not guarantee the intractability of the industry's positive growth momentum, given political economy issues associated with the industry's immersion into global value chains, it is a necessary condition for the industry's future economic success.

INTRODUCTION

The title of this research report captures its core thrust. As highlighted in numerous Working Papers and Research Reports compiled for the Department of Trade and Industry by the Industrial Restructuring Project, the South African automotive components industry is certainly driving in the fast lane. Whilst the ongoing liberalisation of the South African automotive trade regime through to 2007 has led to the continued intensification of foreign competition in the domestic automotive market place, the South African automotive components industry appears to be flourishing. Exporting growth continues unabated (DTI 2001) and now sits at R10.5 billion, whilst even the domestic market has picked up with new vehicle sales growth through 2000 and year to date 2001 providing the automotive components industry with a positive momentum. Macro economic perspectives on the automotive components industry consequently look very healthy, with this clarified in terms of the DTI's ongoing monitoring of the automotive assembly and component industry's economic performance (see DTI 1997, 1998, 1999, 2000).

Critically, however, these macro economic perspectives, whilst extremely useful, fail to adequately interrogate the competitiveness progress of the South African automotive components manufacturing industry since its exposure to international competition and the global environment. The firm-level research undertaken by the Industrial Restructuring Project for the Department of Trade and Industry over the last few years has attempted to fill this important knowledge gap. The Industrial Restructuring Project has, through four rounds of extensive firm level research, generated a formidable firm-level database plotting the competitiveness of the automotive components industry in South Africa. The findings from the 2001 follow-up study, upon which this report focuses, thereby constitutes a further development of this longitudinal database. In order to avoid duplication with previous reports, its core focus is on the firm-level competitiveness progress made by the industry since the compilation of the 1999 automotive component manufacturing competitiveness report. This research report consequently needs to be read in conjunction with the three previous automotive component manufacturing competitiveness reports written in 1997, 1998 and 1999 respectively[1].

Given the finalisation of the Motor Industry Development Programme (MIDP) mid-term review and the associated liberalisation of the South African automotive trade regime through until at least 2007, the continued relevance of this type of firm-level analysis is unquestionable. If the South African automotive components industry is to succeed economically in an open operating environment, it is critical that competitiveness improvements continue to be made and that adherence to world class manufacturing principles become standard practice. As highlighted in the 1999 competitiveness report, due to political economy issues and issues of global connectedness (also see Barnes and Kaplinsky 2000a, 2000b and Barnes 2000a) this may still be insufficient for firm-level success, but it is without any doubt a necessary condition for firm-level survival. Whilst macro indicators suggest significant improvements in the industry, these improvements may relate

[1] See: (1) Barnes (2000e) The competitiveness of the South African automotive components industry: Findings from the 1999 follow-up study, **CSDS Research Report No. 27**. (2) Barnes (1998) Competing in the Global Economy: The Competitiveness of the South African Automotive Components Industry, **CSDS Research Report No. 13.** (3) Barnes (1997) Facing up to the Global Challenge: The State of KwaZulu-Natal's Automotive Component's Industry, **CSDS Research Report No. 11**.

to exporting benefits derived from the import export complementation component of the MIDP and improved domestic market conditions, rather than firm-level competitiveness progress. If this is the case then the industry is likely to struggle over the course of the next few years – as international competitors increase their presence in the domestic market (in line with further tariff reductions) and DTI derived exporting benefits become less lucrative.

The principal purpose of this report is therefore to analyse firm-level competitiveness data from 27 South African automotive component manufacturers. At the heart of this analysis lie the three key research questions being explored:

1. Can South African automotive component manufacturers achieve world class performance standards?
2. Is the domestic industry, on average, moving in the right direction in terms of adherence to world class manufacturing principles?
3. Is the industry improving its competitiveness at a fast enough pace to "catch up" to continuously improving international competitors?

The first two research questions are, of course, not new, with both extensively explored in the three previous firm-level competitiveness reports compiled for the DTI. The third question has not, however, been dealt with before due to a lack of comparative international data. However, this has been resolved by accessing the international benchmarking data generated out of the KwaZulu-Natal and Eastern Cape Benchmarking Clubs. As such, this report marks both a continuation and further development of the previous firm-level competitiveness reports compiled for the DTI.

To ensure continuity between the findings presented in this report and the content of the three previous competitiveness reports, it focuses on the same six operational competitiveness areas covered in those reports – namely cost control, quality performance, external flexibility, operational flexibility, human resource development and innovation capacity. The performance findings pertaining to these six "market drivers" form the core content of the report and are presented in Section 3. Importantly, the findings for the international firms benchmarked through the KwaZulu-Natal and Eastern Cape Benchmarking Clubs are also explored in this section, thus permitting a more detailed analysis of competitiveness progress in the industry than was possible in the previous competitiveness reports compiled for the DTI. Section 3 is, by implication, a lengthy and rather descriptive section. As a mechanism for clarifying the importance of each of the market driver issues explored, a brief description of the market drivers is also presented in each of the sub-sections.

The major findings generated out of the study are further analysed in Section 4. The three key research questions outlined above form the core focus of a policy discussion in this section, with this then also serving as a conclusion to the report.

An overview of the research methodology employed for the study, as well as a detailed profile of the companies that participated in the research is, however, first presented (Section 1), as are the economic performance findings for the sample of firms (Section 2). The profile of the surveyed

companies is explored as a mechanism for highlighting similarities and differences between the surveyed firms, as well as between the sample of firms as a whole and the national profile of the automotive components industry. The extent to which the profile of the surveyed South African based firms matches the profile of the international firms included in the report is also highlighted. Economic performance findings are presented to illustrate the economic health of the companies, particularly since the last national competitiveness survey. Importantly, moreover, the findings also reflect similarities and differences in economic performance between the surveyed firms, between the survey sample and the national picture for the automotive components sector, as well as between the survey sample and the comparative international firms. The representative nature and recent economic well being of the automotive component firms included in the study is therefore clarified in these two sections.

1. METHODOLOGY & FIRM PROFILE

1.1. Methodology

The methodology employed for the 2001 follow-up competitiveness study was the same as that followed for the 1998 and 1999 studies. Firms were sent a similarly structured questionnaire, except that it covered only 1999 and 2000 performance levels. No historical data was requested given the fact that this was covered in the previous competitiveness surveys undertaken. Certain questions were, however, removed from the questionnaire, whilst others were added. New questions pertained to levels of capital expenditure and a breakdown of costs at individual companies. With the exception of 19 KwaZulu-Natal and Eastern Cape Benchmarking Club members, who were included in the survey as part of their annual benchmarking activities, these questionnaires were sent out in February 2001, with the deadline for their return being late April 2001. Firms were given the option of completing the questionnaire and returning it to the Industrial Restructuring Project, or alternatively they could also request a firm-level visit where the questionnaire and purpose of the study could be explained as it was in 1998 and 1999; after which the questionnaire would be returned.

The IRP attempted to use the same sample population that participated in the 1999 survey (i.e. the 27 firms that returned the questionnaire in time for the writing of the 1999 report). However, a number of firms declined participation in the follow-up survey as a result of their being too busy or ownership changes having taken place. A total of 12 new firms were therefore included in the sample, with the same firm-level questionnaire used for these firms, except insofar as data was requested for the period from 1997 through to the present to ensure data consistency for the longitudinal data set. Firm-level visits were undertaken at each of these new firms to secure their participation. The majority of these firm-level visits were undertaken in the Gauteng. This was due to the significant bias evident in the previous survey towards KwaZulu-Natal and Eastern Cape firms. As such eight additional Gauteng firms were approached to participate in the survey. These firms were also introduced with the expectation that they would ensure that the sample size reached 30 firms at the least. Importantly, given the stratified sampling methodology used in both 1998 and 1999, the additional firms that were included in the 2001 competitiveness survey had the same employment size spread as the 1998 and 1999 sample populations.

Whilst the same 1999 research methodology was employed for the 2001 competitiveness survey[2], only 27 questionnaires were returned timeously and hence included in this report. This was made up of 19 firms from the 1999 sample of 27 firms and eight from the new firms. As was the case for the 1999 competitiveness survey, telephonic requests for the return of the questionnaires indicated that a number of the firms were under enormous pressure due to continued growth in the automotive market. This resulted in their non-participation in the study. Although the smaller data set does not in any way corrupt the integrity of the 2001 findings, it does unfortunately limit its population size.

[2] Each of the firms that participated in the 1998 and 1999 surveys received a copy of the competitiveness reports, with firm-level presentations of the findings also given in certain instances. All firms visited for the 2001 competitiveness survey were once again promised that the competitiveness report, once compiled, would be sent to them.

Given the fact that we anticipated a data set comprising at least 30 firms, this is, however, a limitation that needs to be recognised.

In addition to the South African competitiveness data generated, this report also reflects on the performance trajectory of 21 internationally based automotive component manufacturers that were surveyed on behalf of domestic automotive component manufacturers that are members of the Eastern Cape and KwaZulu-Natal Benchmarking Clubs. The findings presented are an important complement to the exploration of the industry's competitiveness trajectory, as the same market driver methodology was used for the benchmarks[3], thus revealing the competitiveness 'gap' that exists between the population of South African automotive component manufacturers and their international competitors.

Importantly, the set of 21 international firms matches the set of KwaZulu-Natal and Eastern Cape Benchmarking Club members included in the national survey. This is because the firms were selected on a "like with like" basis. The international firms were selected to match the corresponding South African based Club members they were benchmarked against, with filter manufacturer benchmarked against filter manufacturer and glass manufacturer benchmarked against glass manufacturer, etc. Whist the international findings presented are constrained by the fact that the firms only match a smaller sub-sample of the national sample population, the findings are still critically important. They highlight the performance of a broadly matching set of international automotive component manufacturers – based in Western Europe, Brazil and Australia (see 1.3) – and as such the comparative performance indicators ***suggest*** the extent of the competitiveness gaps that exist between the South African automotive components industry and that of the international industry it is competing against.

1.2. The Market Driver approach used

Intimate engagement with the South African and international automotive component industries, as well as the best operating practice[4] and world class manufacturing/lean production literature[5] has highlighted that the key variables determining firm level, or even industry-wide success or failure

[3] The research methodology employed for national survey, as well as the benchmarks is explored below.

[4] The UK DTI has put into the public domain a number of best operating practice guides for manufacturers. These illustrate the importance of non-financial figures in the measuring of firm-level competitiveness and were influential in the construction of the 'market driver' methodology. Other important influences were the Anderson Consulting study of world class manufacturing in the auto components industry (1992), the annual assessment of auto vehicle competitiveness undertaken by the Australian Automotive Authority (1994) and the IMVP research into auto assembler competitiveness from the mid 1980s. Finally, best practice guides such as Brown (1996) and Porter (1990) were also important in shaping the methodology.

[5] The influence of the lean production/world class manufacturing discourse on the structure and content of the research undertaken was made explicit in the previous competitiveness reports. From a methodological perspective, this influence is obviously also significant, although many lean production texts are case study based (e.g. Hines 1994, Kaplinsky 1991, 1994, 1995, Humphrey, Kaplinsky and Saraph 1998, Bessant and Kaplinsky 1995, Management Today 1994, Womack and Jones 1996). Whilst case studies are an inappropriate methodology for assessing industry-wide competitiveness performance, numerous measurements were drawn from the case studies.

are extremely complex. As highlighted in this literature, despite the intense focus on economic performance variables, they offer little explanation as to why firms are doing either well or badly. This is a major weakness of economic figures as they offer limited potential for directing corrective interventions. Whilst an assessment of economic performance is obviously both interesting and important when reflecting on the context in which firms operate, there are significant limitations to the findings generated. Brown in his book on strategic manufacturing argues this point, when he notes:

> *"Whilst the financial ratios are useful…[they]…are historical indicators after the event…a firm's ability to provide excellent quality products at competitive costs and meet customers' delivery requirements, together with all other specific needs, are the competitive variables which enable a firm to win in the market place"* (1996: 34).

Maskell (1991) further supports this argument when he notes that:

> *"…many of the time honored verities of our business culture are not only unhelpful in the productivity conscious 1990s, but can be absolutely harmful to the future success of our businesses. One of these issues is performance measurement and management accounting. It is clear that the traditional methods no longer work and a new approach is required – an approach that is built upon the concepts and philosophy of world class manufacturing" (1991: xvi).*

Although relatively detailed economic performance figures were obtained during the course of the longitudinal research underpinning the ongoing firm-level research for the DTI, they were not the central focus. The core areas of analysis were the six key market drivers that are explored in Table 1 and that relate to cost control, quality performance, value chain flexibility, internal operational flexibility, capacity to change (human resource development) and innovation capacity. These are the six key areas of operational focus that will render firms more capable of meeting ever more demanding market requirements. The market driver approach effectively illustrates the operational strengths and weaknesses of the South African automotive components industry and its recent performance trajectory, as well as the relative competitiveness of the firms against their international competitors.

The market driver approach therefore develops the typically 'case study based' world class manufacturing measurements used in previous academic research by codifying it into a detailed firm-level competitiveness questionnaire, thus permitting an assessment of individual firm, sub-sectoral and industry-wide competitiveness[6]. Importantly, the approach allows manufacturing researchers to step beyond the weaknesses of using perception data in firms. Firm level research is frequently based on qualitative analysis only and the subsequent compilation of subjective responses. For example, firm respondents are asked whether their lead time performance has improved or deteriorated and this information is then captured in a database (e.g. Jayaram, Vickery and Droge 1999). Whilst such studies are useful, the figures are not real, in the sense that they are

[6] See Appendix 1 for the firm-level competitiveness questionnaire used in the 1998 round of national research, Appendix 2 for the follow-up questionnaire developed in 1999 and Appendix 3 for the questionnaire used in this study.

open to biased perceptions of what improved operational performance actually entails[7] and fail to quantify the magnitude of improvement or deterioration over time, thus limiting their value in terms of longitudinal analysis. The more precise measurement of operational performance variables at companies also allows one to break free from analyses based on financial performance figures that are an indication of past performance, as well as external market forces. It permits the quantifiable and accurate assessment of operational competitiveness over time.

Table 1: Market drivers in the automotive industry and related operational performance measures

Market drivers	Operational performance measures
1. Cost control	• Inventory holding: 1. Raw materials stock holding, 2. Work in progress levels, 3. Finished goods stock holding
2. Quality	• Customer return rates, • Internal reject, rework and scrap rates, • Supplier quality performance
3. External flexibility	• Time from customer order to delivery, • Delivery frequency and reliability to customers, • Delivery frequency and reliability of suppliers
4. Internal flexibility	• Machine changeover times, • Batch and lot sizes, • Inventory levels, • Throughput time through factory, • Machine utilisation levels
5. Capacity to change (human resource development)	• Labour/management turnover levels, • Absenteeism rates, • Training expenditure and types of training, • Employee development, • Suggestion schemes/continuous improvement
6. Innovation capacity	• R&D expenditure • Proportion of sales from new products

[7] For example, firms may be improving their lead times by holding on to more finished goods inventory. They may then claim to be more flexible, but at an exorbitant cost - thus giving them a sense of 'false' flexibility.

As argued in the 1999 competitiveness report, understanding how well South African based automotive component manufacturers meet the key market drivers outlined in Table 1 will go a long way towards helping one understand the competitiveness capacity of the industry and its ability to compete in the international market place. Of particular importance here, is the competitiveness data illustrating the extent to which firms have improved (or deteriorated) their operational performance since the 1999 study. The 1999 study highlighted the critical fact that performance improvements had been substantial from the mid 1990s through to the end of 1999, but questions marks still remained as to whether these performance levels were still significantly short of international competitiveness standards or not.

1.3. Profile of sampled SA and international firms

The total sample of 27 firms is disaggregated in this section according to the three profile categories listed below, namely firm characteristics, market presence and operating parameters. The profile of the international firms included in the study is also presented according to this profile categorisation.

Firm characteristics	Market presence	Operating parameters
Geographical location Ownership Employment size Turnover size	Position in automotive value chain Market focus Levels of exporting	Auto sub-sector (activities and raw materials usage) Shifts per day/Hours per shift Operating days per annum

1.3.1. Firm characteristics

Geographical location: The 27 firms that participated in the national survey are located in KwaZulu-Natal, the Eastern Cape and Gauteng. The 27 firms together have 29 manufacturing plants located in South Africa. The overwhelming majority of firms (93.1%) have one manufacturing facility, with only two firms having two separate manufacturing plants. As shown in Table 2, a significant percentage of the sampled firms are located in KwaZulu-Natal (40.7%), with the remainder based in the Eastern Cape (37.0%) and Gauteng (22.2%). This highlights a bias in the geographical location of the sample, with the most important automotive component locality in South Africa being the Gauteng (with 55% of NAACAM's members), followed by the Eastern Cape (26%) and only then KwaZulu-Natal (11%).

The skewed geographical location of the sample is a result of the action research methodology employed in previous IRP automotive research and the IRP's initial research focus on the KwaZulu-Natal automotive industry. Findings from both the 1998 and 1999 national surveys, as well as the

two regional surveys carried out in KwaZulu-Natal in 1996 and 1997 suggest, however, that geographical location is not an important contributing factor to the competitiveness of automotive component firms. As such the geographical bias of the sample is not deemed a skewing factor in terms of the representivity of the findings generated. A disaggregation of the 21 international automotive component manufacturers reveals that they are primarily based in Western Europe (61.9%), with Brazil (23.8%) and Australia (14.3%) also represented.

Ownership: The majority of the 27 surveyed firms are South African owned either via a holding company (29.6%) or as independent privately owned operations (29.6%). Direct foreign ownership is however the largest single category of ownership, with 40.7% of the surveyed firms subsidiaries of multinational corporations. A significantly greater proportion of the international firms are, however, multinationally owned (57.1%), with less firms concomitantly domestic holding company (14.3%) or privately (19.1%) owned. In addition 9.5% of the international firms are joint venture operations, and as such are owned by both multinational corporations and local capital.

Employment size: Given the fact that the stratified sampling methodology used in the original 1998 national survey was based on employment levels, it is unsurprising to see a relatively even spread of employment sizes amongst the sample of 27 firms. Approximately half the surveyed firm employ more than 300 people and half less than 300. Whilst the average employment level for the South African based firms is 349 people, the range is extremely large with the smallest firm employing 91 people and the largest 918. The standard deviation is consequently high at 230.7. The South African based firms are on average significantly smaller than the international firms included in the study. Their average size is 479.4 employees; with the standard deviation around this average an extremely high 446.4. The largest of the international firms employs 1,968 people, whilst the smallest employs only 19.

Turnover size: As illustrated in Table 2, the widely divergent employee sizes evident amongst both the South African based and international firms is further evident in their turnover levels. The average turnover level of the surveyed South African based firms is R115 million, with the standard deviation sitting at R106 million. This large standard deviation is unsurprising given the wide turnover range of the surveyed firms. For example, the smallest firm's turnover in 2000 was only R9 million, whilst the largest firm had a turnover level of R403 million. As with the employment profile presented above these figures are not, however, as variable as the international firm sample. The average level of turnover generated by the international firms in 1999/2000 was R568 million, with the standard deviation around this average an extremely large R705 million. This is because of a number of outlying international firms with extremely high turnovers. For example, the largest international firm had a turnover level the equivalent of R3.1 billion in 2000.

Critically, from a representation point of view, the total sample population is extremely important to the national economy in terms of both employment provided and turnover generated. The total employment complement for the 26 firms in the sample that provided their employment figure is, for example, 9,080, whilst total turnover is R3,129,576,000 for the 25 firms that provided their turnover figures. The sample population consequently represents 22.99% of total employment in the automotive components industry - if one accepts the accuracy of the DTI's estimation of employment in the South African automotive components industry of 39,500 (DTI 2000).

Table 2: Summary of firm-level characteristics of surveyed SA and international firms

Criteria	South African firms	International firms
Geographical location	KwaZulu-Natal: 40.7% Eastern Cape: 37.0% Gauteng: 22.2%	Western Europe: 61.9% Brazil: 23.8% Australia: 14.3%
Ownership	SA holding company: 29.6% Privately owned: 29.6% Multinational: 40.7%	Domestic holding company: 14.3% Privately owned: 19.1% Multinational: 57.1% Joint Venture: 9.5%
Employment size	N=26 1-150: 14.8% 151-300: 37.0% 301+: 48.1% Average: 349.2	N=18 1-150: 16.7% 151-300: 22.2% 301+: 61.1% Average: 479.4
Annual turnover size	N=25 >R25m: 18.5% <R25m>R100m: 29.6% R100m+: 51.9% Average: R115 million	N=16 >R20m: 0% <R20m>R100m: 13.3% R100m+: 87.5% Average: R568 million

1.3.2. Market presence

Position in the automotive value chain: The majority of surveyed firms are first-tier component manufacturers supplying directly to the vehicle assemblers, their parts and accessories division or aftermarket wholesalers or retailers. This is a direct result of biases in the firm selection process. NAACAM was asked to facilitate contact with Eastern Cape and Gauteng firms for the 1998 national survey and as such largely first tier component manufacturers were included in that sample population[8]. As revealed in Table 3 only four second-tier manufacturers are included in the national database. The four second-tier component manufacturers do not, moreover, skew the sample in any way, as they are primarily automotive oriented. The competitive pressures being confronted by these firms is consequently very similar to the pressures being felt by the first tier suppliers. Importantly, despite the first tier status of the majority of automotive component manufacturers in the sample, many also supply products to other first tier automotive component manufacturers on a

[8] NAACAM's membership base is made up of largely first tier automotive component manufacturers. Many of the second tier manufacturers would belong to the Steel and Engineering Industries Association of South Africa (SEIFSA) or alternatively remain independent of business associations.

sub-contracting basis. This is clearly apparent when considering the market focus of each of the surveyed South African based firms (see below). The tier status of the international firms is similar in that only two of the 21 firms are second tier suppliers.

Market focus: Original Equipment Manufacturers are the most important market for the surveyed South African based firms. This is verified in Table 3. Whilst approximately half of the 27 firms supply into more than one market hence the larger sample size of 40, as is apparent 50% of the firms list OEMs as one of their major markets. Just under one-third (32.5%) of firms indicated an orientation towards original equipment supply (OES)/aftermarket supply, whilst 17.5% of supply is into other automotive component manufacturers. This market breakdown is very similar to the international firms where the related profile indicators read 59.4% OEM focus, 25.0% OES/aftermarket and 15.6% to other automotive component manufacturers.

Exporting propensity: The South African survey sample exports a significant proportion of its turnover – 21.9%. This is below the international firm average of 27.5%, although the international average is skewed by the important fact that most of the exports from the Western European and Brazilian firms are to adjacent countries, i.e. within the European Union and Mercosur respectively. There is a wide spread of exporting propensity amongst the surveyed South African firms. The figures presented in Table 3 clearly reveal this. Nearly one-quarter of the firms export nothing, whilst a further 30% export only marginal amounts (10% or less). The bulk of exports are consequently made by 37% of the surveyed population that generate more than 30% of their output from international markets.

Table 3: Summary of surveyed SA and international firms' market presence

Criteria	South African firms	International firms
Position in the automotive value chain	N=27 First tier: 85.2% Second tier: 14.8%	N=21 First tier: 90.5% Second tier: 9.5%
Market focus	N=40 OEMs: 50.0% OES/aftermarket: 32.5% Tier 1 suppliers: 17.5%	N=32 OEMs: 59.4% OES/aftermarket: 25.0% Tier 1 suppliers: 15.6%
Exporting propensity	N=27 None: 22.2% 1-10%: 29.6% 11-30%: 11.1% 31%+: 37.0% Average: 21.9%	N=19 None: 0% 1-10%: 36.8% 11-30%: 31.6% 31%+: 31.6% Average: 27.5%

1.3.3. Firm operating parameters

Automotive sub-sector: A diverse range of manufacturing activities takes place at the sampled firms. As revealed in Table 4, the 27 sampled firms together undertake 43 core manufacturing activities. The five most important activities in order of importance are machining (25.6%), assembly (20.9%), metal forming/pressing (20.9%), injection moulding (13.9%) and materials casting (7.0%). "Other" manufacturing activities (comprising glass manufacture, painting and sewing/weaving) contribute 11.6% of the sample. This breakdown of manufacturing activities is broadly matched by the international firms, where the 21 firms have 30 core manufacturing activities comprised of metal forming/pressing (30.0%), assembly (16.7%), machining (16.7%), injection moulding (13.3%), materials casting (10.0%) and other activities (13.3%).

Principle raw materials usage: Given the diverse range of manufacturing activities evident at the surveyed firms, they are also users of a wide spectrum of primary raw materials. This is highlighted in Table 4, which categorises the sample into four main types of raw material users: Ferrous metals, non-ferrous metals, polymers/chemicals and other (comprising paper, glass and electronics). Where firms are major users of two primary raw material inputs both are included, hence the larger sample size of 37 responses.

As illustrated, the primary raw materials used by the surveyed firms are ferrous metals (43.2%), although there is also significant use of polymer/plastics/chemicals inputs at 21.6% of the total sample. Non-ferrous metals constitute 16.2% of the primary inputs to the surveyed firms, with other inputs making up 18.9% of the sample. The breakdown for the international firms is very similar to this with ferrous metals (44.0%), non-ferrous metals (16%) and polymers/plastics/chemicals (20%) making up the bulk of raw materials used.

Operating days per annum/Shifts per day/Hours per shift: The surveyed South African based firms operate for 235 days per annum, at an average of 1.9 shifts per day of 8.54 hours duration. This equates to the plants operating for an average of 3,813 hours per annum. This differs quite significantly from the international firms who operate for an average 247 days per annum, at an average of 2.3 shifts per day of 8.2 hours duration. This equates to a significantly higher average annual plant usage of 4,658 hours per annum – or 845 hours more than the average of the South African firms. If one were to equate this to the South African firms' existing hours per shift worked, then, on average, the international firms work an additional 98.9 shifts per annum.

Table 4: Summary of surveyed SA and international firms' operating parameters

Criteria	South African firms	International firms
Principle production processes	N=43 Machining: 25.6% Metal forming/pressing: 20.9% Injection moulding: 13.9 Assembly: 20.9% Casting: 7.0% Other: 11.6%	N=30 Machining: 16.7% Metal forming/pressing: 30.0% Injection moulding: 13.3% Assembly: 16.7% Casting: 10.0% Other: 13.3%
Raw materials usage	N=37 Ferrous metals: 43.2% Non-ferrous metals: 16.2% Polymers/chemicals: 21.6% Other: 18.9%	N=25 Ferrous metals: 44.0% Non-ferrous metals: 16.0% Polymers/chemicals: 20.0% Other: 20.0%
Operating days per annum	N=26 Average: 235.0 days	N=13 Average: 247.0 days
Operating shifts per day	N=26 Average: 1.9 shifts	N=13 Average: 2.3
Hours worked per shift	N=26 Average: 8.54 hours	N=11 Average: 8.2

1.3.4. Summary

As revealed in this section, the sample of South African based automotive component manufacturers is heterogeneous, with this evident in terms of all the profile areas explored. Not only is there variance in terms of the firms' general characteristics, there is also variance in terms of their market presence and general operating parameters. This diversity is, however, reflective of the general diversity of the automotive components industry in South Africa. The domestic automotive components industry is comprised of various sub-sectors making a wide range of products feeding into a number of different markets. It is therefore significant that the profile of the survey population matches this general diversity. If the survey population had been concentrated any one particular sub-sector the findings may have been skewed, but this is not the case.

The only area where the sample population is markedly different from the national automotive components industry is its geographical spread. The bias towards larger KwaZulu-Natal/Eastern Cape proportions of the sample is however insignificant, with cross regional economic performance

issues and operational competitiveness differences insufficient to suggest that geographical location is an explanatory variable[9].

Whilst the findings presented in the following sections of this report need to be understood with the variance of the surveyed population in mind, the aggregated findings are a true reflection of the industry's average performance (with the exception of catalytic converter and leather car seat manufacture). By virtue of this they are therefore indicative of the competitiveness trajectory of the domestic automotive components industry more generally, although they are not indicative of trends at the firm-specific or sub-sectoral level.

[9] The sample population also fails to capture the burgeoning catalytic converter and leather seat cover industries. These are however recent additions to the South African automotive landscape, hence their exclusion from the initial national survey sample.

2. ECONOMIC PERFORMANCE FINDINGS

In order to ensure consistency with the economic performance findings presented in the 1999 competitiveness report compiled for the DTI, the economic performance trajectory of the 2001 survey population is analysed according to the same three key criteria: employment, turnover and profitability levels. As will be highlighted 2000 proved to be an extremely positive year for the majority of firms, with performance clearly having improved since 1999. The generally positive trajectory highlighted in 1999 has consequently been consolidated, with the economic performance indicators that suggested a minor turnaround in performance in 1999, now suggesting major improvements. A number of outliers do, however, influence the survey average, with some very encouraging performance findings matched by poorer performance trajectories. Where applicable these outliers are highlighted in the sub-sections.

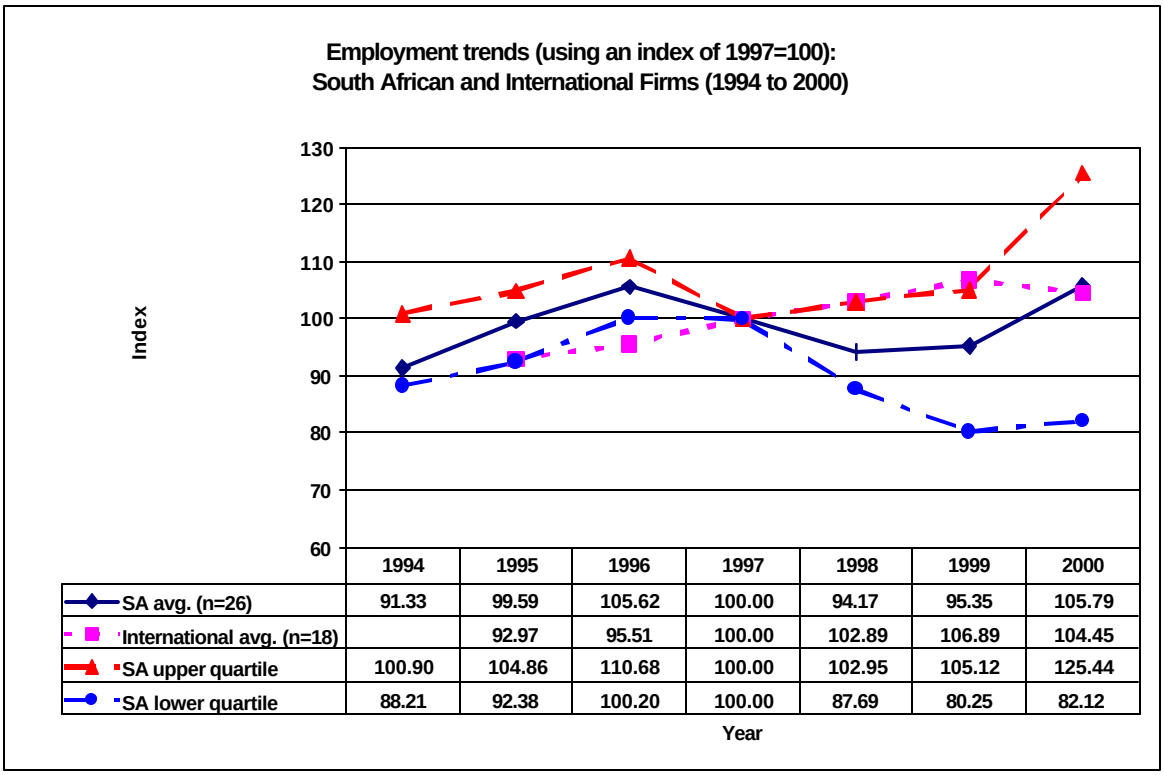
2.1. Employment

As revealed in Figure 1, which presents the indexed trajectory of the surveyed firms' employment levels from 1994 to 2000 (based on 1997 employment levels equaling 100), from a peak in 1996 of 105.2 employment declined through to 1998, touching at 94.17 index points. Employment then stabilized between 1998 and 1999, with marginal growth of 1.3% recorded. The last 12 months have, however, been exceptionally good for firms with employment climbing 10.9% through 2000. As a result the employment index for the surveyed firms in 2000 is 105.8. This is even higher than the previous peak of 105.62, achieved in 1996.

As further revealed in Figure 1, the upper and lower quartile medians for the surveyed South African based firms are strongly divergent, with significant employment growth recorded amongst the top quartile of the South African firms and on-going weak performance amongst the lower quartile of surveyed firms. For example, whilst employment levels stand at only 80% of 1997 levels for the lower quartile of firms, the upper quartile of firms have increased their employment levels by a very impressive 25% over the last three years, with 1999-2000 alone marking almost a 20% improvement.

If one compares these figures against the international average also presented in Figure 1, then it is clear that the South African based firms have in fact surpassed the performance of the international firms over the last 12 months. For example, whereas the international firms' score on the index dropped from 106.89 to 104.45, suggesting a small deterioration in performance through 2000, the South African average improved from 95.35 to 105.79. If one considers employment changes since 1997, then, the South African and international average shifts are almost identical albeit with different recent trajectories.

Figure 1



	1994	1995	1996	1997	1998	1999	2000
SA avg. (n=26)	91.33	99.59	105.62	100.00	94.17	95.35	105.79
International avg. (n=18)		92.97	95.51	100.00	102.89	106.89	104.45
SA upper quartile	100.90	104.86	110.68	100.00	102.95	105.12	125.44
SA lower quartile	88.21	92.38	100.20	100.00	87.69	80.25	82.12

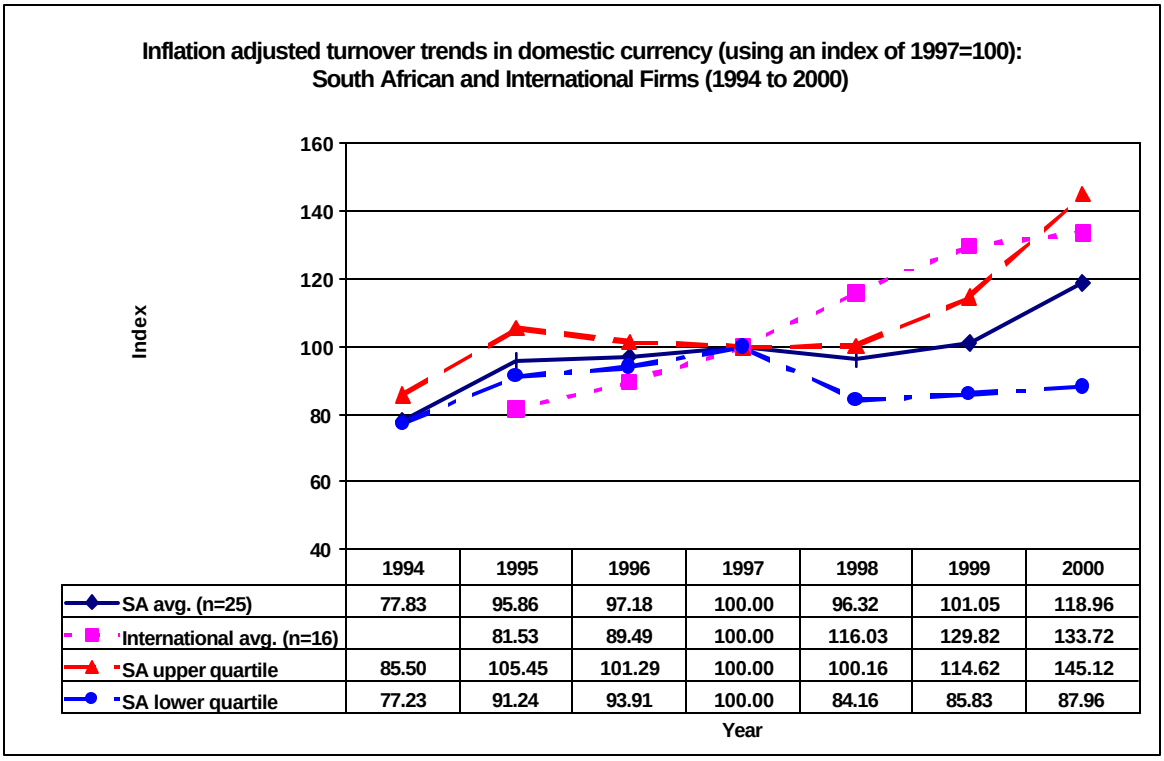
2.2. Turnover

The turnover trend (in constant 1999 Rand prices, based on 1997 = 100) generated for the sample of firms reveals an even more positive picture than the employment trend outlined above, thereby also *suggesting* a process of productivity improvement[10]. As highlighted in Figure 2, whilst the surveyed South African based firms, on average, struggled to maintain their output levels in real terms between 1995 and 1998, a small improvement was recorded through 1999, with real turnover increasing by 4.9% on 1998 levels. This brought average real output back to its 1997 level. Since 1999, turnover growth has, however, been exceptionally strong amongst the surveyed firms, with real turnover in 2000 17.5% higher than in 1999. As with the employment trajectory, the surveyed population's average turnover figure is also strongly influenced by variable turnover performance at individual companies. This is clearly reflected in the upper and lower quartile figures presented in Figure 2. Whilst the lower quartile of firms have struggled to maintain their output levels over the last few years, with 2000 turnover still 12% below 1997 levels, the upper quartile of firms have significantly improved their turnover performance, with this especially evident from 1998. For

[10] The term "suggested" is used as the turnover sample size is smaller than the employment sample size, thus limiting the validity of any direct comparisons between employment and turnover findings. The Rand output per employee levels of a smaller sample set of firms (i.e. incorporating only those firms that supplied both their employment and turnover figures) is considered in Section 3.5. The findings from the smaller data set support the suggestion of productivity improvement made in this section. See Figure 32.

example, average output levels in real terms for the upper quartile of firms increased by 14.4% between 1998 and 1999 and then a further 26.6% from 1999 to 2000. Output levels for the upper quartile of firms are consequently 45.1% higher than they were in 1997. This increase has been even more impressive than the average 33.7% non-inflation, non-currency value adjusted growth recorded at the international firms between 1997 and 2000[11].

Figure 2



	1994	1995	1996	1997	1998	1999	2000
SA avg. (n=25)	77.83	95.86	97.18	100.00	96.32	101.05	118.96
International avg. (n=16)		81.53	89.49	100.00	116.03	129.82	133.72
SA upper quartile	85.50	105.45	101.29	100.00	100.16	114.62	145.12
SA lower quartile	77.23	91.24	93.91	100.00	84.16	85.83	87.96

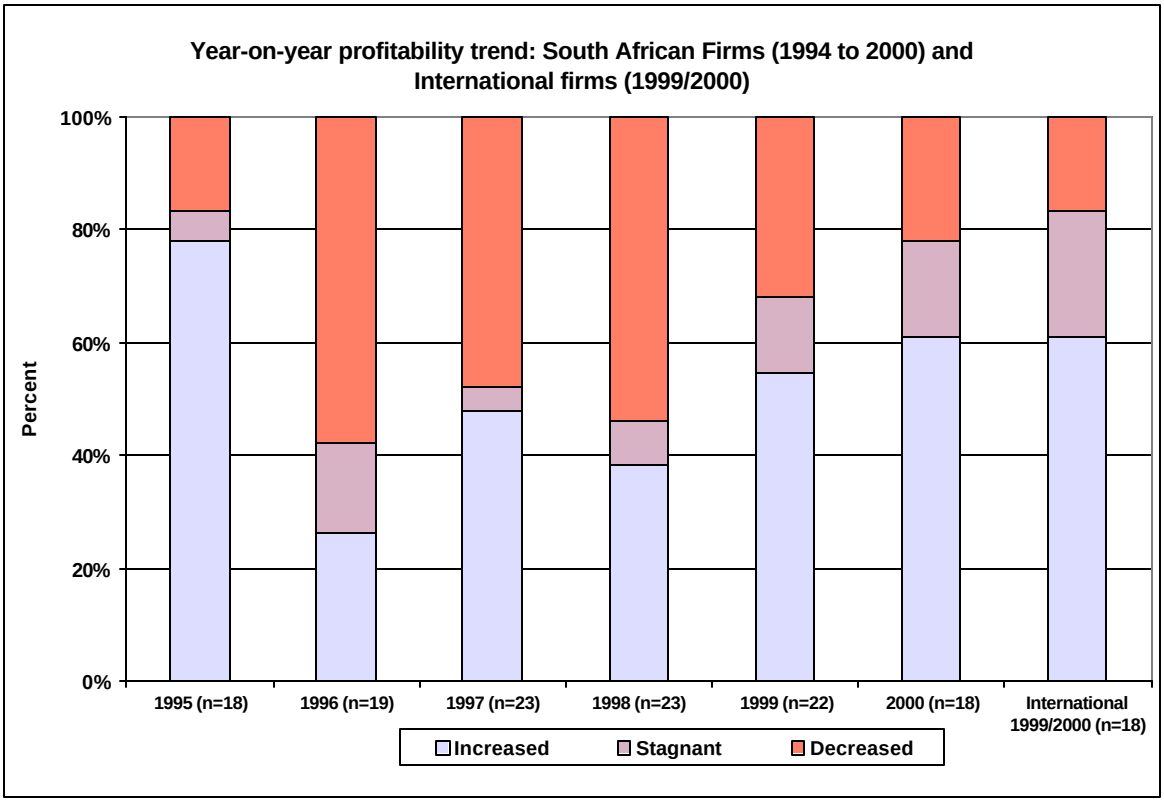
2.3. PROFITABILITY TRENDS

The general year on year profitability trajectory of the surveyed firms was extremely concerning between 1996 and 1998, with most firms recording declining rather than improving profitability levels over this period. As revealed in Figure 3, the picture since then has become decidedly healthier, with nearly 60% of the surveyed firms recording improved levels of year on year profitability in 1999 and well over 60% of the firms recording similarly positive trajectories through 2000. If comparisons are drawn between 2000 and any of the previous years captured in the competitiveness database, it is clear that profitability trajectories amongst the surveyed firms have not been as healthy since 1995, which was a "bubble" year for the domestic automotive industry,

[11] What this means is that the international firms' year on year turnover levels have been indexed against their 1997 performance and have not been adjusted to reflect currency value shifts or inflation rates in their respective countries of operation.

with the domestic automobile market growing by over 20% on 1994 levels. The most recent profitability trajectory of the surveyed firms largely matches the equally positive trajectory of the international firms in 1999/2000. As highlighted in Figure 3 less than 20% of the international firms benchmarked on behalf of the KwaZulu-Natal and Eastern Cape Benchmarking Club members experienced declining levels of profitability in 1999/2000[12].

Figure 3



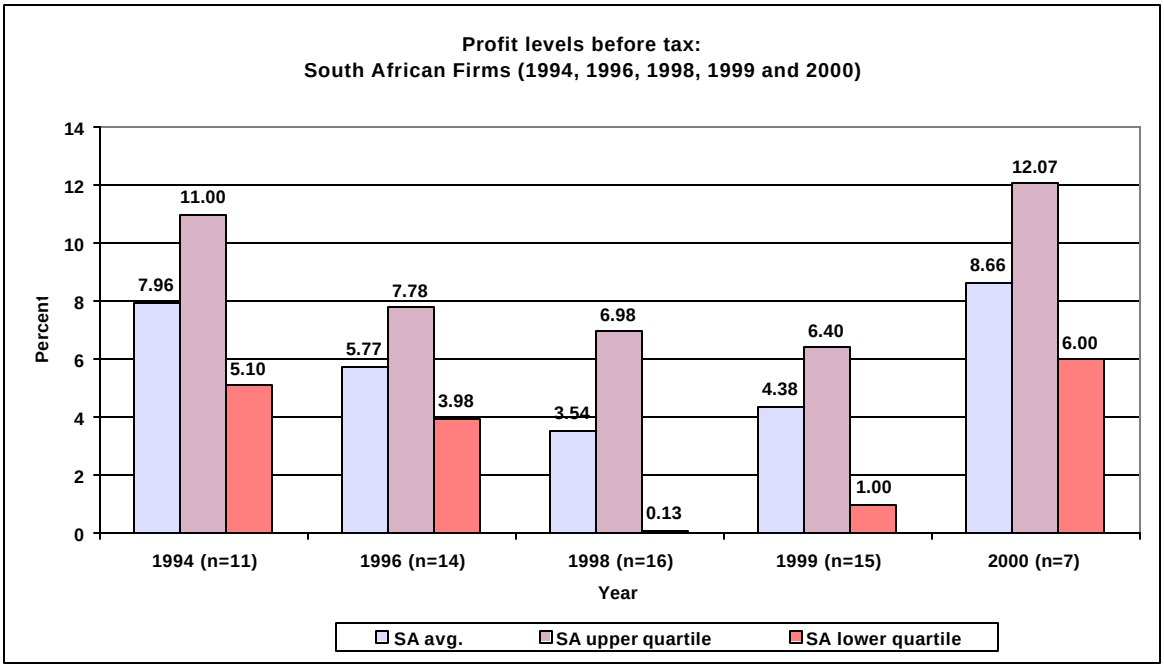
Whilst the findings presented in Figure 3 are indicative of general profitability trends amongst the surveyed firms, they only highlight trends and not the magnitude of the shifts presented. The findings are therefore potentially misleading. Given the difficulty associated with obtaining actual profitability performance figures from firms (due to confidentiality concerns, especially at privately owned companies) only a significantly smaller sub-set of firms (i.e. those belonging to the KwaZulu-Natal and Eastern Cape Benchmarking Clubs) provided their actual profit figures, with these findings presented in Figure 4 below.

As is clearly highlighted the real profit levels of this smaller sub-set of firms rapidly diminished over the latter part of the 1990s, with average profitability levels (before tax) eroding to only 3.54% in 1998. In 1999 the 15 firms that provided their actual profitability levels experienced slightly

[12] The international firms were benchmarked in either 2001 or late 2000 and as such their performance measures generally relate to 1999/2000 findings. The exception to this is turnover and employment where projected 2000 year-end figures were supplied during the course of the benchmarks completed in 2000.

better margins, although levels of 4.38% profit before tax were still weak. It is really only in 2000 that profit margins look healthy again with the seven firms that provided their figures generating profit before tax levels of 8.66%. These average figures are once again skewed by the widely divergent profitability performance of the firms that provided their figures. This is reflected in the almost diametrically opposed upper and lower quartile profitability figures presented in Figure 4. This is despite the fact that the most recent trajectory for both upper and lower quartile firms is positive[13].

Figure 4



2.4. Overview of Economic Performance Findings

The most recent economic performance trajectory of the sample population is extremely encouraging, with this evident in terms of every one of the economic performance variables considered: turnover, employment and profitability levels. As revealed in the upper and lower quartile findings presented in the various figures, recent economic performance has, however, been highly differentiated. Certain firms are performing far better than others, with this apparent from the 1998 to 1999 and 1999 to 2000 turnover and employment trends presented. Economic performance divergence consequently appears to be occurring, with percentage improvements amongst the better performing (i.e. upper quartile) firms outstripping the performance improvements recorded at the lower quartile firms. This is outlined in Table 5 below, with the upper quartile firms' positive

[13] Given the small sub-sample size for 2000, the latest findings presented in Figure 4 are potentially misleading. They are however included for illustrative purposes.

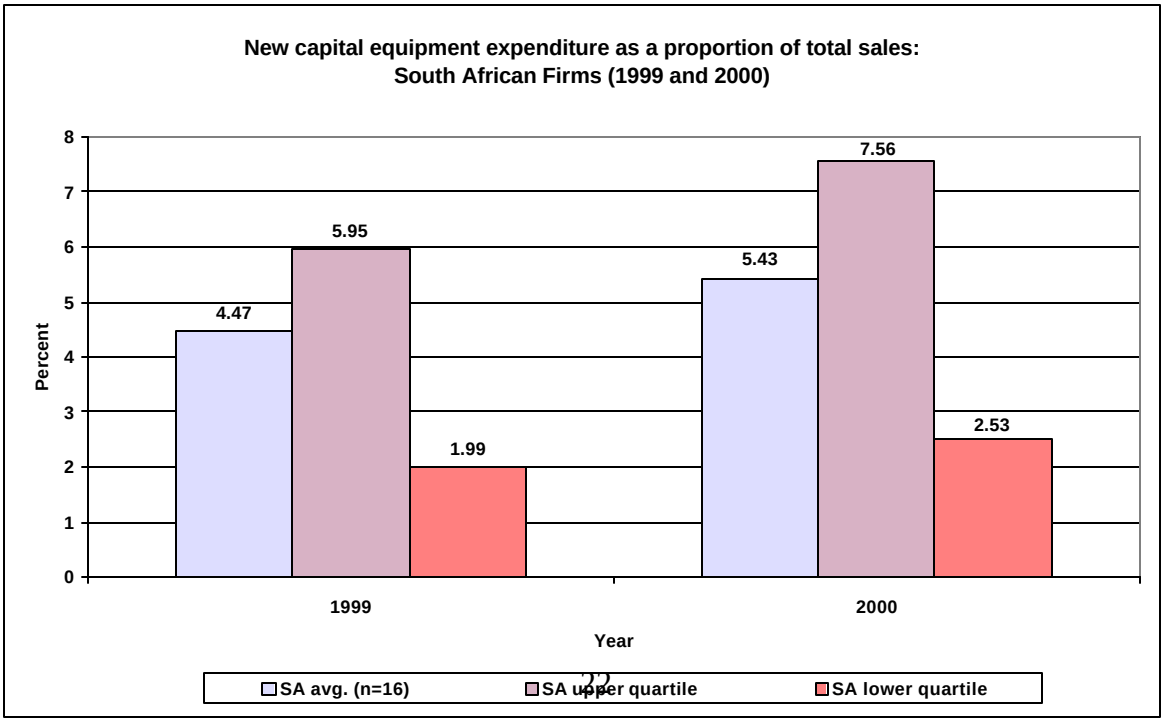
trajectories consolidating more rapidly than is apparent at the lower quartile of firms. The gap between the upper and lower quartile trajectories for employment and real turnover growth between 1999 and 2000 alone is, for example, 17% and 24.1% respectively.

Table 5: Recent economic performance divergence amongst surveyed South African based firms

	Employment growth		Real turnover growth	
	Change from 1998 to 1999	**Change from 1999 to 2000**	**Change from 1998 to 1999**	**Change from 1999 to 2000**
Upper quartile average	2.1%	19.3%	14.4%	26.6%
Lower quartile average	-8.5%	2.3%	2.0%	2.5%
Gap between upper/lower quartile change	**10.6**	**17.0**	**12.4**	**24.1**

Whilst the overall performance trajectory of the surveyed firms is presently looking very positive it is also important to bear in mind that recent positive performance is off an extremely weak base and that a further consolidation of this incipient positive trajectory is necessary to further secure the position of the South African automotive components industry. A major potential weakness in this regard is the apparent failure of many of the surveyed South African firms to invest in new capital equipment. This is highlighted in Figure 5, which highlights new capital expenditure levels as a proportion of total sales at the surveyed firms. As revealed firms spent the equivalent of only 4.47% of their sales in 1999 on new capital equipment, with this then ratcheted up to 5.43% in 2000. Unfortunately, the international database for this measure is too small to generate any comparative measures.

Figure 5



3. OPERATIONAL COMPETITIVENESS FINDINGS

Using firm-specific proxy measures, the operational competitiveness trajectory of the survey population is presented below according to each of the "market driver" areas detailed in Section 1. This section is therefore broken into six overlapping areas of focus:

- Cost control,
- Internal and external quality performance,
- Value chain flexibility,
- External flexibility,
- Capacity to change (human resource development), and
- Innovation capacity

In order to situate the importance of each of the market driver areas, each sub-section begins with a brief description of the importance of the driver and the associated proxy measures. This will clarify why the particular measures generated are important in the context of ever more demanding market requirements. In addition, each of the graphs presented plots the average (mean) performance of the firms in terms the particular measure explored, whilst also exploring upper and lower quartile median figures. Upper and lower quartile figures are included as they offer an accurate indication of performance spread around the average figures, thus highlighting the extent to which performance convergence/divergence is occurring in the South African automotive components industry. In addition, the international average figures are also presented. This highlights the extent to which the South African automotive component manufacturers included in the database match the performance standards of the international firms.

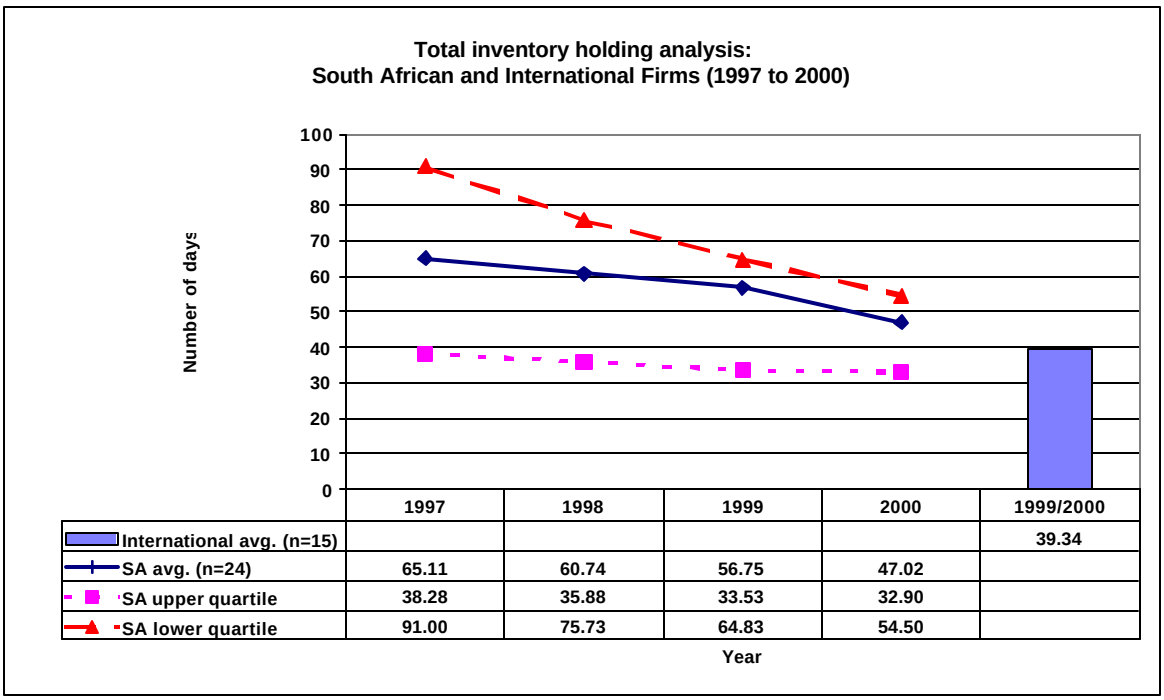
3.1. Market Driver No. 1: Cost control

The measurement of inventory levels provides a good proxy for the measure of cost control at manufacturing firms. Firms with good control over their various forms of inventory are likely to be in control of their manufacturing costs. Raw material, work in progress and finished goods stock all contribute both directly and indirectly to the costs of the products being manufactured. Direct associated costs include working capital and space utilisation expenses, whilst indirect associated costs include the manner in which excess inventory holding hides quality problems and increases staffing levels (Bessant 1991).

As highlighted in Figure 6, total inventory holding figures at the surveyed firms suggest significant average performance improvement between 1997 and 2000, with the most noteworthy improvement recorded between 1999 and 2000. Year on year improvements in total inventory holding at the surveyed South African firms between 1997 and 2000 have been to the magnitude of 6.7%, 6.6% and 17.1% respectively. Whilst the average performance of the survey population (n=24) has

improved over the period analysed, performance has been highly variable across the sample. For example, the top 25% (i.e. the upper quartile median) of firms has performed significantly better than the bottom 25% (lower quartile median). Importantly though it is the poorer performing firms that have made the most impressive progress since 1997. The upper quartile has, in fact, only improved by 14.1% since 1997, and appears to be struggling to improve beyond the 33-day level, where it has been placed for the last two years. In stark contrast the lower quartile has improved from a very high 91.0 days in 1997 to 54.5 days in 2000 – an improvement of 40.1%. As a result of the significant improvement in the lower quartile of firms' performance the standard deviation for the sample as a whole has decreased from 45.7 in 1997 to 34.1 in 2000. Despite significant improvements in average inventory holding at the surveyed South African firms, as further revealed in Figure 6, average performance in 2000 was still 19.5% higher than the international average (n=15) of 39.34 days total inventory holding.

Figure 6



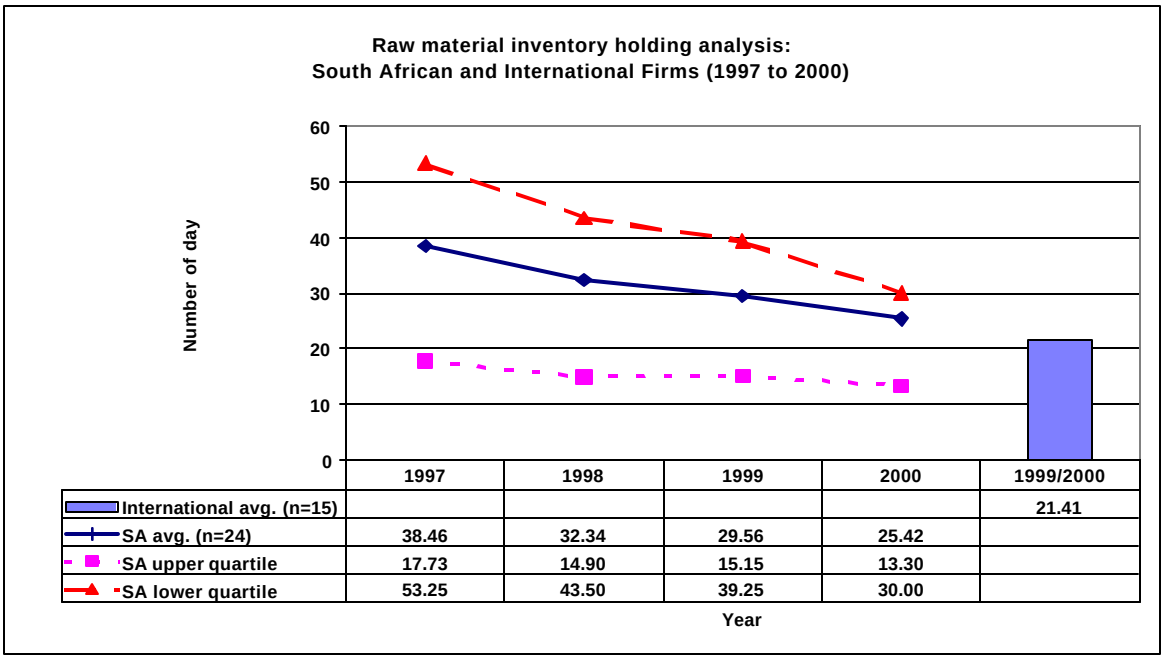
	1997	1998	1999	2000	1999/2000
International avg. (n=15)					39.34
SA avg. (n=24)	65.11	60.74	56.75	47.02	
SA upper quartile	38.28	35.88	33.53	32.90	
SA lower quartile	91.00	75.73	64.83	54.50	

Total inventory holding at companies is, of course, made up of raw materials, work in progress and finished goods stock. It is therefore important to consider the impact of each of these individual trajectories on total inventory holding, as different operational pressures impact on all three. Finished goods stock holding, and to a certain extent raw material holding can, for example, be negatively impacted on by the immersion of firms into global value chains, i.e. as firms export/import more they hold on to increased levels of finished goods and raw material stock The breakdown of total inventory according to each of its constituent parts is presented in Figure 7, and Figure 9. As revealed in these three figures the raw material inventory holding performance trajectory of the surveyed firms is broadly similar to the work in progress (WIP) trajectory. WIP levels cannot be attributed to value chain changes and this consequently suggests that the raw material inventory performance of the surveyed firms is not simply a result of exogenous factors. Finished goods inventory holding does, however, appear to be impacted upon by the exporting

success of many firms. The trajectory for this key cost control measure is not as positive as evident for the two other measures.

Raw materials: As explored in Figure 7, average raw material inventory improvement amongst the South African based firms has been marked, with year on year improvements recorded for every year since 1997. As a result average raw material inventory holding has declined from an average of 38.5 days in 1997 to 25.4 days in 2000. Whilst this is still 18.7% higher than the international average for 1999/2000, the year on year average improvements suggest that the industry trajectory is positive, although this positive trajectory is once again being lead by the lower quartile of firms, who appear to be improving their performance more rapidly than the upper quartile of firms. As a result of this performance convergence the standard deviation for the surveyed firms has decreased from 26.78 in 1997 to 21.16 in 2000.

Figure 7

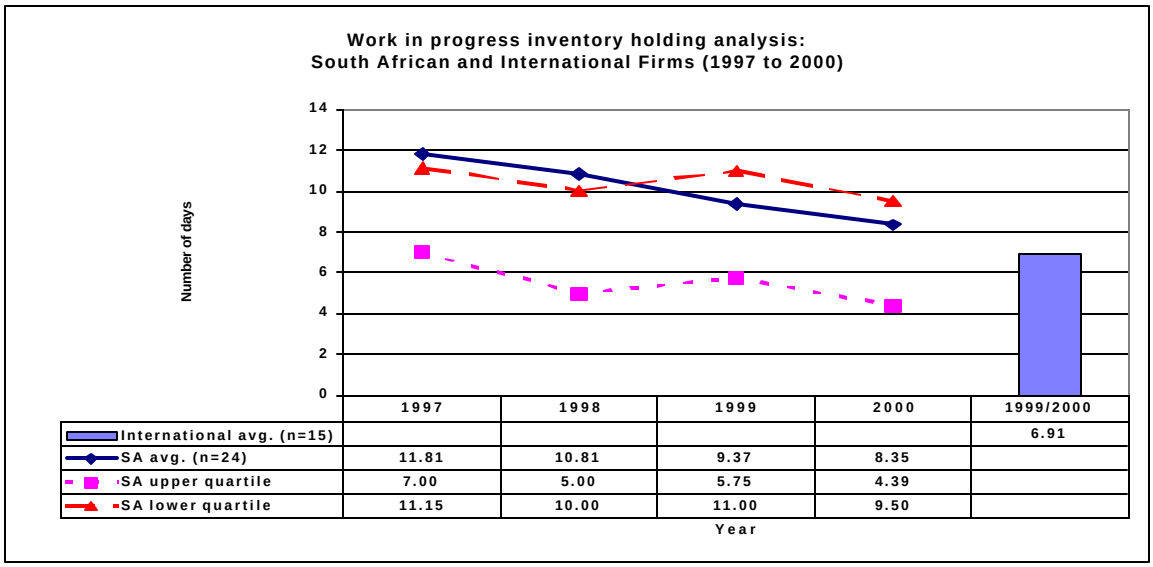


	1997	1998	1999	2000	1999/2000
International avg. (n=15)					21.41
SA avg. (n=24)	38.46	32.34	29.56	25.42	
SA upper quartile	17.73	14.90	15.15	13.30	
SA lower quartile	53.25	43.50	39.25	30.00	

Work in progress: Improvements in WIP holding amongst the surveyed firms is consistent with the improvements recorded for raw material inventory holding. This is clearly highlighted in , which shows that average WIP holding improved by 29.2% from 1997 to 2000, with relatively consistent improvements recorded on a year on year basis. This is an extremely encouraging finding as WIP figures are not impacted on by exogenous factors and are therefore an accurate reflection of intra-firm process improvements. The South African average for 2000 is still, however, 20.8% higher than the 1999/2000 international average.

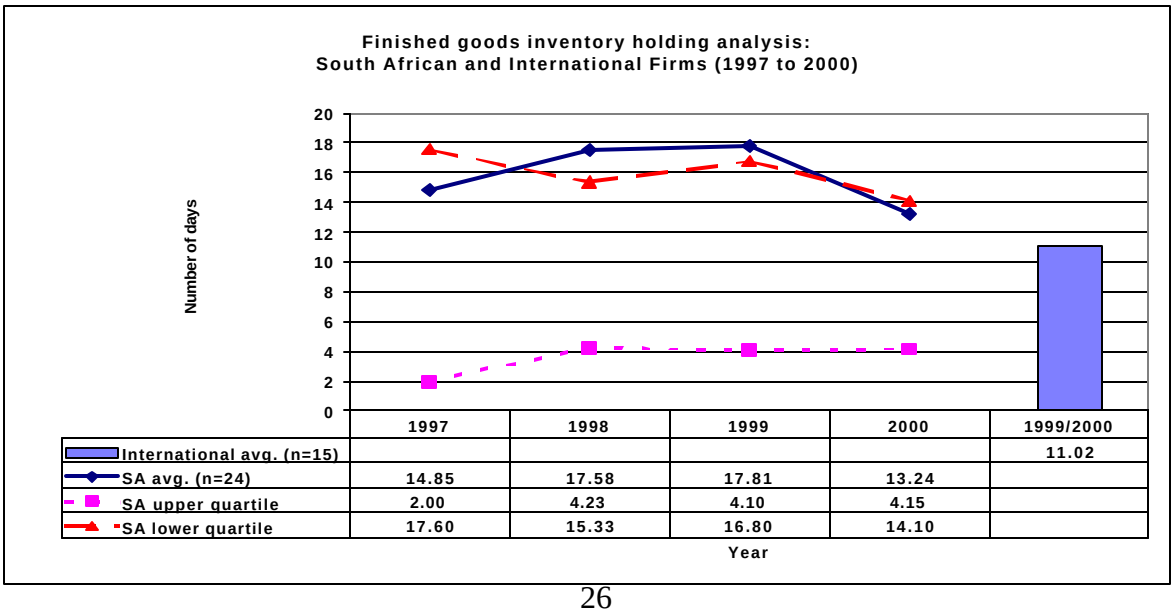
Interestingly, the lower quartile median was ahead of the South African average in 1997 and 1998, thus revealing that a number of weak performing outliers skewed the industry average. WIP figures for 1999 and 2000 suggest that this aberration no longer exists. As with raw materials inventory holding, performance convergence appears to once again be occurring with the standard deviation for this measure dropping from 10.9 in 1997 to 6.5 in 2000.

Figure 8



Finished goods: Given the increased levels of exporting at many South African based firms, it is perhaps unsurprising to note that average finished goods inventory holding performance has remained largely unchanged over the period 1997 to 2000, with performance deterioration actually occurring between 1997 and 1999. The rather static trajectory evident is not necessarily then an indication of comparatively weaker inventory control performance amongst the surveyed firms. As revealed in Figure 9, it is however concerning to note that the South African average in 2000 was 20.1% higher than the 1999/2000 international average, although the upper quartile of firms are clearly performing at levels significantly ahead of even the international average. Their figure of 4.15 days *suggests* that domestic OEM oriented firms hold on to very little finished goods inventory, although their performance has been largely stagnant over the last four years.

Figure 9



Summary: The South African based automotive component manufacturers surveyed appear to have made significant progress in better controlling their inventory. This is evident in terms of total inventory holding and two of its constituent parts – raw material inventory holding and work in progress levels. The only anomaly is finished goods inventory holding, which fails to show a consistently improving trend, although 1999 to 2000 performance changes are encouraging. Finished goods inventory holding at firms is moreover strongly impacted on by levels of exporting and as such the findings presented in this regard are not necessarily indicative of deteriorating performance. Despite improvements in inventory control, the South African average is still, however, some distance from the averages recorded for the international firms benchmarked through the KwaZulu-Natal and Eastern Cape Benchmarking Clubs.

3.2. Market Driver 2: Internal and external quality

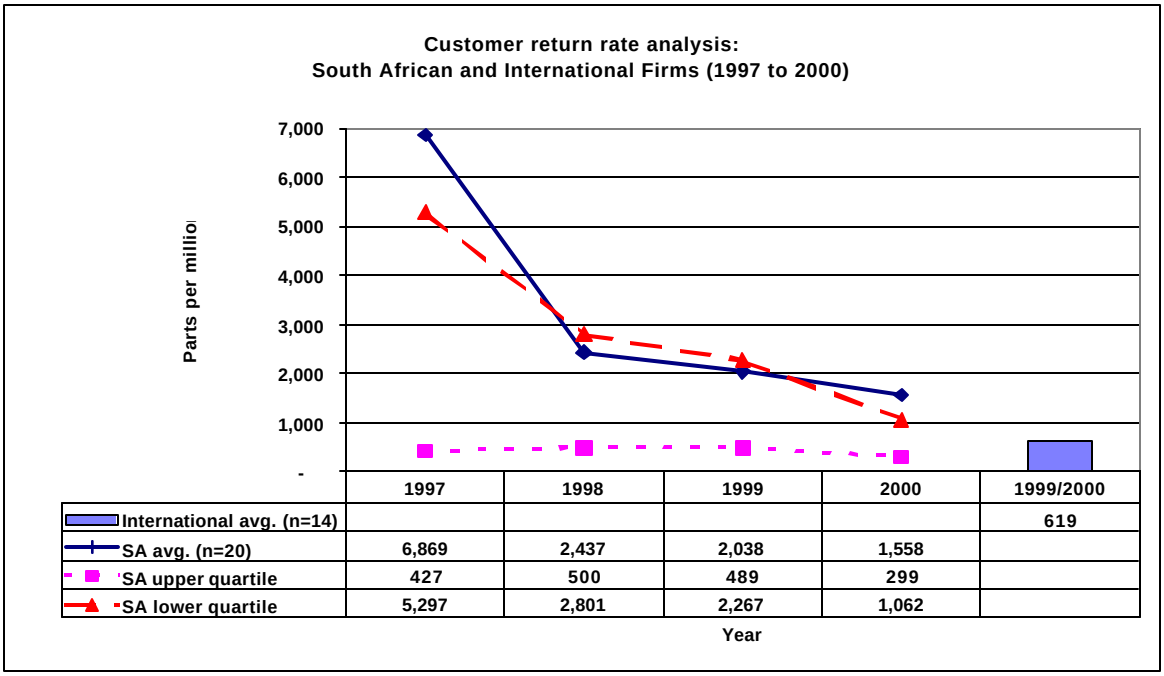
There are two broad dimensions of quality that are important to a firm: external and internal quality performance. External quality performance, which is measured in terms of customer returns, highlights customer satisfaction levels regarding the quality performance of a particular firm. Importantly, though, customer return rates offer little indication of the internal quality performance at the firm. A firm may have a poor internal production system and yet provide good quality products to its customers by following stringent quality checks at the end of its production process. It is therefore also critically important to measure internal quality performance in the form of reworks and/or rejects and/or scrap). The problem with poor performance in this regard is that it indicates the extent to which quality is being generated at a cost (Bessant 1991). Measuring the extent to which quality is built into the production system itself, is therefore critical, as the ideal quality situation is one where low customer return rates are complemented by low internal quality indicators. Only then is it possible to provide high quality products at low prices – one of the key determinants of market success (Brown 1996).

External quality performance: The average customer return rate of the surveyed South African firms is presented in Figure 10, and as is apparent significant improvements in external quality performance have occurred through the period 1997 to 2000. Average customer return rates in 2000 are in fact less than one-quarter 1997 levels, thus revealing an excellent average competitiveness response by surveyed firms in terms of this particular market demand. Significantly, this improvement is once again most noticeable for the lower quartile of firms. The lower quartile median in 2000 is one-fifth its 1997 level and below the average performance of the surveyed firms, thus highlighting that the overall population's performance is highly skewed by a few outliers with high customer return rates. The upper quartile of firms have also, however, improved their external quality performance with the upper quartile figure sitting at just under 300 parts per million (ppm), which is 30% better than 1997 levels.

The net result of the significant improvements at especially the weaker firms in the sample population is a reduction in the standard deviation from the average – from 13,119 in 1997 to 2,504 in 2000. These findings are consequently very similar to the findings for inventory control. Performance convergence is once again occurring, with this being driven most strongly by the weaker firms "catching up" to both the average and leading firms in the survey population. Despite the exceptionally promising trajectory captured in Figure 10, it is critical to note that the industry is still some distance from the performance standards of the international firms included in the study.

The South African average is, for example, still 151.7% higher than the 1999/2000 international average of 619 ppm. And even the international average is skewed by two weak firms with ppm returns around the 2,000 ppm mark. If these two international firms are excluded the international average drops to below 300 ppm.

Figure 10



Internal quality performance: The internal quality data requested in the 1999 competitiveness survey was incompatible with the internal quality data requested in the 1998 and previous surveys and as such the longitudinal database for internal quality improvements only extends back to 1998[14]. The three internal quality performance figures focused upon include reject, scrap and rework rates and as highlighted in Figure 11, Figure 12 and Figure 13 respectively all three of these critical measures suggest significant improvements over a short period of time for the surveyed South African based firms. Average internal rejects have, for example, decreased by an impressive 35.6% between 1998 and 2000, with scrap rates and rework rates also down by 22.3% and 39.8% respectively.

Whilst there is significant variance in performance in terms of each of the measures (as captured in the upper and lower quartile figures), as revealed in all three figures performance improvements are generally consistent across the range of surveyed firms. The only exceptions to this are the upper quartile internal rework rate and the lower quartile scrap rate, which have remained relatively constant over the last three years.

[14] The internal quality measures generated in the 1998 competitiveness study were significantly refined for the 1999 study, hence this incompatibility. In 1998 only internal rework rates were included, with scrap and reject rates omitted. This was corrected in the 1999 competitiveness survey.

The upper quartile performance figures for each of the internal quality performance figures suggest that the best performing of the South African based firms are performing at levels well ahead of the international average. However, this is misleading as internal quality performance indicators are sub-sector specific (i.e. certain production processes generate significantly more scrap, reworks, rejects, etc. than other production activities) and as such the only valid comparison is between the South African and international averages; and even here the findings need to be viewed with a level of circumspection. This relates to two factors.

First, the data sets do not match one another in their entirety, with this potentially skewing the internal quality findings presented (i.e. the sub-sectors represented in each of the survey populations do not completely match one another); and second, many South African firms do not accurately capture the full extent of their internal quality performance, thus skewing the findings presented. This is most evident for rework rates, where most South African firms only measure reworks that are detected at the end of the production process. In stark contrast most of the international firms measure reworks on a right first time basis (i.e. at individual workstations during the course of value adding processes). Whether the South African firms' 2000 rework performance standards really match the 1999/2000 standards of the international firms as suggested in Figure 13 is therefore highly debatable.

Figure 11

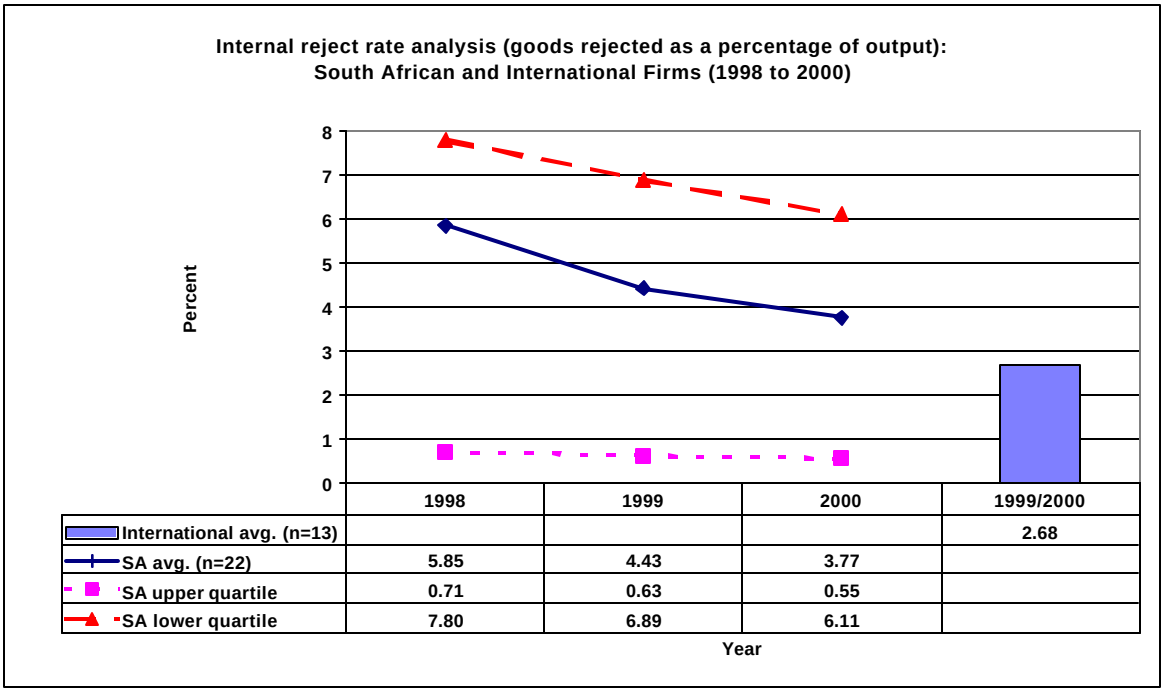


Figure 12

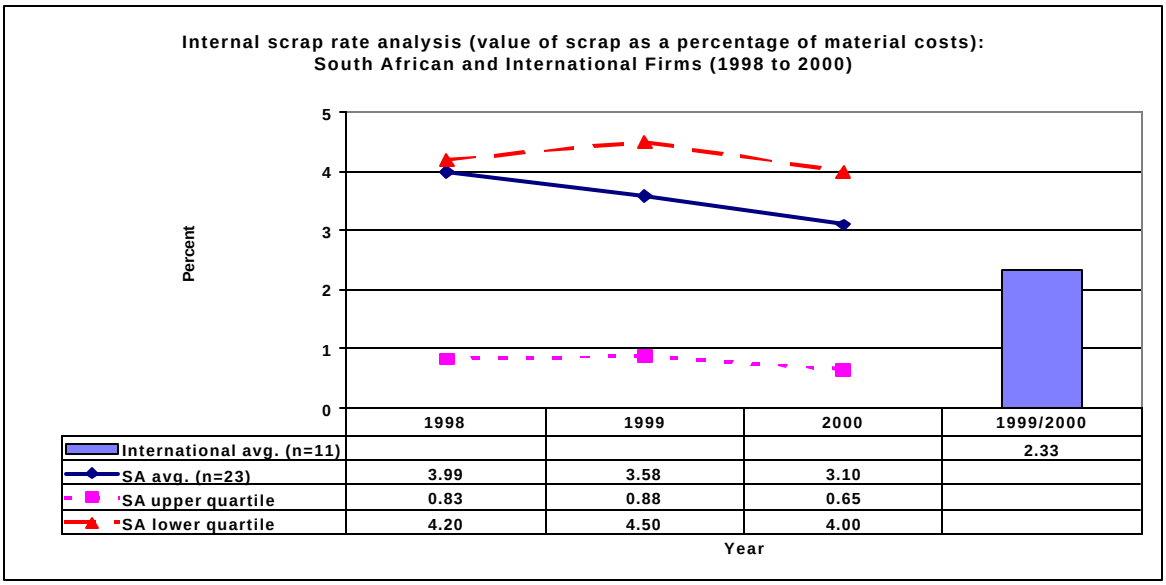
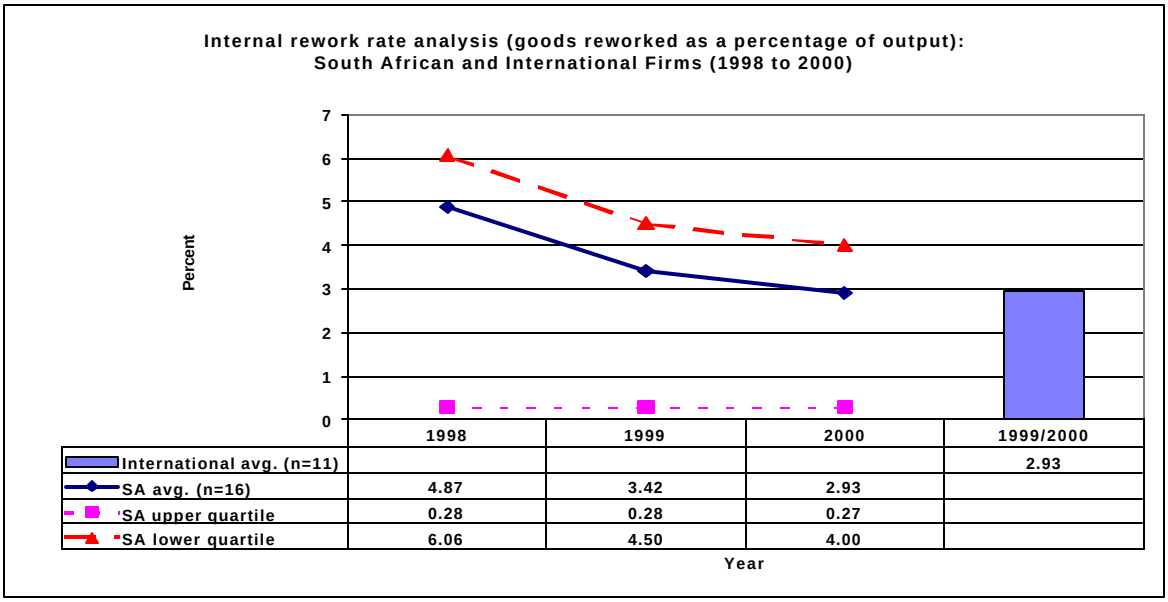


Figure 13



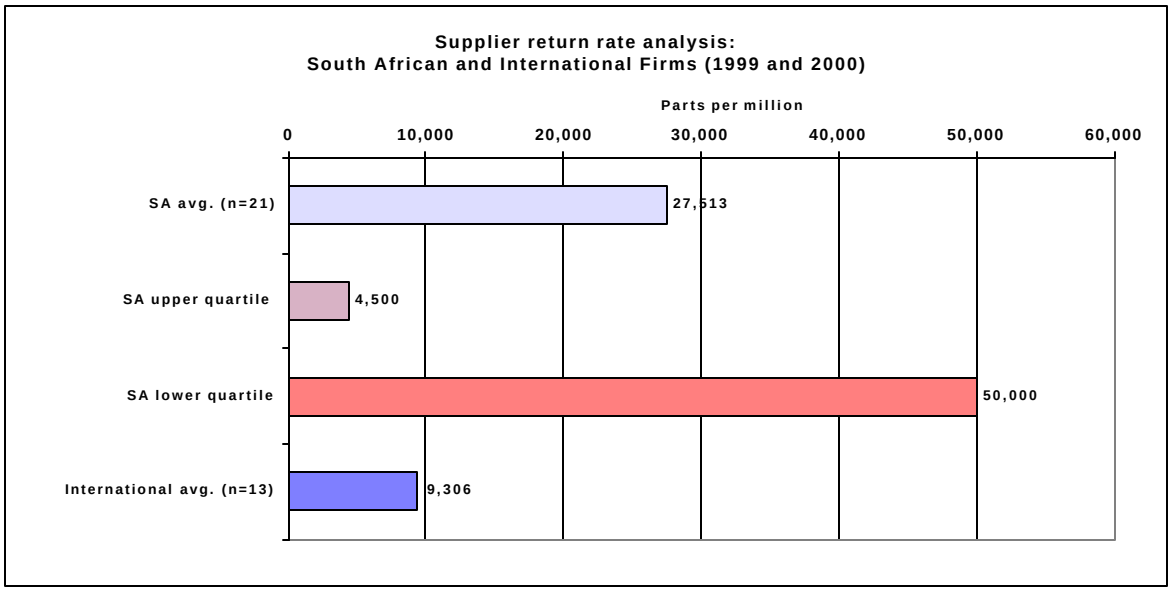
Both outgoing (i.e. to customers) and internal quality performance is impacted on by the quality of raw material inputs[15]. The 1999 competitiveness survey therefore requested an indication of supplier performance levels in the South African automotive components industry for the first time. Quite strikingly, despite all the firms having internationally recognised quality accreditations, it was found in the 1999 survey that only 16 of the 27 firms measured their own suppliers' quality

[15] This is also true for raw material inventory holding. If firms have problem suppliers that fail to deliver consistently perfect quality products, the need to buffer raw material inventory with additional stock becomes more acute, "just in case" there is insufficient material to keep production lines operational.

performance levels, with average supplier quality performance for these 16 firms being a high 6,885 parts per million in 1998.

Unfortunately, the 20001 survey findings are even less positive than previous findings. As highlighted in Figure 14, of the 27 firms surveyed, 21 firms supplied their average supplier return rates for either 1999/2000, and for these South African based firms, their ppm return rate to suppliers was an extremely high 27,513 ppm. This is almost 18 times the surveyed firms' average outgoing quality level in 2000, thus suggesting a huge disjuncture between outgoing and incoming quality performance. This disparity between outgoing and incoming quality performance is also, however, evident for the international firms, with the gap almost as striking - supplier return rates are 15 times outgoing quality levels. There is one fundamental difference between the international and South African based firms. This relates to the fact is that the overall quality performance of the suppliers to the South African based firms is almost 300% worse than at the international firms – 9,306 ppm versus 27,513 ppm. This reveals an area of significant competitiveness weakness (and hence potential) for South African based automotive component manufacturers. The critical issue of weak raw material/component supply to the South African based automotive component manufacturers is further explored in 3.3.

Figure 14



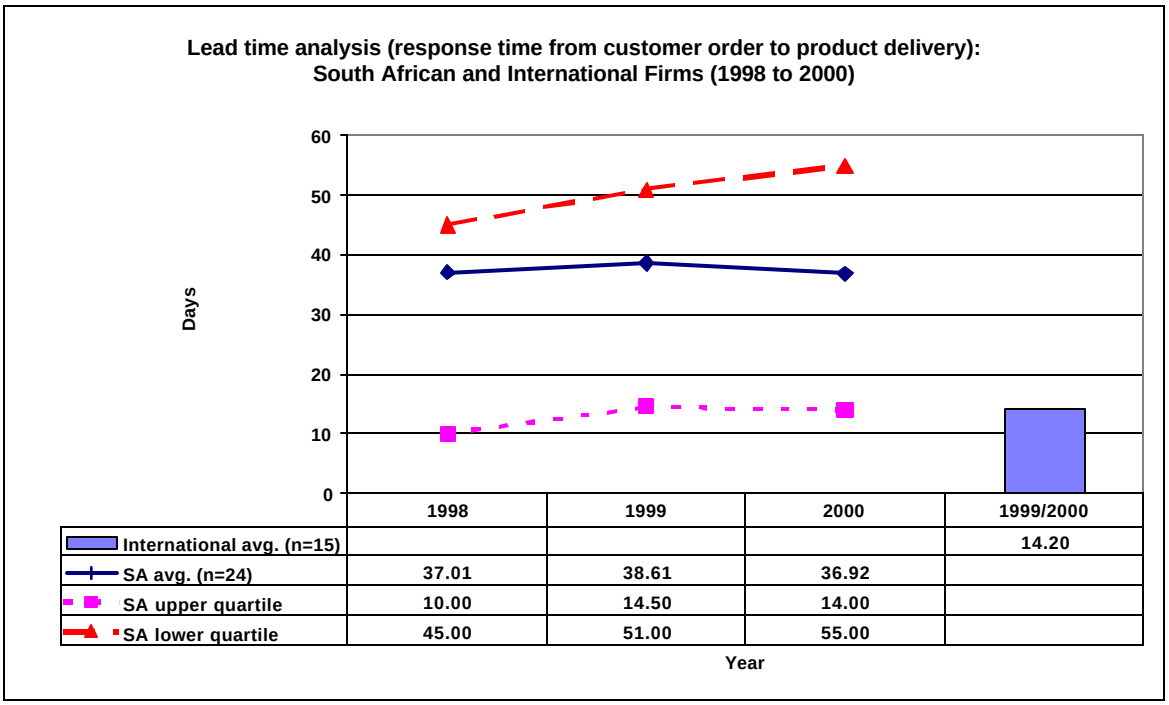
3.3. Market driver No. 3: External flexibility

External flexibility is determined by a firm's lead time (i.e. customer response time), which refers to the time taken from a firm's taking of a customer order to the delivery of the product ordered (Kaplinsky 1994). It is impacted on by three key variables: The interface that the company has with its customers, the efficiency and reliability of its suppliers and the flexibility of the production systems in place at its own factory. Given the complexity of the issues relating to operational firm flexibility this is dealt with as Market Driver No. 4. Here the sole interest is in the manner in which

the customer interface and the frequency of supply from suppliers impacts on the speed, frequency and reliability at which firms are capable of delivering products to their customers. External flexibility is therefore a key determinant of a firm's ability to meet its customers' flexibility requirements, hence the importance of measuring operational competitiveness in this regard. External flexibility (along with internal operational flexibility) determines the ability of a firm to respond quickly and reliably to a customer's order.

This is a market driver against which only very limited progress has been evidenced amongst the surveyed firms over the last couple of years. As highlighted in Figure 15, average lead times (response times from the placing of a customer's order to the delivery of the product) for the five major products manufactured by the surveyed firms has decreased from 37.01 days in 1998 to 36.92 days in 2000. This marks a marginal improvement of only 0.2% over the three year period. Interestingly, moreover the improvement has not occurred at either the upper or lower quartile of firms, with both quartile figures in fact deteriorating quite substantially. The improvement has therefore taken place amongst the mid band of firms in the survey population. Unfortunately, the performance of the South African based firms is not only stagnant; it also lags the international average by a significant margin. The international lead time average of 14.2 days is 61.5% lower than the South African average. Lead time figures for the South African based firms are, however, skewed by the changing composition of major customers. This is covered in Table 6, which reveals that more of the surveyed firms' major customers are located outside of South Africa – hence stagnant/deteriorating lead time performance figures at certain firms[16].

Figure 15

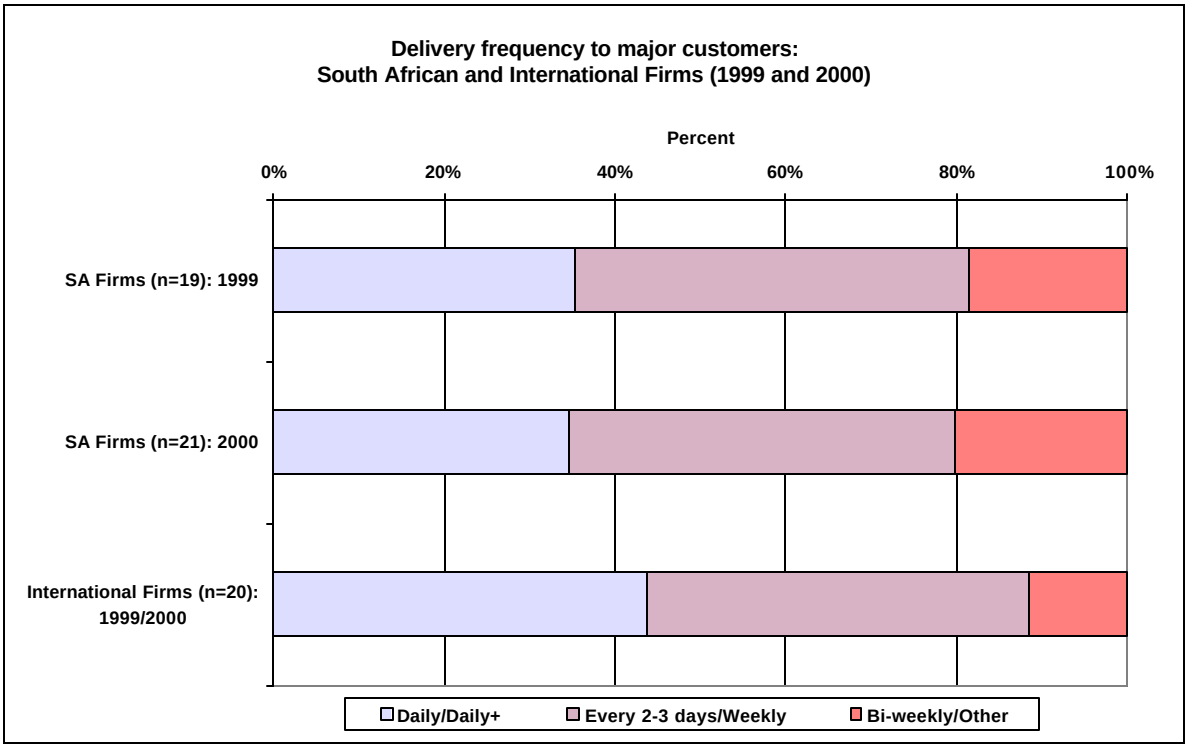


	1998	1999	2000	1999/2000
International avg. (n=15)				14.20
SA avg. (n=24)	37.01	38.61	36.92	
SA upper quartile	10.00	14.50	14.00	
SA lower quartile	45.00	51.00	55.00	

[16] This becomes particularly obvious when one or more of a company's most important products are exported to international customers.

The stagnation in the surveyed firms' lead time performance is matched by their delivery frequencies to major customers. As illustrated in Figure 16, hardly any shift in delivery frequencies to major customers has taken place. The level of just in time (JIT) deliveries (i.e. deliveries that take place on a daily or more frequently basis) has remained constant at levels behind the international firms. As argued in the lead time discussion, this once again, however, represents the increasing importance of major foreign customers who are delivered to on a more infrequent basis than domestic customers, rather than actual stagnation in performance. The growth of this international customer base from 7% of major customers in 1999 to 9% in 2000 is highlighted in Table 6.

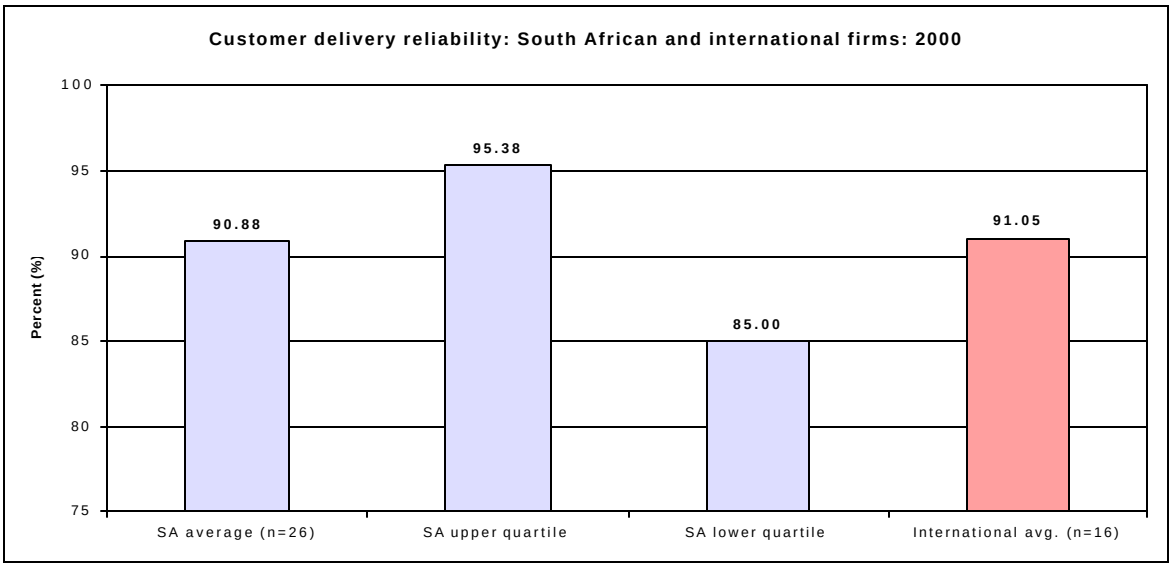
Figure 16



In addition to their relatively weak flexibility levels, the surveyed South African based firms are also struggling in terms of their average delivery reliability record to customers (i.e. % of on time deliveries). As highlighted in Figure 17, the average number of on-time deliveries to customers is presently only 90.9%, with the upper quartile of firms performing at 95% and the lower quartile at 85%.

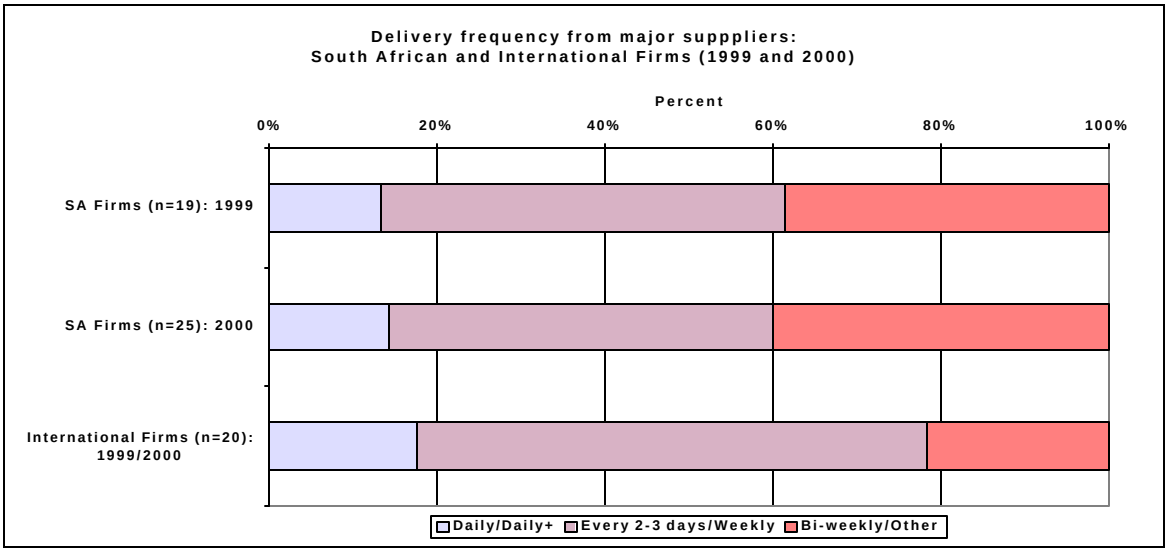
JIT supply to customers is contingent upon 100% delivery reliability and as such the findings are disappointing from a world class manufacturing perspective – although the international findings do not suggestive particularly strong performance either. The international average is only 91.1%, only fractionally (0.2%) better than the South African average.

Figure 17



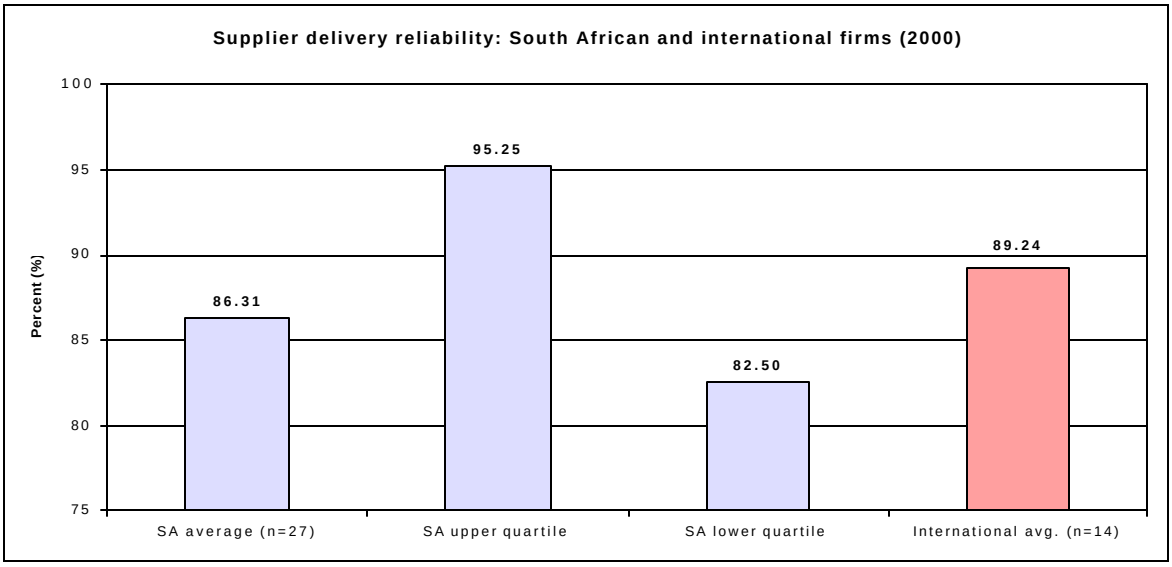
Assessing external flexibility cannot only be done on the basis of output measures. Real flexibility improvements are contingent upon JIT pressures being forced back through the supply chains of the surveyed firms and yet as highlighted in Figure 18 this does not appear to be happening, with suppliers delivering as frequently to the sampled firms in 2000 as they did in 1999. Daily or more frequently deliveries have only increased fractionally and there have been no significant shifts in the spread of delivery frequencies through the surveyed population. A greater proportion of deliveries is now, in fact, taking place on a monthly basis than they were in 1999. As highlighted in Table 6, this is not necessarily an indication of declining value chain flexibility, but rather the result of the firms continued immersion into global value chains. For example, whereas only 21% of the survey population's major suppliers were internationally based in 1999, this had climbed to 23% in 2000.

Figure 18



In addition to the firms' low levels of supply chain flexibility, it is also disconcerting to note that the delivery reliability of suppliers (i.e. % of on time deliveries) to the surveyed firms is extremely poor at only 86.3%. As further highlighted in Figure 19, performance is, moreover, highly variable with the standard deviation around this average being 12.17 and the upper and lower quartiles sitting at 95.25 and 82.5 respectively. As with outgoing delivery reliability, despite relatively weak South African based firm performance, the international firm average is only slightly ahead of the South African average. In this case the gap between the two comparators is 3.4%.

Figure 19



Whilst there is clearly significant performance variance between the input and output aspects of the survey population's value chain flexibility, with this evident in terms of the firms' more frequent deliveries and better delivery reliability to customers relative to supplier delivery frequencies and delivery reliability records, overall performance appears to be largely stagnant. An important mitigating factor in this regard, however, is the immersion of many of the firms in global sourcing arrangements, with more firms now procuring supplies from international suppliers and selling to international buyers. A summary of these value chain flexibility findings is presented in Table 6 below.

Table 6: Differences in value chain flexibility in terms of outputs and inputs at surveyed SA firms

Performance measure	From suppliers	To customers	Value chain implications
Frequency of most deliveries	Weekly	2-3 Days	JIT not being forced through value chain
International suppliers/ customers as % major customers	1999: 21% 2000: 23%	1999: 7% 2000: 9%	Negative impact on delivery frequency performance measures

Table 7: Differences in value chain flexibility in terms of outputs and inputs at surveyed SA firms *(Continued…)*

Performance measure	From suppliers	To customers	Value chain implications
Average delivery reliability (% on time deliveries)	86.3%	90.9%	Delivery reliability demands not being forced through value chain
Standard deviation on average delivery reliability	12.2	6.4	Consistent firm performance but highly variable supply chain performance
Delivery reliability: Upper quartile median	95.3%	95.4%	Upper quartile of firms approaching necessary competitiveness levels
Delivery reliability: Lower quartile median	82.5%	85%	Lower quartile of firms have serious supply chain weaknesses

3.4. Market driver No. 4: Operational flexibility[17]

Notwithstanding the importance of value chain issues, many firms are struggling with their own internal flexibility. This is critical as internal flexibility determines not only the market responsiveness of firms, but also to a large extent firm-level performance in terms of a number of other market drivers, such as cost control and quality performance. Some of the important issues pertaining to firm-level flexibility have been discussed under different market drivers (for example WIP is a key measure of operational flexibility), but other important measures also reveal the extent of a firm's internal flexibility and are considered under this particular market driver:

***Batch and lot sizes:** A batch size indicates the quantity of manufacture of one particular product in a factory before machines are re-set to produce another product, whilst a lot size represents the actual quantity of product passed from one workstation to the next (Bessant and Kaplinsky 1995). Both are important internal manufacturing performance variables as increasing flexibility entails the manufacture of small batches, with these small batches then being broken up and transferred from one work station to the next in small lots (perhaps even one at a time, i.e. single unit flow).*

[17] Many of the operational flexibility measures recorded in the 1999 national competitiveness survey were different from the measures generated in the previous national surveys undertaken as firms indicated that average operational flexibility measures were impossible to provide for the full array of products manufactured as previously requested. Marginal products influenced the average enormously thus providing a highly skewed picture of the firms' operational flexibility. In line with the action research methodology employed for the research, it was decided in consultation with the firms that participated in the 1998 survey, that average figures would be sought for the five most important products at the firms only. The operational flexibility figures presented in this sub-section therefore only cover the period 1998 to 2000.

Throughput times: *This refers to the time taken from the beginning to the end of production in a manufacturing plant (Kaplinsky 1994). It is therefore a very useful indication of the velocity of manufacturing throughput at firms. Firms with highly flexible and responsive manufacturing systems are likely to have very short throughput times.*

Production flow: *Mass production-style factory layouts and machine configurations on factory floors severely restrict smooth material and production flow and therefore limit the possibility of work in progress control and improved firm-level flexibility. Firms manufacturing according to cellular techniques or in single unit flow lines are on the other hand likely to have significantly better production flow through their manufacturing operations, with this contributing to increased flexibility (Bessant 1991).*

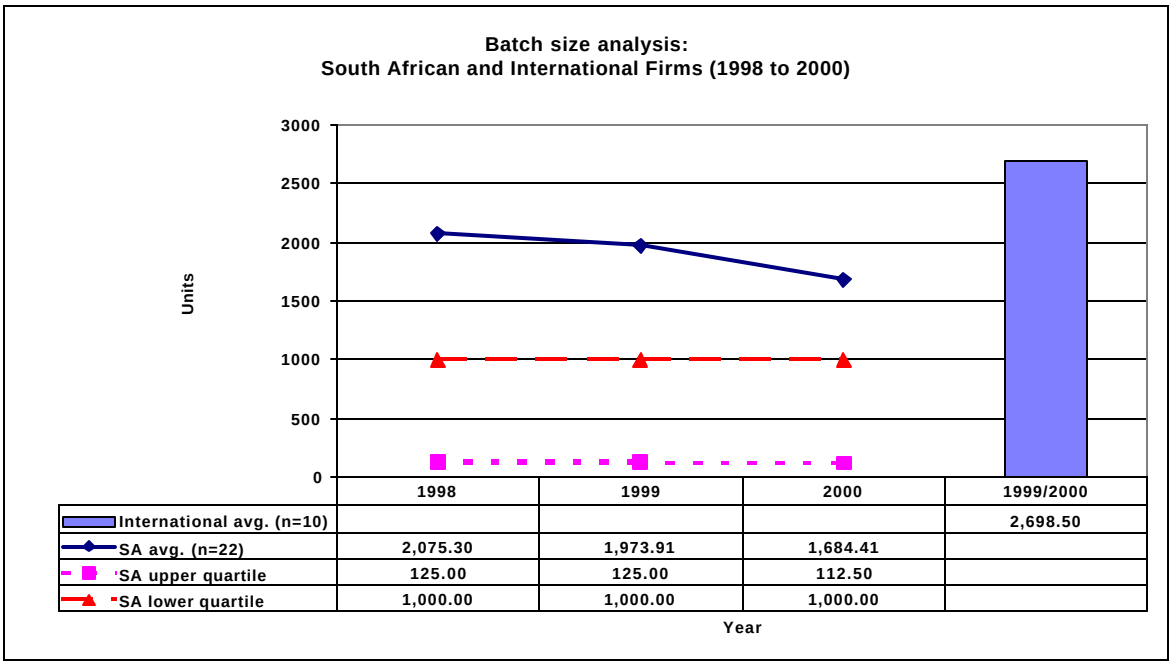
Machine changeover times: *Improving throughput times at factories, as well as decreasing batch and lot sizes is contingent upon significantly shortening machine changeover times (Bessant 1991, Kaplinsky 1994). It would prove too costly to improve production flexibility if, for example, it took four hours to changeover a tool in a machine. The costs of continuously changing the tool over would prove exorbitant given the amount of downtime that would develop. Firms consequently need to focus on ways to decrease their machine changeover times, a difficult endeavour given the age of many of the machines in use in South African factories.*

The various operational flexibility measures generated for the national survey population suggest that performance is highly differentiated – to the extent that few concrete assertions can be made about the general drive towards improved overall flexibility at manufacturing operations. This is evident for average manufacturing batch and lot sizes at the firms, as well as manufacturing throughput times. Machine changeover time and machine capacity utilisation findings are less ambiguous, suggesting that flexibility improvements are indeed occurring at the surveyed firms. This is despite the fact that many of the surveyed firms have a high degree of flexibility on the basis of their generally low levels of machine capacity utilisation, i.e. they are flexible simply because of low levels of demand.

3.4.1 Batch and lot sizes

Batch sizes for the five major products manufactured by the surveyed firms have, on average, decreased marginally since 1998. This improvement is highlighted in Figure 20 below, with 2000 levels 18.8% lower than in 1998. As also revealed, however, average batch sizes are significantly higher than the lower quartile figures, thus revealing that the survey population's batch figures are highly skewed by outliers manufacturing in large batches. Both the upper and lower quartile figure suggest that a large number of firms are manufacturing in very small batches – significantly lower than the international firm average, which is 59.7% higher than the SA average. From a WCM perspective this trajectory is extremely encouraging, although management interviews at many of the surveyed firms revealed that their reduced batch sizes were more a factor of declining order sizes than purposive decisions to reduce batch sizes. This is borne out by the fact that for the overwhelming majority of firms lot sizes have remained at the same levels between 1998 and 2000, hence the exclusion of any quantitative analysis of lot size trajectory. The average lot size for the surveyed firms has remained unaltered at 690 units.

Figure 20

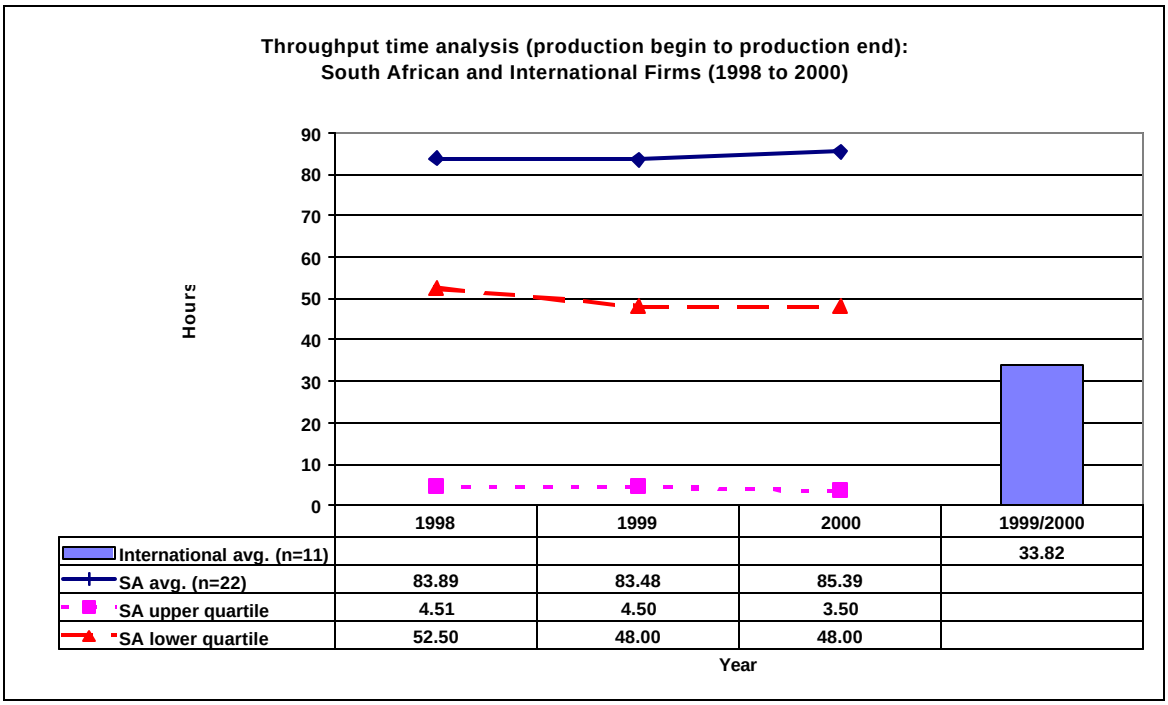


	1998	1999	2000	1999/2000
International avg. (n=10)				2,698.50
SA avg. (n=22)	2,075.30	1,973.91	1,684.41	
SA upper quartile	125.00	125.00	112.50	
SA lower quartile	1,000.00	1,000.00	1,000.00	

3.4.2 Throughput times

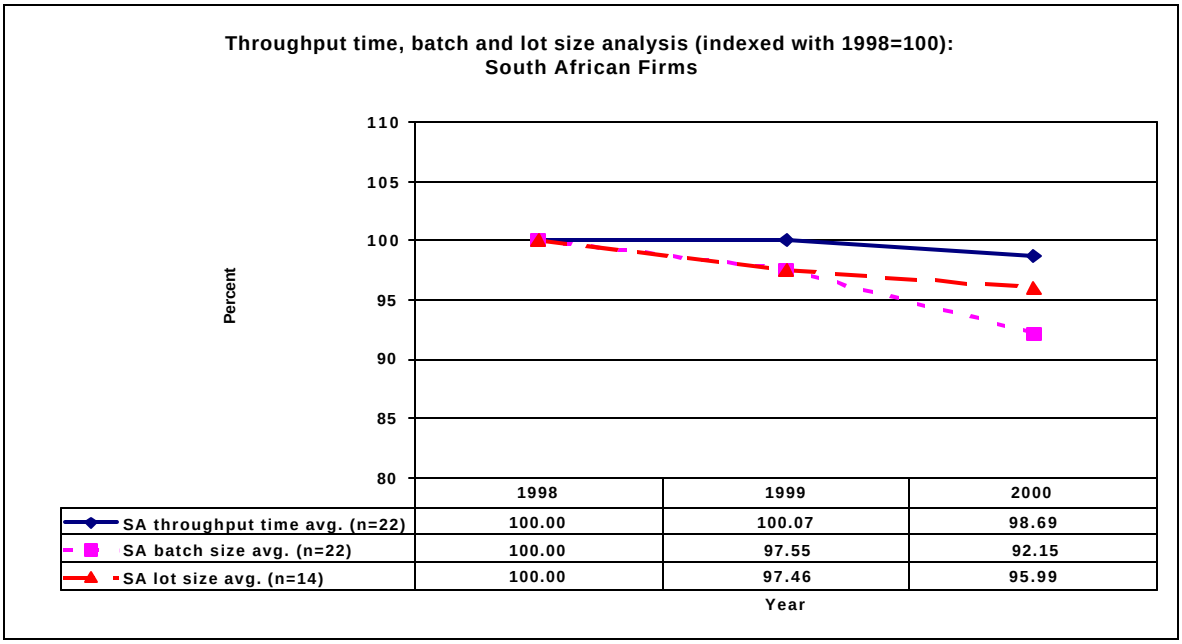
As with the batch findings presented above, throughput time measures for the surveyed firms are ambiguous. On average the surveyed population recorded a marginal deterioration (1.8%) in performance over the period 1998 to 2000. This deterioration is revealed in Figure 21 below. As also highlighted, however, as with the batch size findings, the lower and upper quartile figures are significantly better than the average performance findings, thus suggesting that the average is highly skewed by poor performing outliers. This contention is further supported by the fact that both the upper and lower quartiles have improved since 1998 – the upper quartile by 22.4% and the lower quartile by 8.6%. This suggests that the average is not an accurate reflection of the general trajectory of firms in terms of their manufacturing throughput times. A comparison between the South African and international averages is therefore misleading, with most South African firms operating at levels on parity with or even ahead of the international average.

Figure 21



Given the wide variability of throughput, batch and lot sizes evident across the surveyed South African based firms, all three variables were indexed at individual firms, with 1998 performance used as the base line (i.e. 1998 = 100). Whilst moving away from the objective of this report, which is to generate real competitiveness performance figures for the domestic industry, this was done as a mechanism for overcoming the highly skewed findings endemic to averaging vastly different figures. By indexing the performance trajectories at individual firms, these disparities are removed. The findings are therefore important, particularly since they reveal different trajectories to those outlined above. They suggest that marginal performance improvements have occurred over the last three years, with throughput times, batch and lot sizes improving by 1.3%, 7.9% and 4.0% respectively. This is revealed in Figure 22 on the following page.

Figure 22



3.4.3. Machine changeover times

To manufacture smaller batches of product, and to facilitate increased velocity of manufacturing throughput, it is essential for firms to focus on improving their machine changeover times through the application of rapid tool and machine changeover principles[18]. If this is not done the ability of firms to improve their operational flexibility will be greatly restricted. To generate an understanding of whether firms were focusing their attention on this critical facet of their operations, the survey population was requested to indicate whether they measured their machine changeovers times. If they did measure their changeover times, they were requested to indicate whether their times had improved or deteriorated over the course of the 12 months preceding their answering of the questionnaire.

Of the total sample of 27 firms, only 16 (59.3%) indicated that they measured their machine changeover times, although most of these firms (81.3%) were experiencing some level of machine changeover time improvement. Despite the improvements being recorded by these 13 firms, it is discouraging to note that those 40.7% of firms not measuring their machine changeover times are unlikely to have improved their performance in this regard.

[18] Industry jargon for the rapid machine changeover principle is SMED – the single minutes exchange of dies.

3.4.4. Production Flow

Production flow measurements were not generated for the entire national survey population - only at those firms that are members of the KwaZulu-Natal and Eastern Cape Benchmarking Clubs. These 17 automotive component firms had their production flow analysed in late 2000/early 2001 by following two sample products at each firm from raw material receiving (of the product's most important raw material constituent) through to the final dispatch of the product. As highlighted in Table 8, the findings were illustrative, highlighting as they did the generally poor production flow at firms. This was largely the result of firms having mass production (i.e. functional) operating layouts rather than manufacturing cells. As such the products tended to travel excessive distances between raw material receiving to production work stations, between individual work stations and then again through finished goods storage and final dispatch. Where cellular manufacturing principles were being adhered to, product flow distances were significantly shorter, although the total distance travelled by products still tended to be high due to the distant location of finished goods and raw material storage areas. The average distance travelled from raw material receiving to production begin, from production begin to end and from production end to product dispatch was therefore 110m, 298m and 142m respectively. Average total distance travelled by products through the 17 firms was therefore 550m.

Table 8: Distances traveled by products followed at South African based firms during the course of factory process benchmarks (n=33)

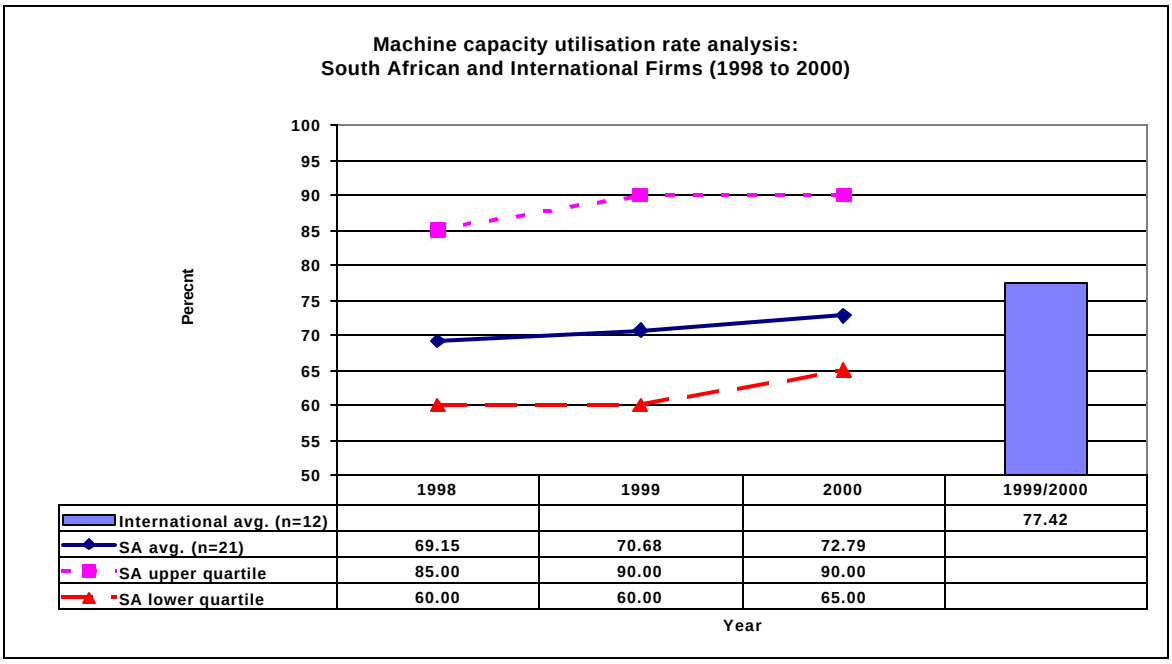
	Raw material receiving to production begin	Production begin to production end	Production end to finished goods dispatch	Overall distance traveled
SA average	**110m**	**298m**	**142m**	**550m**
SA best performer	65m	39m	39m	143m
Average: Best three firms	59m	46m	60m	165m
Average: Worst three firms	199m	1,142m	142m	1483m
SA worst performer	134m	1,997m	102m	2,233m

3.4.5. Machine utilisation levels

Operational flexibility can, of course, be strongly impacted upon by market conditions, as low market demand equates to low machine capacity utilisation and therefore increased flexibility to switch this excess capacity on whenever the need arises. As revealed in Figure 23, whilst sub-optimal capacity utilisation levels are evident amongst the national survey population, this does not appear to be a driver for increased flexibility at the sampled firms. This is because machine capacity utilisation has increased from 1998 through to 2000. Although the South African average of 72.8%

is still lower than the international average of 77.4%, it marks a 5.3% improvement on 1998 levels. Whilst the continuing spare manufacturing capacity that exists at the surveyed firms does provide a certain level of flexibility it would appear appropriate to conclude that any improvements in operational flexibility at firms are not the result of induced flexibility that is directly related to lower levels of market demand.

Figure 23



	1998	1999	2000	1999/2000
International avg. (n=12)				77.42
SA avg. (n=21)	69.15	70.68	72.79	
SA upper quartile	85.00	90.00	90.00	
SA lower quartile	60.00	60.00	65.00	

The operational flexibility indicators explored in this sub-section suggest that the surveyed firms have slightly enhanced their recent performance, although outliers have significantly impacted on the average performance findings presented for batch sizes, lot sizes and manufacturing throughput times. Machine changeover time and machine capacity utilisation trends reveal very similar trends, thereby suggesting slightly improved performance. Overall, though, along with the external flexibility findings, average operational flexibility findings are not as promising as the quality and inventory control findings. Whilst marginal improvements have occurred, no dramatic or sustained shifts in performance are evident.

3.5. Market driver No. 5: Capacity to change (HRD)

As highlighted in the literature pertaining to world class manufacturing the most important determinant of future success for firms is their capacity to change in line with ever increasing market demands (Brown 1996, Maskell 1991, Schonberger 1986). Unless firms continuously innovate in terms of their production and organisational systems, as well as their products, they will fall behind their competitors. There are four key dimensions to this: Manpower, machines, materials and methods. Whilst these four dimensions are all inextricably related, it is the first that

determines firm-level capability to further develop the others. It is their human resource capacity that gives firms the ability to innovate and continuously improve operations. Domestic auto component firms will only be able to meet the challenges of the new operating environment if they have skilled labour and management teams that are committed to the long-term success of the company (see Barnes et al 2001).

A number of proxy measures can be used to gauge a firm's human resource development and hence its capacity to change. These relate to four critical areas, all of which are extensively discussed in this sub-section:

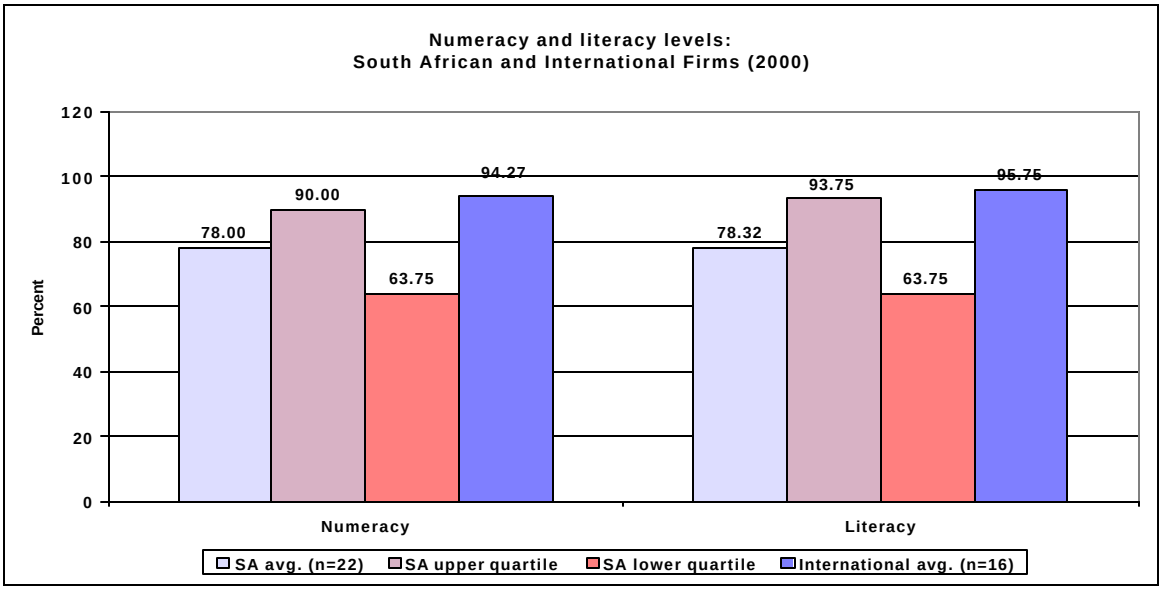
1. The skills development of labour and management,
2. The implementation of processes of continuous improvement,
3. Labour and management commitment to companies, and
4. Employee efficiency levels

In order to explore each of these issues the sub-section is divided into four interrelated parts. The first part deals with the actual levels of employee development at the surveyed firms. Focus is therefore directed to the initiatives that are taking place at the surveyed firms to bolster performance, i.e. training expenditure and the provision of formal off-line training per employee category. In the second part consideration is given to the continuous improvement (CI) programmes at the firms, with the key measure here being labour participation in suggestion schemes. In the third part the commitment and stability of human resources to the surveyed firms is explored. The key measures in this regard are absenteeism rates and labour, management and staff turnover levels. The final area of analysis is that of employee efficiency levels, which is gauged using a flawed, but nevertheless illustrative proxy measure – output per employee levels.

3.5.1. Employee development

The surveyed firms' estimated levels of workforce numeracy and literacy in 2000 are presented in Figure 24 on the page following. As revealed, numeracy is estimated at only 78.0%, whilst literacy is estimated at 78.3%. Whilst there is some divergence around this average, even the upper quartile for firms was estimated at only 90% for numeracy and 93.8% for literacy. This places the South African based firms at a disadvantage relative to the international firms, where the average numeracy estimate was 94.3% and for literacy 95.8%.

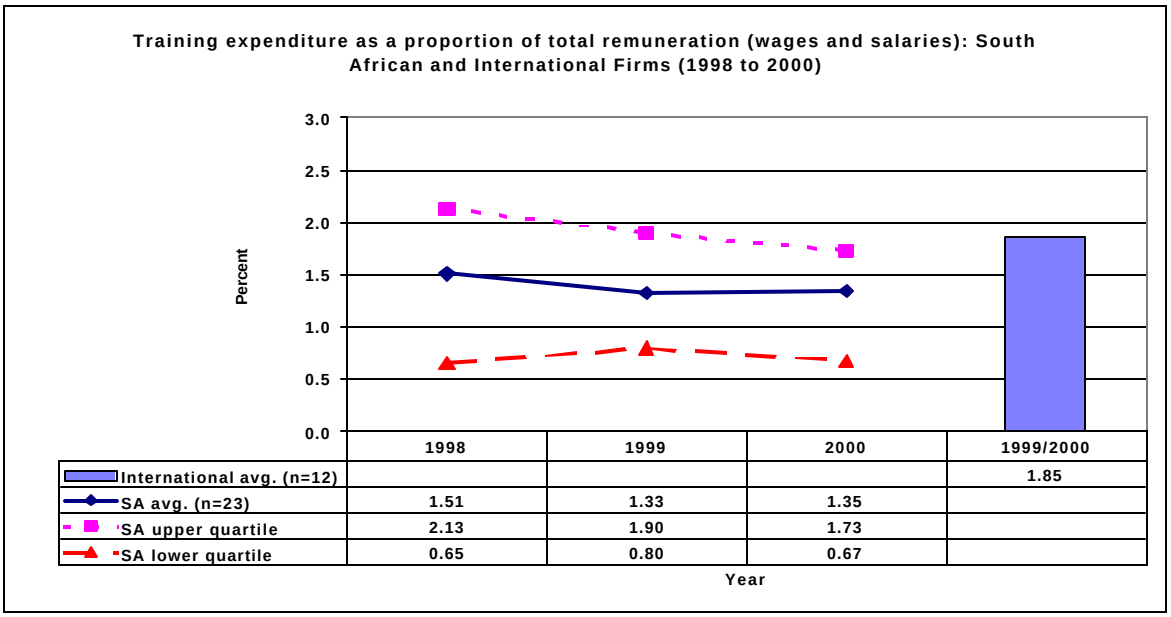
Figure 24



Despite these low levels of basic education and the associated need for intensive training at companies, expenditure levels on training remain very low, particularly given the firms' long term competitiveness challenges. As a point of illustration, the survey population spent less on training as a proportion of their remuneration bill in 1999 than they did in 1998 and then maintained this level through 2000. This static trajectory is highlighted in Figure 25 on the page following, with firms in 2000 spending only 1.4% of their total remuneration bills on training, down from the average of 1.5% in 1998.

Importantly, moreover, there are numerous firms that spend almost nothing on human resource development. The median training spend for the lower quartile of firms is, for example, only 0.7% - only fractionally above the 0.5% that firms are obligated to commit to human resource development through the national government's Skills Development Levy. This is extremely disconcerting from a competitiveness perspective, as it highlights the continued lack of recognition amongst many firms in the survey population of the need for sustained HRD at their operations and the inter-relatedness of this with other aspects of firm-level development. Even the upper quartile of 1.7% in 2000 is significantly lower than the international firms' 1.9% average levels of expenditure on training.

Figure 25

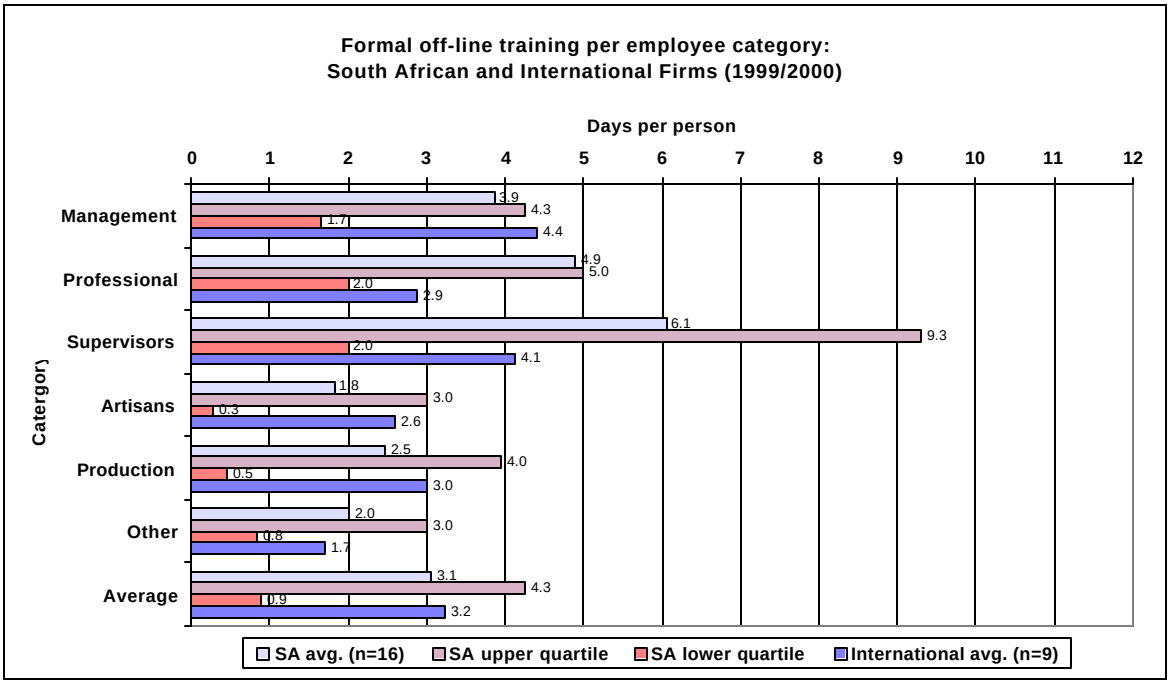


	1998	1999	2000	1999/2000
International avg. (n=12)				1.85
SA avg. (n=23)	1.51	1.33	1.35	
SA upper quartile	2.13	1.90	1.73	
SA lower quartile	0.65	0.80	0.67	

The findings presented in Figure 25 above suggest that many firms still view human resources as a cost to be minimised rather than as a resource to be used effectively in the drive towards international competitiveness. This view is further supported by a breakdown of formalised off-line training according to employment categories. As revealed in **Figure 26** on the page following, the average number of formalised off-line training provided to workers in 1999/2000 was only 3.1 days, with higher proportions of training afforded to workers in management, professional and supervisory positions. Production workers received an average of only 2.5 days formal off-line training in 1999/2000, which is well below necessary training levels, especially given the poor history of training at the surveyed firms and their own recognition of human resource weaknesses in their operations. Even this average is moreover exceptionally high relative to the lower quartile figure for the surveyed firms. The lower quartile figure across all employee categories is only 0.9 days, whilst for production workers it is an almost non-existent 0.5 days.

Somewhat surprisingly, the international average for this key measure is very similar to the South African average (3.2 days versus 3.1 days), although the spread of training across employee categories is different. For example, the international firms provided production workers with 20% more formal off-line training in comparison to the South African average, whilst providing 32.8% less supervisor training and 40.8% less professional staff training. The international firms also provided 12.8% more management training.

Figure 26



3.5.2. CONTINUOUS IMPROVEMENT PROCESSES

There would appear to be a limited Continuous Improvement (CI) culture at the majority of the survey population. For example, most firms have no suggestion scheme programme in place for their workers. Of those 11 firms that did have a suggestion scheme programme in place, nine indicated that they actually measured the number of suggestions received, as well as the implementation of the ideas received. These nine firms (i.e. only 36% of the 25 firms that responded to the question) received 1,211 suggestions from their employees in 2000, with 833 of the suggestions implemented. Given the number of employees at the nine firms this represents a low participation rate by labour and an apparent failure amongst even these firms to implement a CI culture amongst their workforce. This is reflected in Table 9, which tabulates the suggestion scheme findings. As revealed the average number of suggestions received per employee at the nine firms was only 0.45.

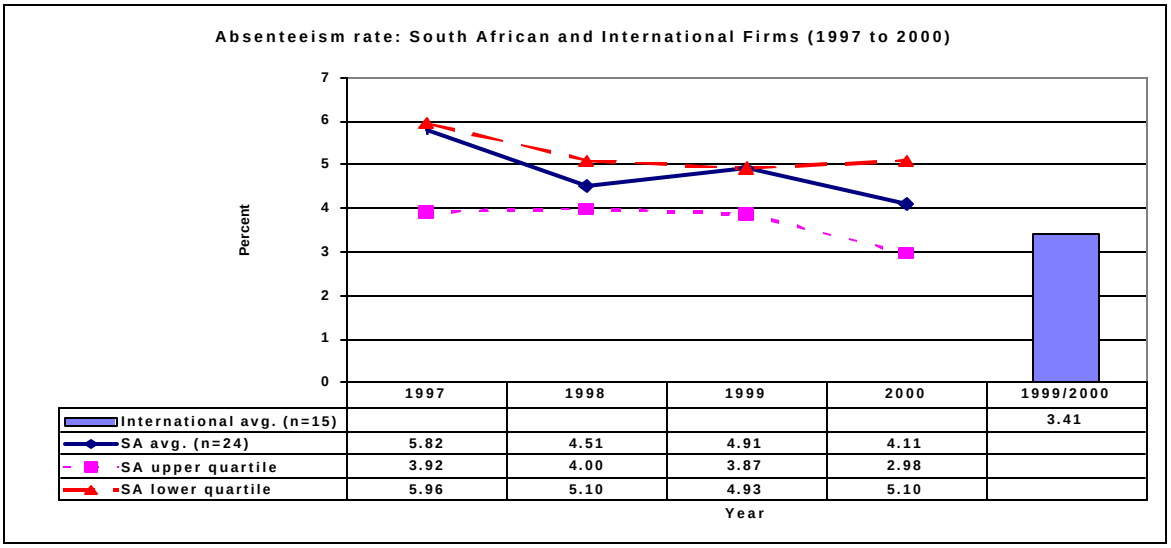
Table 9: Implementation of suggestion scheme programmes at sample population (n=25)

Number of firms with suggestion schemes	11
Number of firms measuring the number of suggestions received/implemented	9
Suggestions received at the nine firms	1,211
Suggestions implemented at the nine firms	833
% Suggestions implemented	68.8%
Total employees at the nine firms	2,705
Suggestions received per employee at the nine firms	0.45

3.5.3. Employee commitment levels

The employee commitment measures revealed below are more encouraging than the training and CI measures highlighted above, although they are still far off optimal levels with significant performance variance evident. For example, whilst the average absenteeism rate at the survey population has improved substantially since 1997, with the average level of absenteeism in 2000 sitting at 4.1% in comparison to the 5.8% of 1997, this performance is still some distance from the international average of 3.4%. Significantly, though, the upper quartile for the surveyed firms has substantially improved over the period 1999 to 2000 and is now below 3%. This reveals the potential for lower absenteeism rates at the rest of the surveyed firms, particularly amongst those firms in the lower quartile of the population. The lower quartile is still hovering at over 5%. However, with the standard deviation around the average having decreased from 3.12 in 1997 to only 1.31 in 2000, it is clear that a level of performance convergence has occurred amongst the surveyed firms. The absenteeism progress made at the surveyed population is illustrated in Figure 27 below.

Figure 27



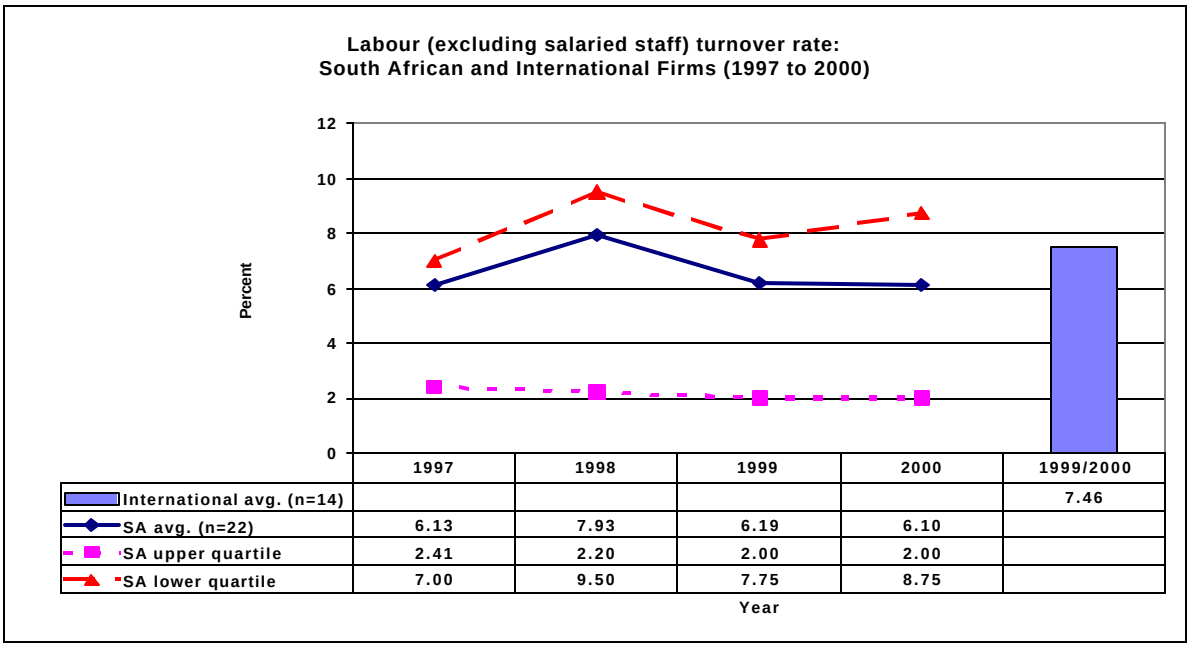
	1997	1998	1999	2000	1999/2000
International avg. (n=15)					3.41
SA avg. (n=24)	5.82	4.51	4.91	4.11	
SA upper quartile	3.92	4.00	3.87	2.98	
SA lower quartile	5.96	5.10	4.93	5.10	

Labour turnover rates have remained consistently low at the survey population over the period 1997 to 2000, with 2000 levels almost identical to 1997 levels. Given the generally weak employment opportunities for semi-skilled workers outside of their present places of employment this is perhaps unsurprising, but it is nevertheless a positive development as stable labour, staff and management teams at companies can facilitate the development of long-term trust relations. Significantly, then, what has happened to management and staff turnover rates, which were identified as major competitiveness weaknesses in the 1999 competitiveness survey?

As highlighted below in Figure 29 (staff turnover) and Figure 31 (management turnover), both of these measures have improved substantially over the last three years. Whilst 1998 figures suggested a mass exodus of skilled personnel from the industry, this incipient trend appears to have been reversed with average staff turnover rates reducing from 10.5% in 1998 to 6.2% in 2000 and

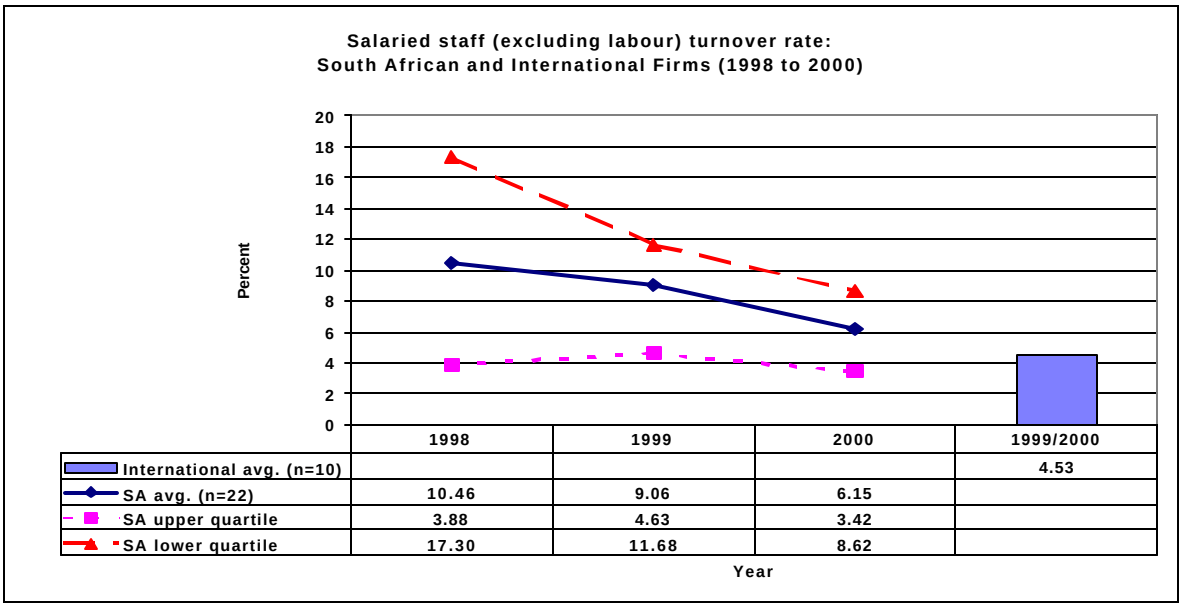
management turnover from 9.1% to 3.8% over the same period. These two measures, which were well above labour turnover levels in 1998 were both on parity with to better than 2000 labour turnover rates. Given the alternative employment opportunities available to skilled personnel in the automotive components industry, particularly outside of South Africa, this is an extremely encouraging finding. Importantly, moreover, all of the findings for the South African based firms are consistent with the findings generated for the international firms.

Figure 28



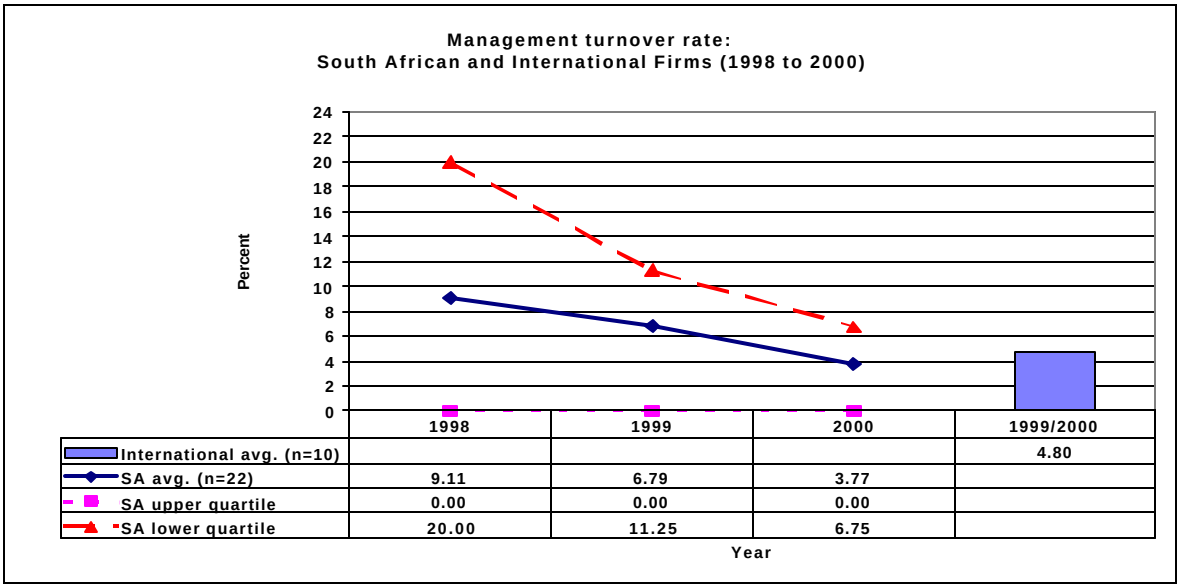
	1997	1998	1999	2000	1999/2000
International avg. (n=14)					7.46
SA avg. (n=22)	6.13	7.93	6.19	6.10	
SA upper quartile	2.41	2.20	2.00	2.00	
SA lower quartile	7.00	9.50	7.75	8.75	

Figure 29



	1998	1999	2000	1999/2000
International avg. (n=10)				4.53
SA avg. (n=22)	10.46	9.06	6.15	
SA upper quartile	3.88	4.63	3.42	
SA lower quartile	17.30	11.68	8.62	

Figure 30



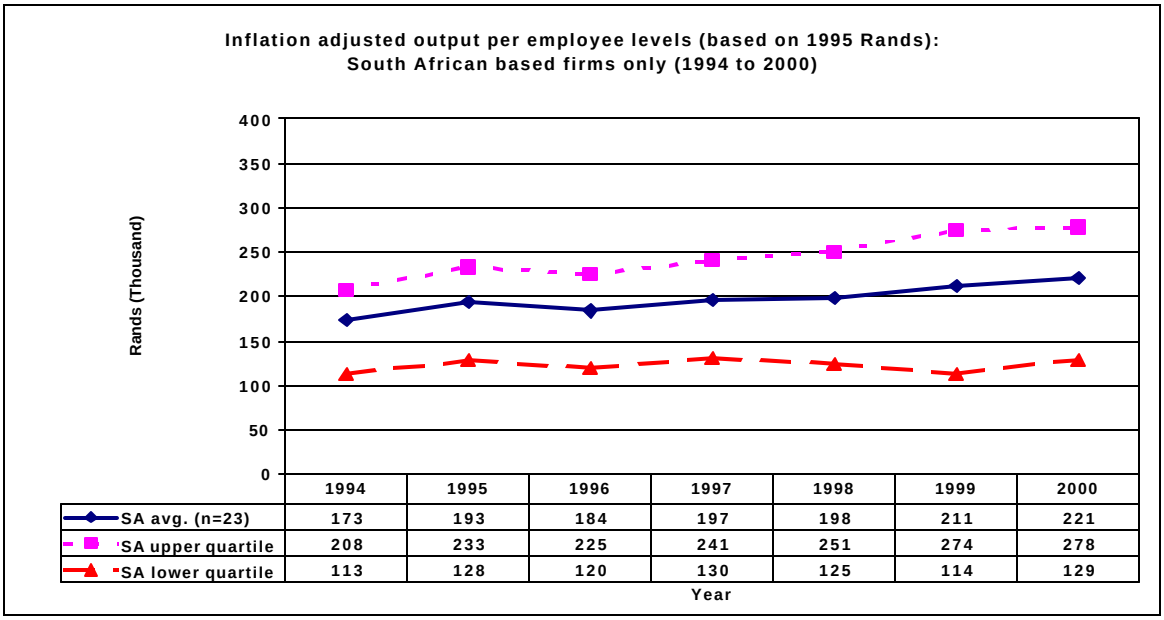
3.5.4. Employee efficiency levels

Measuring the productive utilisation of human resources at firms is extremely difficult, with the most common measure used being average output per employee levels. This is a loose proxy, as there a numerous factors influencing labour productivity, including levels of automation, capital utilisation and market demand. It does nevertheless highlight the output value of employees at the surveyed firms and it does consequently offer a general indication of their productive use of human resources.

Whilst recognising its limitations, the findings generated for the survey population are important, as highlighted in Figure 31. Whilst many of the performance findings explored under the various market driver headings suggest performance convergence in the survey population, with the weaker firms catching up to the performance of the more competitive firms in the survey population, output per employee levels at constant 1995 prices suggest the opposite. Whilst the average for the survey population has improved significantly over the period 1994 to 2000 (from R173,000 worth of output per employee in 1994 - at 1995 prices - to R221,000 in 2000), this improvement has been driven by the upper quartile of firms. The upper quartile figure has climbed from R208,000 to R278,000. In real terms the upper quartile figure has therefore improved by 33.7% over the seven year period.

At the opposite end of the survey population, the lower quartile figure has in fact remained relatively static, improving by only 14.2% between 1994 and 2000 - from R113, 000 to R129, 000. Significantly, between 1994 and 1999, the trajectory was in fact almost completely flat with 1999 levels only R114, 000. As a result of this performance divergence amongst the survey population the standard deviation around the average has increased from 84,590 to 111,100.

Figure 31



In summary, then, a rather mixed picture of the HRD trajectory of the survey population has been generated. It would appear that despite improvements in worker commitment measures over the last few years, human resource development has remained relatively stunted at many of the surveyed firms. Training levels are inadequate, with even the limited training that is taking place being directed towards employee categories other than production workers. Processes of CI at companies would appear to be similarly stunted, with little dynamism evident amongst the majority of the 27 surveyed firms. Importantly, moreover, whilst average output per employee levels have improved significantly in real terms over the last seven years, this improvement has not been consistently driven across the survey population.

3.6. Market driver No. 6: Innovation capacity

One of the key determinants of success for any manufacturing company is its ability to develop new products for the market (Tidd, Bessant and Pavitt 1997). Unfortunately for South African based auto component firms this is a potential market advantage that is being rapidly undermined in line with global sourcing and its associated lead sourcing principles. This has been extensively explored in previous DTI working papers, as well as other IRP publications (see Barnes and Kaplinsky 2000a, 2000b, Barnes 2000a, Barnes 2000b). Except for certain assembler market niches where some level of localisation is permitted, and in certain stable technology aftermarket segments, South African automotive component firms are not viewed as sources of product innovation.

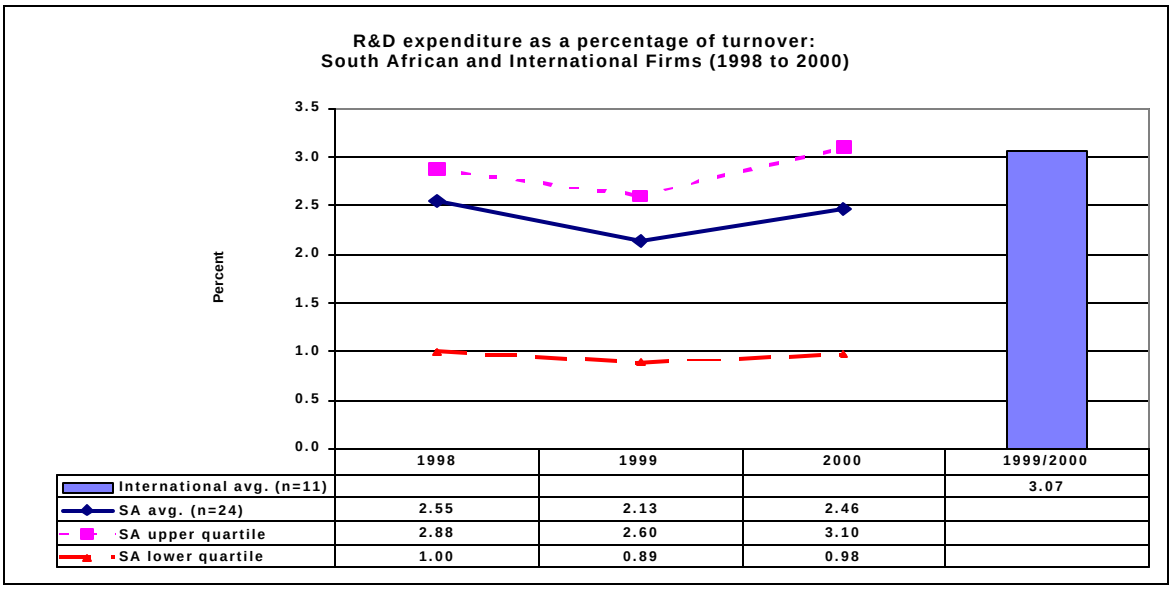
Given the fact that South African based firms are increasingly expected to source their new products through MNC link ups, it is unsurprising to note that Research and Development (R&D) expenditure at the surveyed firms has remained at minimal levels over the last three years. This trend is likely to continue with only limited inputs into new product R&D expected as a result of

global sourcing arrangements and the continued tiering of the automotive components industry internationally.

As highlighted in Figure 32 below, average R&D expenditure for the survey population was 2.6% of turnover in 1998, with this then slipping to 2.1% in 1999 before increasing to 2.5% in 2000. The lower quartile for the firms has also remained constant at just on or under the 1% mark, whilst the upper quartile has increased from 2.9% in 1998 to 3.1% in 2000. This figure is equal to the international firms' average performance. This reveals that certain of the surveyed population still have some R&D capacity, although performance variance in this regard is high with the standard deviation around the average for the sample 2.36 in 2000.

Significantly, this trend is not unique to South African based firms. Many of the international firms also spend very little on R&D. Some of the international firms indicated that they are part of Multinational Corporations, which have centralised R&D activities, either at the corporate level or at one particular plant. Whilst the international firms generally spend more on R&D than the South African average their expenditure levels appear to be determined by their strategic position within their global family. If they are a designated center of design excellence they spend significant amounts on R&D, but if not, very little is spent. This was most evident for the Brazilian and Australian firms included in the international firm population. Most were entirely dependent on their North American or European parent companies for design inputs, particularly for new product development.

Figure 32

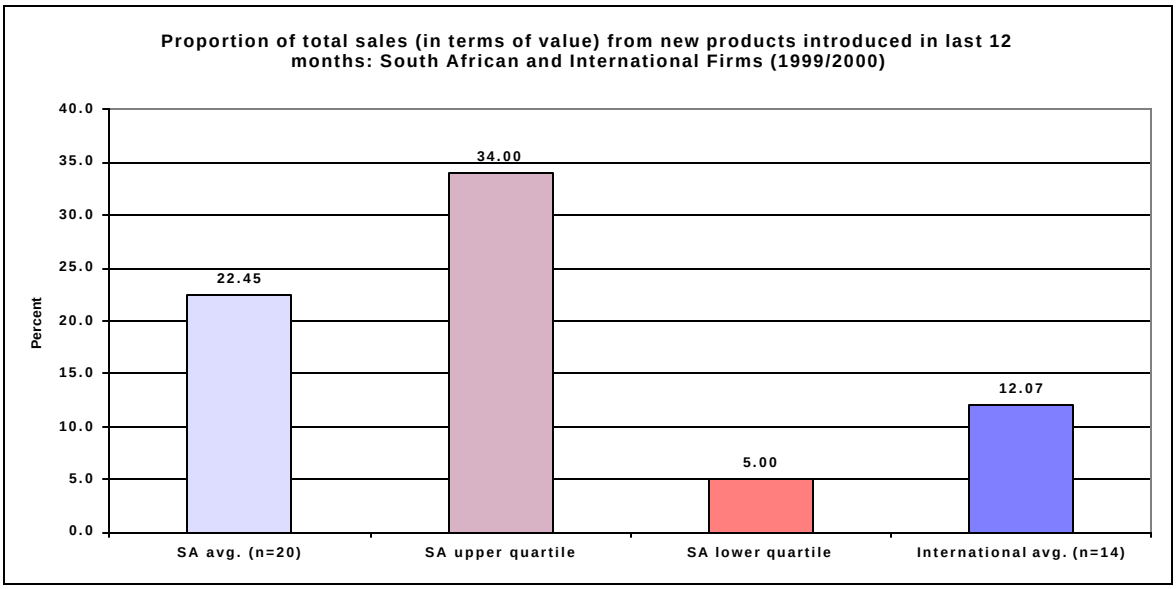


	1998	1999	2000	1999/2000
International avg. (n=11)				3.07
SA avg. (n=24)	2.55	2.13	2.46	
SA upper quartile	2.88	2.60	3.10	
SA lower quartile	1.00	0.89	0.98	

This variance in innovation capacity performance is further borne out by the fact that there is significant variance amongst firms in terms of the proportion of sales generated from products released over the course of 2000. This is revealed in Figure 33. Whilst the average proportion of sales generated from products released during the course of 2000 is 22.5%, the median for the lower quartile of firms is significantly lower at 5%, whilst the figure for the upper quartile of firms is

substantially higher at 34.0%. These findings are extremely encouraging, with the South African average almost double the international average of only 12.1%. This reveals that despite lower levels of investment in R&D, South African firms are generating a significant proportion of their sales from new products. This places the South African firms in an extremely healthy competitiveness position, as the greater the proportion of sales from new products, the younger the companies' product portfolio.

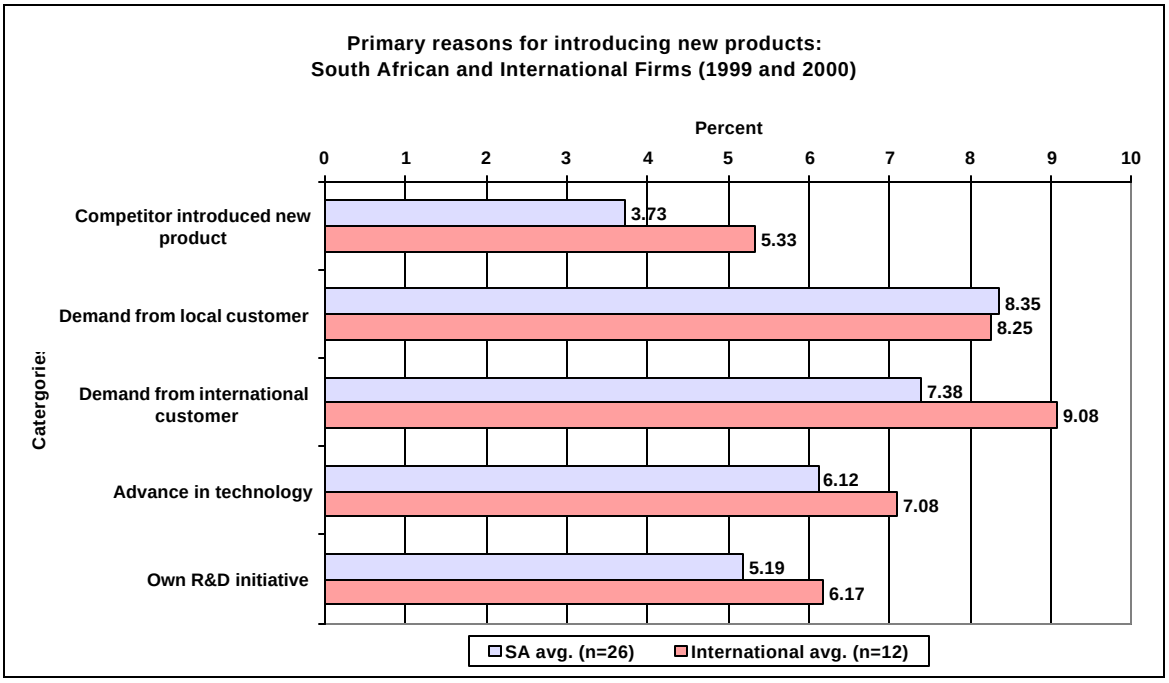
Figure 33



Given the fact that new product development is not being driven by the firms' own R&D initiatives what is driving the release of new products at the South African firms? In an attempt at unpacking this and using a rating system of one (not important at all) to ten (critically important), firms were asked to rate the importance of the factors leading to their introduction of new products. The findings from this rating process are presented in Figure 34 and as is clearly revealed local and international customer demand is the most important factor by a considerable margin (average ratings = 8.35 and 7.38 respectively). 'Own R&D initiative' received a very low average rating of only 5.19, thus making it the second least important factor underpinning the release of new products. Only 'competitor entering a new product' received a lower rating (3.74). Interestingly, for those companies with a direct relationship with a MNC, the relationship with the MNC was accorded an 8 rating in terms of importance underpinning the release of new products.

These findings reveal that new product development is being driven by external factors in the South African automotive components industry, rather than by indigenous "blue sky" developments based on pure R&D inputs. Whilst the ability of firms to convert new product drawings (via CAD) or samples into manufactured products in a short space of time and to the correct specifications is absolutely key to the future success of the industry, the ability of firms to develop products from conception is clearly a non-issue for the overwhelming majority of South African based automotive component manufacturers.

Figure 34



The performance findings generated for this market driver are generally positive, although in a restricted sense. Whilst the survey population has exhibited low average levels of R&D expenditure, a significant proportion of sales are being generated from new products – well ahead of the international average – with this linked to international and domestic customer demands, as well as increasingly close links to MNCs. Whilst firms are meeting the challenge of generating new products for the market, this challenge is not being directed by South African based automotive component manufactures, but rather the international OEMs and first tier MNC component manufacturers that dominate the global automotive landscape. Whether firms will be able to meet the future product innovation challenges posed by these MNCs is dependent on a wide range of factors that lie outside the scope of this research report.

4. DRIVING TOWARDS COMPETITIVENESS?

The extensive findings presented in 3.3 are important in that they quantify the competitiveness trajectory of a largely representative sample of South African based automotive component manufacturers. If one considers each of the market driver issues explored, it becomes clear that the survey population has generally improved its international competitiveness over the latter part of the 1990s. A summary of the major longitudinal findings presented in 3.3 is outlined in Table 10 below. As revealed the competitiveness trajectory of the survey population, whilst uneven, suggests that the South African automotive components industry has moved forward very rapidly in terms of two of the six market drivers - cost control and internal and external quality performance. These are arguably the two most important market drivers and as such the findings are extremely encouraging.

Performance improvements, though still evident, have however been less impressive for two of the other market drivers, namely external (value chain) flexibility and operational flexibility. For the two remaining market drivers of capacity to change and innovation capacity the performance indicators are more mixed. Both trajectories are nevertheless more positive than they are negative. The innovation capacity findings are, moreover, significantly impacted upon by external economic factors that lie beyond the focus of this research report.

As also revealed in Table 10, despite these improvements there are still significant gaps between the performance standards of the South African based firms and that of the international firms. If one compares the improvements recorded at the South African based operations over the last three to four years against the gap that still exists between average South African and international firm performance levels, it is clear that the South African operations are still three to four years away from matching the international firms' present performance levels (assuming that the rate of change amongst the South African firms remains constant).

Table 10: Summary of the surveyed firms' average competitiveness performance trajectory

Market driver	Measurement (measurement unit)	Average performance earliest year data		Average performance 2000	*Improvement over time period*	Gap: SA/ international average
		Year	Figure			
Cost control	**Total inventory (days)**	1997	65.11	47.02	*27.8%*	19.5%
	Raw material (days)	1997	38.46	25.42	*33.9%*	18.7%
	Work in progress (days)	1997	11.81	8.35	*29.3%*	20.8%
	Finished goods (days)	1997	14.85	13.24	*10.85%*	20.15
Quality	**Customer return rate (ppm)**	1997	6,869	1,558	*77.3%*	151.7%

Table 11: Summary of the surveyed firms' average competitiveness performance trajectory *(Continued…)*

Market driver	Measurement (measurement unit)	Average performance earliest year data		Average performance 2000	*Improvement over time period*	Gap: SA/ international average
		Year	Figure			
Quality	**Internal scrap rate (%)**	1998	3.99	3.1	*22.3%*	33.0%
	Internal reject rate (%)	1998	5.85	3.77	*35.6%*	40.6%
	Internal rework rate (%)	1998	4.87	2.93	*39.8%*	0%
Value chain flexibility	**Lead time (days)**	1998	37.01	36.92	*0.2%*	160.0%
Operational flexibility	**Batch sizes (unit)**	1998	2,075	1,684	*18.8%*	(37.6%)
	Throughput times (hrs)	1998	83.69	85.39	*(1.8%)*	152.4%
Capacity to change	**Training expenditure (%)**	1998	1.51	1.35	*10.6%*	*37.0%*
	Absenteeism (%)	1997	5.82	4.11	*29.4%*	17.0%
	Labour turnover (%)	1997	6.13	6.1	*0.5%*	(22.3%)
	Staff turnover (%)	1998	10.46	6.15	*41.2%*	26.3%
	Management turnover (%)	1998	9.11	3.77	*58.6%*	(27.3%)
	Output per employee (R)	1994	173 k	221 k	*27.7%*	N/A
Innovation capacity	**R&D expenditure (%)**	1998	2.55	2.46	*3.5%*	19.9%

Another important finding to emerge from the survey population's competitiveness trajectory has been the general consistency in performance improvements recorded across the range of firms. Unlike the economic performance findings, which suggest that significant performance divergence is occurring, the upper and lower quartile market driver figures suggest that firms in the upper and lower segments of the survey population are both generally improving their competitiveness at healthy rates.

A quantification of the changes in upper and lower quartile figures for each of the market driver measures explored in the report is highlighted in Table 12 below, and as is apparent the percentage improvement for the lower and upper quartile of firms, suggests that the competitiveness progress

findings presented are not being skewed by the trajectories of weak or strong firms in the survey population. Of the 18 key measures explored, upper quartile firms have improved their performance more rapidly than the lower quartile firms in ten areas, whilst conversely the lower quartile movement has been more impressive in eight areas. Performance convergence is clearly, then, not occurring.

Table 12: Summary of upper and lower quartile performance trajectories

Market driver	Measurement	Upper quartile performance			Lower quartile performance		
		Earliest year data*	2000	Change (%)	Earliest year data*	2000	Change (%)
Cost control	Total inventory (days)	38.28	32.9	14.1	91.0	54.5	40.1
	Raw material (days)	17.73	13.3	25.0	53.25	30.0	43.7
	Work in progress (days)	7.0	4.39	37.3	11.15	9.5	14.8
	Finished goods (days)	2.0	4.15	(107.5)	17.6	14.1	19.9
Quality	Customer return rate (ppm)	427	299	30.0	5,297	1,062	80.0
	Internal scrap rate (%)	0.83	0.65	21.7	4.2	4.0	4.8
	Internal reject rate (%)	0.71	0.55	22.5	7.8	6.11	21.7
	Internal rework rate (%)	0.28	0.27	3.6	6.06	4.0	34.0
Value chain flexibility	Lead time (days)	10.0	14.0	(40.0)	45.0	55.0	(22.2)
Operational flexibility	Batch sizes (units)	125	112.5	10.0	1,000	1,000	0
	Throughput times (hrs)	4.51	3.5	28.9	52.5	48.0	8.6
Capacity to change	Training expenditure (%)	2.13	1.35	36.6	0.65	0.67	(3.1)
	Absenteeism (%)	3.92	2.98	24.0	5.96	5.1	14.4
	Labour turnover (%)	2.41	2.0	17.0	7.0	8.75	(25.0)

Table 13: Summary of upper and lower quartile performance trajectories *(Continued…)*

Market driver	Measurement	Upper quartile performance			Lower quartile performance		
		Earliest year data*	2000	Change (%)	Earliest year data*	2000	Change (%)
Capacity to change, continued..	Staff turnover (%)	3.88	3.42	11.9	17.3	8.62	50.2
	Management turnover (%)	0	0	0	20.0	6.75	66.3
	Output per employee (R)	208 k	278 k	33.7	113 k	129 k	14.2
Innovation capacity	R&D expenditure (%)	2.88	3.1	7.6	1.0	0.98	(2.0)

* Same as Table 10.

The findings presented in Table 10 and Table 12 reveal, then, that the South African automotive components industry is experiencing a positive competitiveness trajectory, with the various market driver measures suggesting average performance improvements over time, albeit at variable rates. At a theoretical level the findings suggest that the industry is on the road to international competitiveness. The industry would appear to be unshackling itself from its Import Substitution Industrialisation (ISI) growth path and is showing signs of adapting to the new demands of the more open operating environment in which it finds itself. The industry is on a continuum and is slowly moving from a mass production model towards one based on world class manufacturing standards.

The only disconcerting trend to emerge from the findings generated from the national data set is that there is still a sizeable gap between the performance standards of the leading South African based firms in the survey population and that of the better performing international firms. Whilst the upper quartile figures suggest that the leading South African based firms are already performing at average international levels, these firms are still not operating at world class levels. This can be deduced from the competitiveness data available for the international firms benchmarked for KwaZulu-Natal and Eastern Cape Benchmarking Club members, as well as a number of other international studies[19]. If one accepts the upper quartile performance figures for the international firms as proxies for true world class performance levels in the global automotive components industry then only a very few South African based firms are performing at world class levels in any of the measures explored.

This is clarified in Table 14 below, which compares the international firms' upper quartile figures against the performance standards of the upper quartile South African based firms. As highlighted, the gaps are, with only one or two exceptions, generally large.

[19] For example, Andersen Consulting 1992, Nishiguchi 1989, Womack, Jones and Roos 1990, Sturgeon and Florida 1999.

Table 14: Upper quartile comparisons – Leading SA based firm performance levels against world class manufacturing standards

Market driver	Measurement (measurement unit)	SA based firms: Upper quartile	International firms: Upper quartile	Difference: SA versus International firms
Cost control	**Total inventory (days)**	32.9	30.9	6.1%
	Raw material (days)	13.3	10.0	24.8%
	Work in progress (days)	4.39	2.9	33.9%
	Finished goods (days)	4.15	2.3	44.6%
Quality	**Customer return rate (ppm)**	299	113	62.2%
	Internal scrap rate (%)	0.65	0.45	30.8%
	Internal reject rate (%)	0.55	1.0	(81.8%)
	Internal rework rate (%)	0.27	1.0	(270.4%)
	Supplier return rate (ppm)	4,500	1,000	77.8%
Value chain flexibility	**Lead time (days)**	14.0	1.25	91.1%
	Customer delivery reliability	95.38	98.13	2.9%
	Supplier delivery reliability	95.25	96.94	1.77%
Operational flexibility	**Batch sizes (unit)**	112.5	663	520.4%
	Throughput times (hrs)	3.5	2.25	35.7%
Capacity to change	**Training expenditure (%)**	1.35	2.53	87.4%
	Absenteeism (%)	2.98	1.97	33.9%
	Labour turnover (%)	2.0	2.81	(40.5%)
	Staff turnover (%)	3.42	1.23	64.0%
	Management turnover (%)	0	0	0%
Innovation capacity	**R&D expenditure (%)**	3.1	4.75	53.2%

On the basis of the competitiveness findings generated and in response to the three key research questions posed in the introduction to this research report, the following can therefore be argued:

1. Yes, the domestic industry is, on average, moving in the right direction in terms of adherence to world class manufacturing principles. This is evident in terms of almost all of the performance indicators generated for the South African based firms. Performance improvements have been variable across different operational areas, but improvements have clearly been evident. Importantly, there is not one market driver that one could argue that performance is deteriorating against. Key measures exhibiting impressive average improvements are customer return rates (77.3%, 1997-2000), internal reject rates (35.6%, 1998-2000), total inventory holding (27.8%, 1997-2000), absenteeism (29.4%, 1997-2000) and output per employee levels - in real, inflation adjusted terms (27.7%, 1994-2000). Those measures that have remained largely unchanged or that have deteriorated are lead times (0.2% improvement, 1998-2000), research and development (R&D) expenditure (3.5% improvement, 1998-2000) and manufacturing throughput times (1.8% deterioration, 1998-2000).

2. Yes, at first glance the industry does appear to be improving its competitiveness at a fast enough pace to "catch up" to continuously improving international competitors. This progress is, moreover, evident across the range of firms included in the survey population. If one compares the improvements recorded at the South African based operations over the last three to four years against the gaps that still exists between average South African and international performance levels, it is clear, however, that the South African firms are still three to four years away from matching the international firms' present performance levels (assuming that the rate of change amongst the South African firms remains constant).

3. Yes, South African automotive component manufacturers do appear to have the propensity to achieve world class manufacturing standards; although the attainment thereof is not pervasive and the eventuality not guaranteed. This becomes strikingly apparent when comparing the performance standards of the upper quartile South African based firms against that of the upper quartile for the benchmarked international firms. The differences between the South African and international upper quartile figures for the three key measures of inventory control, customer return rates and absenteeism verifies this, with the gaps sitting at 6.1%, 62.2% and 33.9% respectively.

Based on the extensive firm-level data collected, some key reasons can be identified as blockages to the industry's future competitiveness progress. These pertain to extremely weak second and third tier domestic suppliers, weak capacity to change initiatives at both the management and labour level and low levels of capital investment. Whilst the resolutions to these key policy concerns lie outside the scope of this particular research report, it is clear that additional research is needed so as to better understand how these key impediments to the competitiveness of the South African automotive components industry can be overcome.

Importantly, despite these shortcomings, the general prognosis for the industry appears to be extremely positive. As revealed in Section 1 of the report, a large number of the surveyed firms are now successful exporters; whilst the general economic trajectory of the firms is also very positive, as highlighted in Section 2. Not only have employment levels at the surveyed firms increased by

10.9% from 1999 to 2000, turnover levels in inflation adjusted terms have increased by 17.5%. This marks the most positive annual change recorded at the surveyed firms over the last seven years (i.e. since 1994). Significantly, moreover, profit margins before tax are once again showing a positive trajectory, after a number of years of declining levels.

Despite the very positive economic prognosis for the surveyed firms, the findings are skewed by the significant performance divergence that is taking place in the industry. The upper quartile of firms are presently improving their output levels by substantial levels, whilst the lower quartile of firms are struggling to maintain their existing output levels.

In summary, the findings presented in this report are positive on two fronts. At the operational competitiveness level significant recent progress has been recorded amongst surveyed South African firms, whilst at the economic level, the firms are looking increasingly healthy, after a number of years of decidedly lethargic performance. Despite the competitiveness progress made, the 27 South African based automotive component manufacturers are, on average, still performing at levels well behind the average for the group of 21 international firms included in the study. The recent economic success of the industry cannot therefore be directly linked to its operational competitiveness trajectory. Additional factors include MIDP linked export incentives, the devaluation of the Rand against major currencies and the recent upturn in the South African automobile market.

The DTI's supply side support for the automotive components industry consequently needs to be consolidated to ensure that further competitiveness progress is made and that performance standards match that of the international competition. Whilst this will not guarantee the intractability of the industry's positive growth momentum (given political economy issues associated with the industry's immersion into global value chains) it is a necessary condition for the industry's future economic success.

.

REFERENCES

Andersen Consulting (1992), The Lean Enterprise Benchmarking Project, Andersen Consulting.

Automotive Industry Authority (1994), Report on the State of the Automotive Industry 1993, Melbourne, Australia.

Barnes J (2000a), 'Changing lanes: The political economy of the South African automotive value chain', Development Southern Africa, Vol. 17, No. 3, September 2000.

Barnes J (2000b), 'Global trends in the automotive industry: Their likely impact on South African automotive assembly and component manufacturers', Transformation, No. 43.

Barnes J (2000c), 'Domestic market pressures facing the South African automotive components industry', CSDS Research Report No. 33. Durban, Centre for Social and Development Studies, University of Natal.

Barnes J (2000d), 'International customer perceptions of South African automotive component manufacturer performance levels', CSDS Research Report No. 32. Durban, Centre for Social and Development Studies, University of Natal.

Barnes J (2000e), 'The competitiveness of the South African automotive components industry: Findings from the 1999 follow-up study', CSDS Research Report No. 27. Durban, Centre for Social and Development Studies, University of Natal.

Barnes J (1999), 'What chances international competitiveness in the South African automotive components industry? Evidence from an international benchmark undertaking', CSDS Research Report No. 20. Durban, Centre for Social and Development Studies, University of Natal.

Barnes J (1998), 'Competing in the Global Economy: The Competitiveness of the South African Automotive Components Industry'. CSDS Research Report No. 13. Durban, Centre for Social and Development Studies, University of Natal.

Barnes J (1997), 'Facing up to the global challenge: The state of KwaZulu-Natal's automotive components industry', CSDS Research Report No. 11, Durban, Centre for Social and Development Studies, University of Natal.

Barnes J and Kaplinsky R (2000a), 'Globalisation and the death of the local firm? The automobile components sector in South Africa', Regional Studies, Vol. 34, No. 9.

Barnes J and Kaplinsky R (2000b), 'Globalisation and Trade Policy Reform: Whither the Automobile Components Sector in South Africa?' Competition and Change, Vol. 4.

Barnes J, Bessant J, Dunne N and Morris M (2001), 'Middle management and international competitiveness in South Africa's manufacturing sector', Technovation**,** No. 21.

Bessant J (1991), Managing Advanced Manufacturing Technology: The Challenge of the Fifth Wave, Manchester, Blackwell.

Bessant J and Kaplinsky R (1995), 'Industrial restructuring: Facilitating organizational change at the firm level', World Development, Vol. 23, No. 1.

Brown S (1996), Strategic Manufacturing For Competitive Advantage, London, Prentice Hall.

Cusumano M (1988), 'Manufacturing innovations: Lessons from the Japanese auto industry', Sloan Management Review, Vol. 30, No. 1, Fall 1988.

DTI (1997), Monitoring and Implementation of the Motor Industry Development Programme, DTI, RSA.

DTI (1998), Current Developments in the Automotive Industry, DTI, RSA, December 1998.

DTI (1999), Current Developments in the Automotive Industry, DTI, RSA, September 1999.

DTI (2000), Current Developments in the Automotive Industry, DTI, RSA, September 2000.

Hines P (1994), Creating World Class Suppliers: Unlocking Mutual Competitive Advantage, London: Pitman Publishing.

Humphrey J, Mukherjee A, Zilbovicius M and Arbix G (1998), 'Globalisation, Foreign Direct Investment and the Restructuring of Supplier Networks: The Motor Industry in Brazil and India', in Kagami, M, Humphrey, J and Piore, M (eds.). Learning, Liberalisation and Economic Adjustment. Institute of Developing Economies, Japan.

Humphrey J, Kaplinsky R and Saraph P (1998), Corporate Restructuring: Crompton Greaves and the Challenge of Globalisation, New Delhi: Sage Publications Ltd.

Humphrey J (2000), 'Assembler-supplier relations in the auto industry: Globalisation and national development', *final version for Competition and Change, Vol. 4, No. 3.*

Jayaram J, Vickery, S.K and Droge, C (1999), 'An empirical study of time-based competition in the North American automotive supplier industry', International Journal of Operations and Production Management, Vol. 19, No. 10.

Kaplinsky R (1991), 'From mass production to flexible specialisation: A case study from a semi-industrialised economy', Discussion Paper No. 295, Institute of Development Studies, Sussex.

Kaplinsky R (1994), Easternisation: The Spread of Japanese Management Techniques to Developing Countries, London: Frank Cass.

Kaplinsky R (1995), 'Technique and system: The spread of Japanese management techniques to developing countries', World Development, Vol. 23, No. 1. 57-71.

Management Today (1994), Britain's Best Factories, Haymarket Business Publications.

Maskell B (1991) Performance Measurement for World Class Manufacturing, Productivity Press, Cambridge, Massachusetts.

Porter M (1990), The Competitive Advantage Of Nations, MacMillan Press, London.

Schonberger R (1986), World Class Manufacturing, Free Press, New York.

Sturgeon T and Florida R (1999), 'The world that changed the machine: Globalization and jobs in the automotive industry', Final Report to the Alfred P. Sloan Foundation, Draft: May 5, 1999.

Tidd J, Bessant J and Pavitt K (1997), Managing Innovation: Integrating Technological, Market and Organizational Change, John Wiley and Sons Ltd., Chichester.

Womack J, Jones D and Roos D (1990), The Machine That Changed the World, Rawson Associates, New York.

Womack J and Jones D (1996), Lean Thinking - Banish Waste and Create Wealth in your Corporation, New York: Simon & Schuster.