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Plastics Chamber Research Project – Final Report

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List of Acronyms and Abbreviations

ATR	Annual Training Report
CHIETA	Chemical Industries Education and Training Authority SETA
DOHET	Department of Higher Education and Training
EDM	Electronic discharge machining
EU	European Union
FP & M	Fibre Processing and Manufacturing (Sector Education and Training Authority)
GRP	Glass-reinforced plastics or polyester, also fibreglass
HDPE	High Density Polyethylene
JSE	Johannesburg Stock Exchange
merSETA	Manufacturing, Engineering and Related Services Sector Education and Training Authority
NPO	Not for Profit
OEM	Original Equipment Manufacturers
OFO	Organising Framework for Occupations
PISA	Plastics Institute of Southern Africa
Plastics SA	Industry Association for the plastics industry
SDL	Skills Development Levy
SETA	Sectoral Education and Training Authority
SHER	Safety, Health, Environment Risk
SIC	Standard Industrial Classification
SMME	Small, Medium and Micro Enterprise
SSP	Sector Skills Plan
WSP	Workplace Skills Plan

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Chapter 1: Introduction

This research project was commissioned by the Plastics Chamber of the Manufacturing, Engineering and Related Services Sector Education and Training Authority (merSETA). It is the continuation of a research process which began in 2012. The overall aim of the research has been to gather data about the plastics industry and related industries in order to enable the Plastics Chamber to develop appropriate skills development-related strategies for this sub-sector.

1.1 Background to the project

The merSETA allocated funding to the Plastics Chamber for the research project. The Plastics Chamber contracted Plastics SA, the industry association for the plastics industry and related industries, who in turn contracted two researchers to conduct the research project. The members of the team were:

- Anton Hanekom, Executive Officer, Plastics SA
- Kirtida Bhana, Training Executive, Plastics SA
- Christoph Vorwerk, Skills development specialist
- Fiona Farquharson, Research Fellow at the University of KwaZulu-Natal and an independent consultant with extensive experience in education, training and skills development research

1.2 Purpose of the research

A gap in knowledge exists regarding the size and shape of the plastics industry. For example, estimates of the number of people employed in the industry vary from 45 000 - 63 000 and little is known about industry demographics such as race, age, gender and disability, or about the skills profile and needs of employees. Furthermore, several jobs in the Plastics industry are not adequately “mapped” to the Department of Higher Education and

Training's Organising Framework for Occupations (OFO) and more needs to be understood about these jobs. Lastly, a forecasting dimension is needed in the industry: what does the future hold for the plastics industry in South Africa, in the light of challenges such as Chinese imports; global downsizing; the green economy; waste issues and the perceived lack of entrepreneurs and innovation?

Various iterations of the Sector Skills Plan (SSP) have grappled with these issues, but a solution has not as yet been found. In the light of the research problem stated above, empirical research is required to address the gap in knowledge. The purpose of the current project was therefore:

> To develop an understanding of the size and shape of the plastics industry in South Africa; the factors impacting on its future and the key drivers for change, with particular reference to skills priorities and possible growth scenarios.

It is hoped that the findings and recommendations of the project will also help to inform future research priorities for the Plastics Chamber.

Chapter 2: Research Design and Methodology

2.1 Introduction

This chapter provides an overview of the research design and methodology that were selected for the Plastics Chamber project.

2.2 Research design

The approach adopted by the research team for selecting an appropriate research design is based on the principle of 'questions first, methods later', advocated by White (2009:90). The starting point was therefore to articulate the research problem and the questions that needed to be answered by the project, before deciding on what methods should be used for data collection and analysis. The project's overall purpose (described in Chapter 1) makes it clear that the research problem concerns the gap in knowledge that currently exists regarding the size and shape of the plastics industry in South Africa; the factors impacting on its future and the key drivers for change, with particular reference to skills priorities and possible growth scenarios.

Given the nature of the research problem, a mixed methods research design was selected, as it allows for a flexible combination of quantitative and qualitative approaches. 'Mixed methods' may be defined as a study where: 'the investigator collects and analyses the data, integrates the findings, and draws inferences using both quantitative and qualitative approaches or methods in a single study' (Teddlie and Tashakkori, 2006:15).

A multi-pronged strategy for collecting and analyzing data was identified, in order to collect quantitative data for the demographical component of the research as well as rich qualitative data on the trends, scenarios, skills needs and value chains in the plastics industry in South Africa.

The decision as to what types of data would be required for the research study was directly informed by the project's purpose. The first step was to identify what information would be required in order to be able to analyse (i) 'size and shape'; (ii) 'factors impacting on its future and the key drivers for change' and (iii) 'skills priorities and possible growth scenarios'. The research team worked closely with the project managers for the research project, the Plastics SA Executive Officer and the Training Executive, on this task. Tables 1 – 2 reflect the final result.

Table 1: Identifying the data required to determine the 'size and shape' of the industry

Data	Description
Organisational profile	• Provincial distribution • Area type (rural; peri-urban; urban) • Core business (supplier; converter/ fabricator; other) • Company size (numbers of employees employed) • Types of conversion/ fabrication processes undertaken by the company (if appropriate) • Scope of coverage (SIC codes) • Ownership (privately-owned; state-owned; Not for Profit; Other) • Numbers of employees • Tons of material converted or supplied per month • Number of years in business • Levy paying arrangements • Primary market served • Business functions present in the company • Departments present in the company • Value chains undertaken by the company
Employee profile	• Racial composition • Gender composition • Age composition • Highest educational qualification • Employment status • Employee numbers per business function • Disabled employees per business function • Number of employees in each job per Value Chain • Jobs currently not listed in the Value Chain

Table 2: Factors impacting on the future of the plastics industry, key drivers for change and skills priorities

Factors impacting on the future and key drivers for change	• Current strengths • Current weaknesses • Future opportunities • Possible future threats • Key drivers for change in the future
Possible growth scenarios, skills priorities and training	• Possible growth scenarios • Impact of all the above on skills needs and training and related strategies in the plastics industry • Attracting and retaining talent • Optimising skills development pipelines and career development processes

The proposed starting point for the project was to undertake a literature review and an analysis of existing datasets; which would be followed by the collection of new, empirical data using an online survey and three regional workshops. The benefit of collecting information from a variety of sources is that it facilitates triangulation. As a general principle, 'triangulation' (a research technique which advocates the sourcing and cross-checking of information from multiple sources) is strongly recommended, as it enhances validity. As mentioned earlier, a mixed methods research design was selected for this study. In quantitative research, validity 'refers to whether one can draw meaningful and useful inferences from scores on particular instruments' (in this case, the survey) and in qualitative research (in this case, the regional workshops), validity strategies 'are procedures […] that qualitative researchers use to demonstrate the accuracy of their findings and convince readers of this accuracy' (Creswell, 2009). Chapter 6 triangulates the findings from all three data sources.

A summary of the data sources, together with the methods for data collection and analysis follows in Table 3.

Table 3: Summary of proposed data sources, data collection and data analysis methods

Research objective	Data sources	Methods for data collection & analysis
To identify what is currently known about the plastics industry in South Africa.	Existing literature	Desktop review of available documentation on the plastics industry in S.A.
	Existing datasets	Dataset analysis: including Workplace Skills Plan data
To collect new empirical data on the size and shape of the plastics industry in South Africa.	Companies within Plastics SA	Online survey: to be administered using Survey Shaker
To collect rich qualitative data on the industry. Where applicable, to collect information as well	Nominated and/ or self-selected participants from companies in KZN, Gauteng and Cape Province	Regional workshops: a participative method for collecting rich, qualitative data directly from participants in a face-to-face setting

Once a detailed project plan was developed it became clear the budget was too limited to include the full proposed programme of research activities and after discussions with merSETA it was then decided to remove the detailed literature review and analysis of datasets from the research programme. In any event, there were sensitivities about allowing the research team full access to the databases (for reasons of confidentiality); and serious concerns about the reliability of the data contained in the datasets. The research team made the decision, however, as a "value add" and to assist with triangulating data, to undertake a preliminary analysis of two sets of data that were provided at the start of the project by merSETA, namely a Workplace Skills Plan (WSP) report for the Plastics Chamber (merSETA, 2012) and a Contact List for the rubber industry (PSA, 2012a) supplied by the Plastics Chamber member, David Duncan, who represents the rubber industry on the Chamber. The findings are reported on in Chapter 3.

2.3 The survey

The intention of the survey was two-fold: firstly, to serve as a tool for collecting data on organizational and employee profiles directly from companies in the Chamber and secondly, at a process level, to provide everyone with an opportunity to participate in the research study.

2.3.1 Sample

An important initial step was to identify the size of the target sample. A sample frame is 'that list […] of units composing a population from which a sample is selected'. If the final sample is to be said to be "representative" of the overall population, the sample frame (i.e. the starting point) should include 'all (or nearly all) members of the population' (Babbie and Mouton, 2001:647). No comprehensive list of every single company in the Plastics industry exists, however. The WSP dataset of 2007 includes the submissions of 1709 companies in the plastics and rubber industry. The figure remained constant over the following year: the WSP dataset of 2008 includes the submissions of 1707 companies. Anecdotal evidence from conversations with players in the industry suggested that the figure might be closer to 1000.

As a general rule, a 10% response rate is the minimum required from a survey in order for the data to be worthwhile. The initial target was 20%. Based on the preliminary estimates:

- a 10% response rate would require 100 completed questionnaires.
- a 20% response rate (the ideal) would require 200.

Targets were also set for the number of completed questionnaires to be achieved per province, in order to secure a "provincial" picture of the size and shape of the industry. The table below shows the target figures per province, assuming a 10 % and a 20 % response.

Table 4: Target number of responses per province

Province	Estimated percentage of total companies in Plastics Chamber by province	Estimated number of total companies in Plastics Chamber by province	Assuming a target of 10% (numbers of responses)	Assuming a target of 20% (numbers of responses)
Gauteng	48%	480	48	96
KZN	26%	260	26	52
W. Cape	24%	240	24	48
Remaining 6 provinces	2%	20	2	4
TOTALS	**100%**	**1000**	**100**	**200**

2.3.2 Questionnaire design

At the outset, the research team realized that an innovative solution would be needed to deal with what could potentially be a very long and detailed questionnaire, requiring a high level of sophistication in terms of design and administration. It would have to be capable of collecting not only demographical information, but also information specific to the value chains applicable per company. These 'value chain maps' had been identified in 2011 and were to be a core component of the questionnaire (Vorwerk, 2011):

- Map 01 Receiving, dispatch, logistics
- Map 02 Mould and tooling manufacture, repair and maintenance
- Map 03 Printing, decorating, labelling
- Map 04 Quality Management
- Map 05 Polymer compounding
- Map 06 Volume conversion (machinery based)
- Map 07 Industrial rubber conversion
- Map 08 Polymer composites (GRP, FRP, advanced composites)
- Map 09 Thermoplastic Fabrication
- Map 10 Installation, repair and maintenance of fabricated thermoplastic and composite plant and equipment
- Map 11 Recycling

With eleven value chains in the list, the number of permutations was likely to be significant. It was clear to the research team that the risk of respondent fatigue was very real.

Given the considerable advances in online technology that have taken place over the past few years, and the cumbersome, environmentally unfriendly and time-intensive nature of administering hard copy postal surveys, the decision was made to purchase a one-year licence for an online survey software solution, called *Sphinx Survey Shaker*. This Paris-based organization is recognized in the research community as one of the world leaders in online surveys. The table below summarises the features that attracted the research team to this particular solution.

Table 5: Features offered by Survey Shaker required for the design, distribution, data collection and data analysis of the Plastics Chamber survey

Stages	Features
Creation of online survey	• Easy-to-use and intuitive tool for survey creation with 12 types of questions • Unlimited capacity for questions and answers • Automatic management of "Other, please specify" • Possibility of making the display of certain questions conditional on an earlier response • Possibility of making certain questions mandatory • Over 15 graphic models • Ability to customize graphic charts or forms
Distribution of survey	• Direct access through URL and/ or • Distribution via e-mail
Data collection	• Real-time access of respondents to an online spreadsheet • Ability of survey administrator to monitor response rate • Data cleaning: possibility of correcting/ modifying/ deleting answers if needed • Visualization of answers in form mode • Summary of answers • Ability to filter results
Data analysis	• Capacity to generate a one-way analysis of all questions • Capacity to generate one-way tables • Capacity to generate cross-tabulation tables • Listing of verbatim results as required • Ability to conduct further statistical tests, as required • Calculation of mean, percentage, frequency, sum as required • Possibility of filtering results • Downloadable in Excel format

Summarised from http://www.surveyshaker.com

The research team realised that there was likely to be a considerable learning curve in using the new technology for designing an online survey. The starting point was therefore to draft the questionnaire in hard copy format. The research team worked closely with the Executive Director and Training Executive at Plastics SA, Anton Hanekom and Kirtida Bhana, during this stage. The design process was iterative, with improvements and enhancements being incorporated into the instrument after each draft. The questionnaire was structured so that the level of analysis moved from organizational level, to business function level, to value chain level. The sixth version of the questionnaire was used as the starting point for the online instrument. At that point, Fiona Farquharson underwent training in the Survey Shaker methodology and developed the online survey instrument, working closely with Chris Vorwerk.

The overall finding was that the Survey Shaker software package enabled the research team to develop a simple yet powerful survey. At every step of the development process, the software presented relevant options which could be used to address specific objectives. Some examples follow:

- The flexibility and sophistication of the Survey Shaker software package facilitated the filtering out of those questions and value chains not applicable to a particular respondent.
- The 'Jumps' design facility automatically and seamlessly allowed a respondent to skip a question that was irrelevant to their particular context.
- Some questions could be made mandatory, i.e. the respondent could not move on until it was answered. This was particularly important for questions that were core to the aims of the project.

At a practical level, the above meant that instead of being confronted with a 35 page questionnaire, respondents were presented with a much shorter, more user-friendly version that was directly relevant to their particular company.

A covering note at the start of the survey addressed the issue of confidentiality, stating that the only people who would have access to the database of information collected during the survey would be the researchers. Further, the data would only be used for the purposes of

the research and any published data would be aggregated and summarized with no names of individuals or companies being mentioned at any stage.

2.3.3 Piloting the questionnaire

The online survey was piloted from 17-18 August 2012 and the questionnaire was refined further on the basis of the feedback that was received, both in terms of content and user-friendliness. Participants in the pilot were also asked to monitor how long it took to fill in the questionnaire. The average was 15-22 minutes, provided the respondent had the relevant demographical information to hand (number of employees etc.).

2.3.4 Distributing the questionnaire

A URL link to the online survey was emailed by the Plastics SA office to all organizations on their mailing databases. It was also posted on the Plastics SA website. Several communiqués were drafted and Plastics SA mounted an extensive publicity campaign to heighten member awareness, both of the project and the survey. Plastics SA was asked to send out the workshop report on Value Chains as 'pre-reading' and to post this on the website in a prominent position.

The Survey went live on 27 August 2012. The closing date was extended twice and the survey was finally closed on 31 October 2012. The numbers of responses were reported weekly to Plastics SA. Initially, there was a strong response, but this petered out as the weeks passed. Despite the best efforts of the Plastics SA Head Office and the regional managers, and the offering of an IPad as an incentive (to be awarded to one survey participant through a lucky draw), a total of only 64 responses were received, of which 2 were repeats from the same company. The final sample therefore consisted of 62 companies.

2.3.5 Analysing the questionnaire

A data cleaning exercise was undertaken to remove the two repetitions. Thereafter, using Survey Shaker, one-way tables were generated for each question, as well as cross-tabulation

tables in cases where particular correlations were of interest. The findings are presented in Chapter 4.

The value of the survey component of the research is that a reasonably representative cross-section of companies in terms of size and region was achieved. The data provides a fascinating “snapshot” of 62 companies and some intriguing data on trends and patterns, which need to be tested through further empirical research.

2.4 The Regional Workshops

Whereas the focus of the survey had been the collection of demographical data (organizational profiles and employee profiles) from participating companies, the core objective of the regional workshops was to collect rich, qualitative data.

The decision was made to hold 3 regional workshops in Johannesburg, Cape Town and Durban. Due to budgetary constraints, a workshop was not held in Port Elizabeth. A briefing note and some pre-reading, consisting of the Value Chain report (Vorwerk, 2011) and the workshop programme was sent out with the invitation in advance of each workshop. The briefing note included the following instruction: ‘Talk to at least 2 other people in your company and bring this information with you…’.

From the start, regional managers were seen as being critical to the success of the workshops. A personal invitation and briefing note was sent by the Plastics SA Head Office to each regional manager inviting them and their staff to participate and share their expert knowledge at the workshop. The note made clear the potential benefit of the research project, i.e. that ultimately it would give them a far more accurate picture of the numbers of people employed in their region and what training interventions are required. This would mean that WSPs are updated with accurate, research-based information. Ultimately, this will result in a more tailored grant system that encourages training based on real industry needs in the plastics industry, rather than the current “one size fits all” approach.

The briefing note also outlined the role of the regional managers:

- they will be hosting a workshop in their region and are requested to promote the workshop with their contacts in the industry and try to get as many people there as possible
- there will be an online survey: could they promote this whenever they speak/ interact with their contacts and if necessary assist people to fill it in

Finally, the dates for the regional workshops were provided, together with contact details for any queries.

2.4.1 Piloting the research instrument

In discussion with Plastics SA, an initial set of questions was designed for the first workshop to be held in Cape Town, which was to be used as a pilot. The plan was that the first session of the workshop would be used as an opportunity to get attendees to fill in the survey questionnaire. To this end, the regional managers were asked to ensure that the venues were equipped with Wi-Fi and 2-3 computers.

Table 6: Workshop programme - pilot

8:30	Introduction and background
8:45	Capturing information using the on-line survey form
10:15	Break
10:30	• Factors impacting on the future of the plastics industry, • Current weaknesses and future threats • Key driver for the future • Current strengths and future opportunities • Possible scenarios for the industry • What is the impact of skills needs?
12:30	• Identify factors that impact on skills demand in each sub-sector, issues related to attraction and retention of people in each sub-sector, possible learning and career paths – small group work

13:15	Break
14:00	Value chains • Where do 80% of your quality issues arise? • Describe the quality issues being experienced • Are these issues related to lack of training? • If yes, what should the training be focused on? • If no, what are the quality issues caused by?
15:30	• What are the emergent competency needs given the current state of the industry? • What would be the emergent competency needs for the various future scenarios identified in the workshop?
16:00	• Workshop evaluation • Way forward • Closure

The pilot workshop provided many useful insights, which allowed the research team to refine the design for the subsequent events in Durban and Johannesburg:

- The plan was to allocate time at the beginning of the 3 regional workshops to allow delegates to complete the survey instrument online, if they hadn't already done so. The intention was that this would add to the number of completed questionnaires. In practice, this was not possible, as there were no additional laptops that could be used in the venues and participants did not have the relevant data with them.
- With the exception of one delegate, no-one had completed the survey instrument in advance of the workshop. The decision was therefore made to skip the first session. The survey link was emailed directly to all participants from the workshop venue and they undertook to complete it, with the assistance of other people in their companies where required.
- A sense of context and continuity was provided when Chris Vorwerk made the point that the event was part of a process and that it would build on the insights and data generated during a series of workshops that he had conducted around the country in 2010.
- There was a turning point early in the workshop when the 'Value Chain slides' and the 'Guide to Jobs and Occupations' were presented by Chris (Vorwerk, 2011). The link

between the value chains and the survey instrument was explained. Immediately there was a palpable sense of engagement and anticipation and delegates asked for copies of the document.

- The structure and process of the focus group produced rich data and new insights and a high level of participation was noted. The participative design worked well and the workshop was characterized by rich dialogue and discussion. Each question was introduced by the facilitator, then people worked in small groups of 4-5 and reported back in plenary. The small group and plenary sessions were recorded using digital recorders.
- The initial plan was to use flipcharts to capture the discussions, however none were available. Necessity is the mother of invention: the research team resorted to an innovative use of technology, where information was typed by Fiona Farquharson as participants were speaking and projected "live" via data projector onto a screen. This was very powerful, as information was verified "in progress". From a process point of view, seeing the information projected "live" appeared to stimulate further discussion. People felt liberated from the need to keep detailed notes and also felt that their input was being "heard" and reflected. The research team made the decision to use this methodology for the remaining two workshops.

2.4.2 Refining the instrument

The design of the programme and the workshop process were tweaked as a result of the pilot: the research team realized that asking participants to fill in the survey during the workshop was not going to work; and that getting participants to reflect on 'Weaknesses and Threats' as a first step made it difficult for them to shift into future, solutions-orientated thinking. The order of questions was therefore swapped around and the programme was simplified. The practice of capturing discussions "live" continued for the remainder of the workshops.

Table 7: Revised programme for the regional workshops

Introduction	Background to the research project Purpose of the workshop Overview of the survey instrument and access details Overview the occupations and jobs in each value chain
'Factors impacting on its future'	What are the factors that currently have an impact on the industry? • Current weaknesses • Possible threats, including a perceived lack of innovation in the sector
'Key drivers for change in the future'	What are the key drivers for change in the industry? • Current strengths in the industry • Future opportunities for the industry
'Possible scenarios'	Given the factors identified above, what are the possible scenarios?
'Impact on skills needs'	What is the impact of each scenario on skills needs?

2.4.3 Attendance at the regional workshops

Initially it was hoped that there would be approximately 25 people in each workshop, giving a total of 75 from the 3 regions. The target participants were HR managers; Skills Development Facilitators (SDFs); owners; technical managers and production managers. Companies were advised that there were no restrictions and that if they would like to, to send 2-3 representatives to a workshop. Unfortunately few senior managers are able to allocate a day to attend such workshops. As a result they either didn't attend or sent junior members of staff to attend on their behalf. This was conveyed during the workshops and also by the staff of Plastics SA who assisted in providing venues and canvasing support from the companies in each region.

Recommendation 1: *To attract senior managers, future regional workshops should not be longer than four hours.*

The final number of people who attended the workshops was 36, a much lower figure than was originally expected. This is possibly due to timing: the workshops were scheduled at the

busiest time of the year in the plastics industry. The recommendation was made that future workshops should be a maximum of 3-4 hours in length. The final distribution of attendees across the 3 workshops was as follows:

Table 8: Breakdown of workshop participants by work role and gender

Centres	Female	Male
Cape Town		
Technical Consultant		1
HR	3	
Production	1	5
Sales	1	
Shop steward		1
Training	2	1
Durban		
Chemist	1	
Production		6
Training		1
Johannesburg		
Chamber manager		1
Technical Consultant		1
HR	3	
Marketing		1
Production		1
Professor		1
Technical		1
Training	3	
Total	**15**	**21**

2.4.4 Data analysis

The data captured "live" during the workshops was analysed the day after the event by the research team, which was a good decision, as it enabled the research team to examine the data while it was still very fresh in their minds. No aide memoires were needed, although the digital recordings were available as a backup if needed. It also enabled the researchers to go into the second and third workshops with emerging qualitative data, which could be further tested and refined.

The document sharing facility, 'Google Docs' on Google Drive was used by the research team in order to work simultaneously on the same document and to collaboratively undertake a thematic analysis. The process also facilitated a constant cross-checking of emerging themes.

The findings from the three regional workshops are reported in Chapter 5.

2.4.5 Nature of the discussions

From the first to the last workshop it was evident that there had also been a considerable sea change in the mood and approach of the participants, compared with the Value Chain workshops held during 2011. During those workshops the discussions and contributions invariably emphasised the problems and much of the discussion was in the form of complaints, finger pointing "Organisation x should…" and a degree of passivity when it came to proposing solutions.

These workshops proved to be different. Companies represented, by and large:

- Had a positive focus
- Were aware of the problems but regarded them as challenges
- Were engaged in various improvement or development programmes

Some of them have been in this positive mode for several years while others were in the early phases of implementing such an approach.

The first portion of the workshop was structured using the classic *strengths, weaknesses, opportunities, threats* (SWOT analysis) framework. We clustered strengths and opportunities and weaknesses and threats. We did this because we had limited time and we suspected the difference between, e.g. strengths and opportunities would be confused in any case. What we didn't anticipate was how often participants would describe a weakness or a threat and then immediately switch to illustrating how the issue was being addressed or resolved.

Often too, after groups had reported back to the plenary, other participants from the other groups presented their approaches to resolving the challenges described. In general, the discussions in the plenary were more in the nature of conversations between participants and the overall tenor of these conversations was open, sharing and often humorous. As a consequence our reporting also had to change and reflect this shift and we started capturing "success stories" as well (see below).

We concluded that most participants had a real interest in addressing industry problems and hence were motivated to attend. But this does not mean that the participants represented a cross-section of the industry as a whole. We cannot, therefore, assume that these views represent the plastics industry as a whole.

There were only 8 industry representatives in KwaZulu-Natal, so we conducted the workshop in plenary format and didn't use the small group approach. As a result the information collected there was far richer and elicited greater discussion than that collected during the plenary sessions elsewhere.

Chapter 3: Findings from a preliminary analysis of available datasets

3.1 Introduction

The research proposal that was originally presented to the Plastics Chamber included the analysis of existing datasets as part of the research design. Due to budgetary constraints, this component had to be removed.

Because of the limited number of companies who participated the research team made the decision to undertake a preliminary analysis of the Workplace Skills Plan (WSP) dataset as of August 2012 (merSETA), a Contact List of Companies in the Rubber Industry (Duncan, 2012) supplied by the Plastics Chamber member, David Duncan who represents the rubber industry on the Chamber, and a dataset supplied by Plastics SA (Plastics SA, 2012).

3.2 Findings from the WSP dataset for 2012

On receiving the WSP dataset for 2012 (merSETA, 2012), a data sorting and cleaning exercise was conducted by the research team. The dataset consisted of 488 companies and contained information relating to these companies, including geographic location and employee data including occupational information, race, gender and age.

Based on previous experience with similar data sets the research team did not place too much reliance on the occupational information. Too many companies supply inaccurate information related to occupations and this data set also included many such anomalies. Other employee data provided, e.g. age, race and gender seemed to provide useful data.

However, a chance cross-check at a very late stage in the report-writing process revealed a number of companies in the list which seemed to have no interest in plastics or related manufacturing. In two samples of 50 companies from the 488 companies, 24 and 23

companies respectively were identified that would appear to have nothing to do with plastics manufacturing, even taking into account that sometimes companies may have a small plastics manufacturing department within their other operations. The identification of non-plastics companies was based on:

- the company name, ie
    - indicating well-known steel and fibre cement companies, or
    - indicating business activity such as tyre fitment, hydraulics or boiler making
- a brief web search to confirm the business activities of the other companies in the list that were not familiar to the researchers.

This means that, if one extrapolates the samples, approximately half of the 488 companies in the list were non-plastics. This left only approximately 244 companies that could be considered plastics, rubber or composites. Secondly, the reverse could also be true: Plastics companies may also be captured under other chambers in WSP data sets resulting in their exclusion from this sample. The researchers, therefore, had to reluctantly discard the dataset in its entirety. The data contamination appears to have arisen because companies have made incorrect choices in terms of the SIC codes in their WSP submissions. This is a real cause for concern for merSETA research and the matter should be investigated further.

Recommendation 2: *merSETA should investigate the causes and find ways of preventing the inclusion of non-plastics companies in plastics-related data*

3.3 Findings from the Contact List of Companies in the Rubber Industry

Mr David Duncan provided the research team with the current contact list for the rubber industry (as of August 2012) (Duncan, 2012). The only information that could be obtained from the list, however, was the total number of companies on the mailing list, together with the provincial distribution of companies.

3.4.1 Number of companies

The initial dataset of 152 records was cleaned to remove any repetitions, leaving 103 companies.

3.4.2 Provincial distribution of companies in the rubber industry

Using the postal codes provided in the contact list, the research team worked out the provincial distribution of the103 companies. The findings are as follows:

Table 9: Provincial distribution of companies in the rubber industry

Province	Number of companies
Eastern Cape	14
Gauteng	43
Western Cape	8
Free State	1
KwaZulu-Natal	37
Total	**103**

Source: Duncan, 2012

The majority of companies in the rubber industry are found in Gauteng, followed by KwaZulu-Natal, Eastern Cape, Western Cape and the Free State. No companies were listed for the remaining provinces.

3.4 Findings from the Plastics SA- Dataset

Plastics SA supplied the researchers with a dataset (Plastics SA, 2012a) summarising the manufacturing process, size and regional location of companies on their database. PSA acknowledged that they had experience difficulty in extracting the data of out of their propriety web-based database. The database had not really been intended for extracting this type of information. For each of ten thermoplastic conversion/ fabrication processes the dataset provided information on company size (based on the number of employees) and the geographic location. The dataset created difficulties in that it was not clear if companies were involved in more than one conversion or fabrication process and how these were accounted for.

Unfortunately the information proved to be too limited to triangulate the survey data. The dataset does, however enable us to make some very limited and broad comparisons in relation to the survey data.

3.5 Concluding comments

Even though budget constraints had curtailed this part of the project, it would have been useful to triangulate some of the data in the survey to obtain an indication of the representivity of the companies that participated in the survey and to validate some of the data that was submitted. Unfortunately this proved to be impossible.

However, here and there some reference will be made to the datasets to support some of the survey data.

Chapter 4: Findings from the Survey

The chapter that follows presents the findings from the online survey, which was conducted using Survey Shaker. The methodology that was used is described in Chapter 2. Section 1 covers the organizational profile of the participating companies and Section 2 discusses their employee profile. As noted in the methodology chapter, the final sample consisted of 62 companies, therefore it is not a statistically representative sample and the findings cannot be generalized to the total population. It does provide us with an intriguing "snapshot" of these companies, however, together with the diversity of size and coverage that they represent. Some of the issues and trends identified through the survey may well be indicative of patterns in the broader population, but this can only be confirmed through further empirical research.

In Chapter 5, the survey data will be triangulated with other sources of data (from the regional workshops, the available literature and an analysis of datasets) to cross check the findings.

4.1 Section 1: Organisational Profile

4.1.1 Provincial distribution

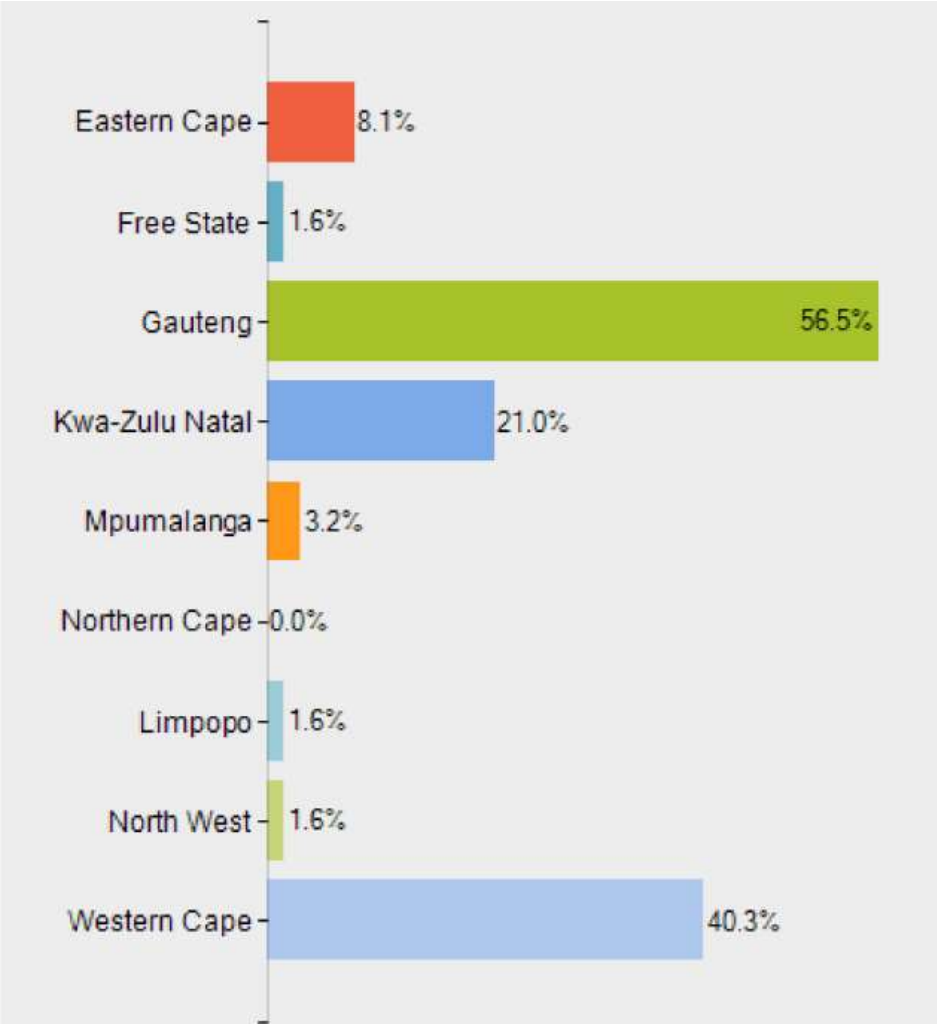

Figure 1: Provincial distribution of participating companies

The findings show that the majority of participating companies are situated in two provinces, namely Gauteng (56.5%) and the Western Cape (40.3%), followed by KwaZulu-Natal (21.0%), Eastern Cape (8.1%), Mpumalanga (3.2%), Limpopo, North West Province and Free State (all at 1.6%). The figure of 0% for the Northern Cape is explained by the fact that no companies in this province took part in the survey. Neither Duncan (2012) nor Plastics SA (2012) list any companies in the Northern Cape so this finding is not entirely unexpected.

The overall combined total percentage of 133.9% indicates that several companies have a geographical presence in more than one province.

The feeling of Plastics Chamber Operational Team members and researcher C Vorwerk is that they spilt between the Western Cape and KwaZulu-Natal is not representative. The general view is that the industry in KwaZulu-Natal is slightly larger than that of the Westerns Cape and that the actual percentage share would be around 25each of the national figure.

4.1.2 Type of Area

Table 10: Type of area in which participating companies are located

Modality	% Observed
Rural	4.8%
Peri-Urban	12.9%
Urban	87.1%

The results show that as would be expected, the majority of participating companies are situated in urban areas (87.1%), followed by 12.9% in peri-urban areas and 4.8% in rural areas. The total combined percentage (104.8%) indicates that some of the participating companies have a presence in more than one type of area.

4.1.3 Core Business

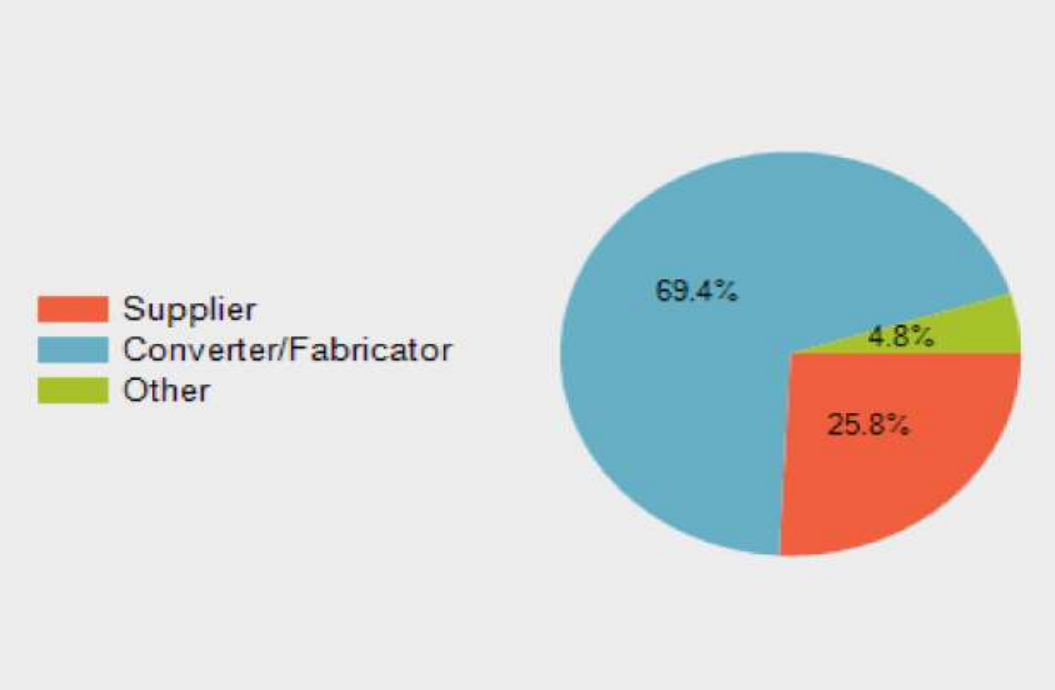

Figure 2: Core business of participating companies

With regard to the core business of the participating companies, the majority identified themselves as converter/ fabricators (69.4%), 25.8% as suppliers, and 4.8% as 'Other', described as 'Consulting' and 'Collection of materials for recycling'.

4.1.4 Products supplied

Table 11: Products supplied by participating companies

Modality	% Rep.
Thermoplastic raw materials	46.2%
Thermosetting resins (including polyurethanes)	15.4%
Semi-finished products (sheets, pipes, profiles)	23.1%
Compounded materials (polymer compounding)	46.2%
Mould and tooling manufacture, repair and maintenance	38.5%
TOTAL	**169.40**

Out of the participating companies that identify their core business as 'Suppliers', 46.2% supply thermoplastic raw materials and compounded materials (polymer compounding). Mould and tooling manufacture, repair and maintenance follow at 38.5%; then semi-finished products (sheets, pipes and profiles) at 23.1% and lastly thermosetting resins (including polyurethanes) at 15.4%.

The overall total of 169.4% indicates that several companies supply a range of products.

4.1.5 Conversion/ fabrication processes

The next section of the questionnaire asked companies identifying themselves as 'Converter/ Fabricators' to indicate which processes they undertook.

Table 12: Conversion/ fabrication processes undertaken by participating companies

Modality	% Rep.
Volume conversion: injection moulding	47.5%
Volume conversion: pipe and profile extrusion	22.5%
Thermo-plastic fabrication	17.5%
Volume conversion: blow moulding	12.5%
Recycling	12.5%
Volume conversion: film extrusion	10.0%
Volume conversion: other	5.0%
Volume conversion: compression moulding	5.0%
Volume conversion: injection stretch	5.0%
Polymer composites: excluding pultrusion and filament winding	5.0%
Volume conversion: roto moulding	2.5%
Volume conversion: sheet extrusion	2.5%
Industrial rubber conversion: moulding	2.5%
Volume conversion: foams and expanded plastics	2.5%
Industrial rubber conversion: extrusion	0.0%
Industrial rubber conversion: other	0.0%
Installation, repair and maintenance of thermoplastic or composite structures, plant or equipment	0.0%

Volume conversion: cable and wire coating and covering	0.0%
Volume conversion: coating	0.0%
Volume conversion: filament winding	0.0%
Volume conversion: pultrusion	0.0%
TOTAL	**152.50**

Out of the participating companies identifying their core business as 'Converter/ Fabricator', the majority are involved in various kinds of Volume Conversion. The figures of 0% for 'Industrial rubber conversion: extrusion' and 'other'; for 'Installation, repair and maintenance'; 'Volume conversion: cable and wire coating and covering; coating; filament winding' and 'pultrusion' are misleading, as two subsequent questions on scope of coverage and value chains demonstrate (see 1.6 and 1.15). Some companies may have ticked only those boxes representing processes that were 'core' to their business, in their view, rather than 'a component of'.

Looking specifically at conversion/ fabrication processes, injection moulding represents the highest percentage (47.5%); followed by pipe and profile extrusion (22.5%); thermo-plastic fabrication (17.5%); recycling and blow moulding (12.5%); film extrusion (10%); polymer composites (excluding pultrusion and filament winding), compression moulding, injection stretch and volume conversion 'other' (all 5%) and lastly roto moulding, sheet extrusion and moulding (all 2.5%). The number of companies involved in Film extrusion (10%) is considered to be low by industry players (Plastics Chamber and researcher, C Vorwerk). This view is confirmed by the data from Plastics SA which indicates that 31.84% of the companies in the dataset are involved in Film extrusion.

The fact that the combined percentage adds up to more than 100% (152.5%) shows that a good number of companies are involved in a range of conversion/ fabrication process.

4.1.6 Scope of coverage

For the scope of coverage section of the questionnaire, a list of conversion/ fabrication processes, together with the relevant SIC codes, was provided. The results follow.

Table 13: Scope of coverage of participating companies

Modality	% Obs.
Manufacture of carpets, rugs and mats (31220)	1.6%
Manufacture of cordage, rope, twine and netting (31230)	0.0%
Manufacture of footwear from material other than leather (31701)	1.6%
Pallets and bulk bins (32294)	4.8%
Manufacture of packing material (32323)	11.3%
Printing (32510)	14.5%
Manufacture of plastic bags (33431)	6.5%
Manufacture of other rubber products (33790)	6.5%
Calendaring (33791)	0.0%
Compounding (33792)	4.8%
Injection moulding (33801)	38.7%
Blow moulding (33802)	12.9%
Extrusion (33803)	27.4%
Plastics processes (33804)	12.9%
Manufacture and/or repairs of illuminated signs and advertising displays (36502)	1.6%
Design, manufacture and display of illuminated signs and advertising displays (36504)	3.2%
Rotational moulding (39001)	4.8%
Dip coating (39002)	0.0%
Compression moulding (39003)	4.8%
Cast moulding (39004)	0.0%
Manufacture and/or repairs of furniture made predominantly of plastic materials (39102)	1.6%
Recycling of plastic materials (39521)	14.5%
Manufacture and/or repairs of water proofing products (50492)	0.0%
Manufacture of resistant and insulation material (50493)	0.0%
Wholesale trade in other intermediate products, waste and scrap (61490)	1.6%
Packaging activities (88590)	9.7%
Other	21.0%

TOTAL	**206.3**

The combined overall percentage of 206.3% indicates that several companies undertake or supply a variety of processes and/or products. 21% of the participating companies ticked the 'Other' option and provided the following details:

- Consulting
- Fabrication of High Density Polyethylene HDPE Fittings and Bends
- Skills Development Training
- Machinery and Technology
- Manufacture of flooring products
- Manufacture of medical devices (diagnostic test kits - HIV, malaria, urinalysis)
- Manufacture of medical devices using moulded plastic parts
- Supplier of new and pre-owned plastic pallets
- Fibreglass Laminating
- Glass reinforced plastic/ polyester GRP gutters/ rainwater goods
- Architectural mouldings for the construction industry
- Manufacture of large cooling fans
- Hand layup
- Manufacture of fibreglass boats
- Vacuum forming (thermoforming)

The red text in the list above indicates products that are all polymer composite/ fibreglass products. The scope of coverage provided to the researchers does not currently make provision for this. Similarly, the item highlighted in green text ('Vacuum forming'/ thermoforming) was also not reflected in the scope of coverage.

Recommendation 3: *The SIC codes should be revisited to take these additional products/ processes into account and a comprehensive list should be generated.*

In addition, the current list of SIC codes is a hodgepodge of process- and product-related codes. This leads to confusion, difficulties in determining what the most relevant code is and

difficulties in creating a consistent set of categories for the purposes of analysis. Does a company choose Extrusion (33803) – the process – or does it choose Manufacture of plastic bags (33431) - the product. Having two such mutually competing categories will create a lack of consistency in any data collected using these categories.

This means that the industry bodies need to take this matter up with the Department of Trade and Industries. Alternatively research processes should separate process and product in the collection of data.

Recommendation 4: *Industry bodies should take up the issue of overlapping SIC codes with the Department of Trade and Industry OR future research projects should distinguish between codes that relate to manufacturing processes and codes which relate to the production of specific products (by whatever process).*

4.1.7 Ownership category

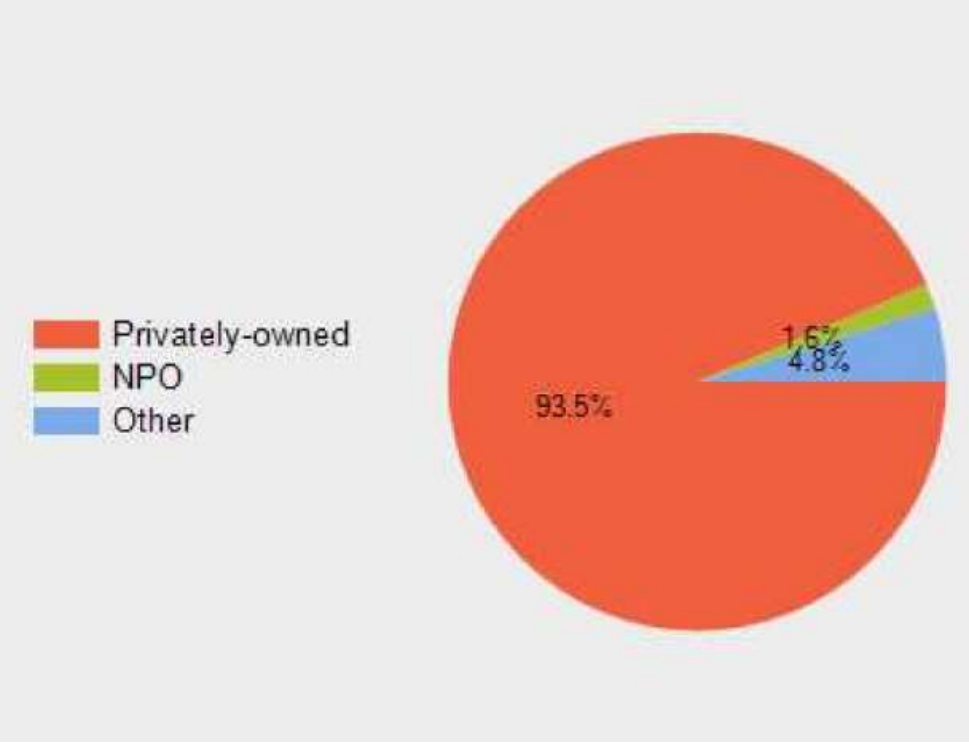

Figure 3: Ownership of participating companies

Participating companies were asked: 'Which category best describes your organisation?' Four options were provided, namely: privately-owned enterprise; Not for Profit (NPO); state-owned enterprise and 'Other'. The results show that 93.5% of the participating companies are privately-owned; 1.6% are NPOs and 4.8% fall into the 'Other' category. Respondents who ticked the 'Other' box provided the following details:

- Division of a listed public company
- Johannesburg Stock Exchange (JSE) listed, American owned
- Public company

None of the participating companies indicated that they are state-owned.

4.1.8 Number of employees (as of 1 August 2012)

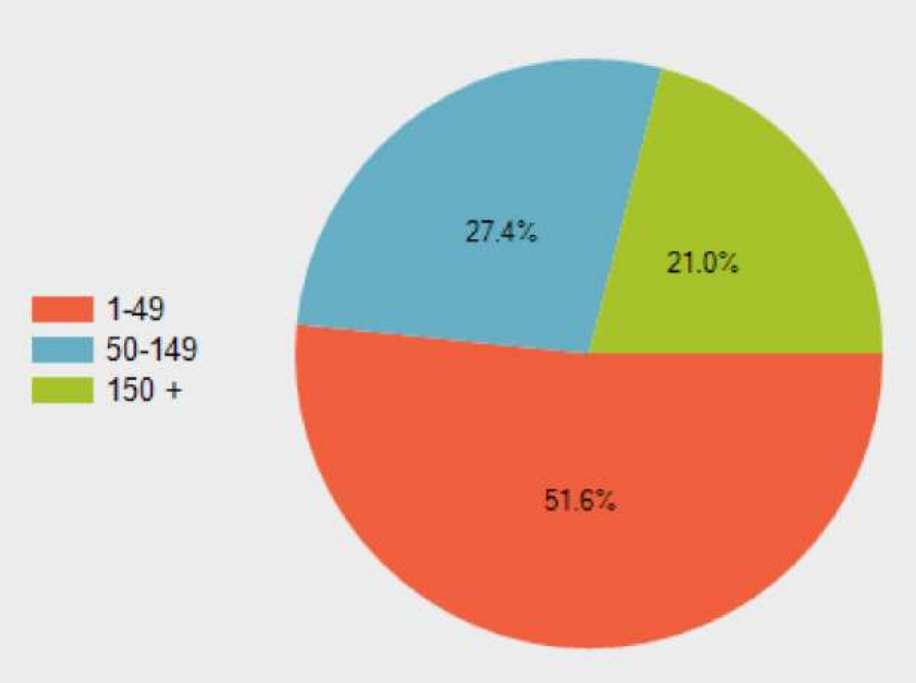

Figure 4: Number of employees currently employed by participating companies

Most of the participating companies (51.6%) employ 1-49 people. Just over a quarter (27.4%) employ between 50 and 149 people and 21% employ more than 150 people. This shows that the plastics industry is diverse, ranging from micro-enterprises to large companies. The number of companies in the 150 + range in the sample may be skewing the data, however – this will be discussed further in the concluding comments section.

The Plastics SA dataset, with all its limitations as noted in Chapter three, shows and even lower proportion for medium-sized companies:

1-49: 57.55%

50-149: 18.63%

150+: 23.82

4.1.9 Tons of material converted/ supplied per month (as of 1 August 2012)

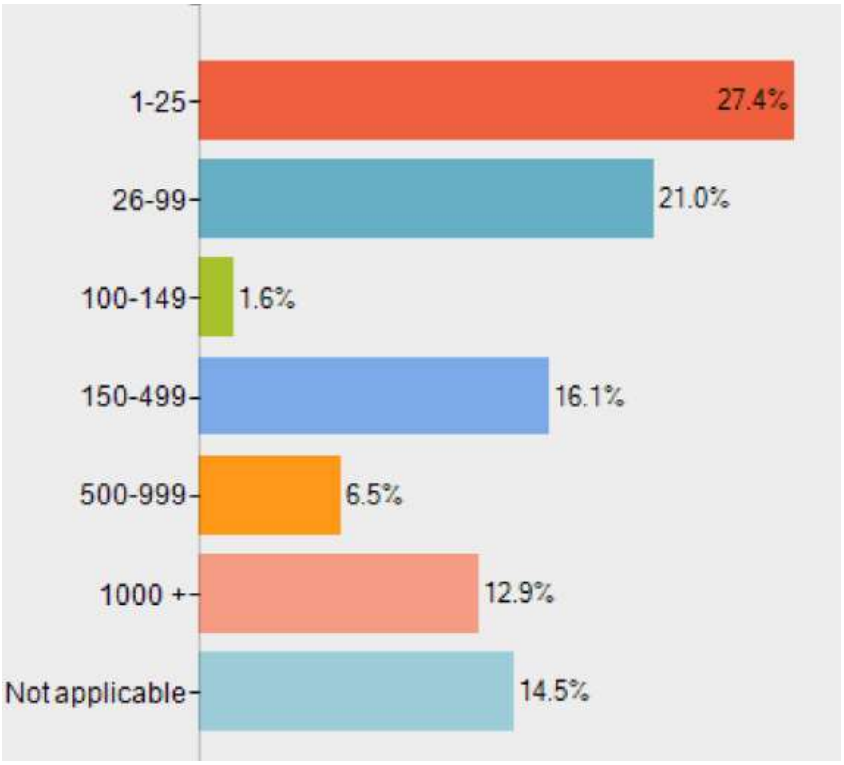

Figure 5: Tons of material converted/ supplied per month by participating companies

14.5% of participating companies indicated that this question was not applicable to them. Most of the participating companies (27.4%) convert or supply 1-25 tons of material per month. The next highest (21%) convert/ supply 26-99 tons, followed by 16.1% between 150-499 tons. One thousand tons of material is converted or supplied by 12.9% of the participating companies. 6.5% convert/ supply between 500 and 999 tons and 1.6% between 100 and 149 tons per month. These figures correlate with those on company size discussed earlier.

4.1.10 Years in business (as of 1 August 2012)

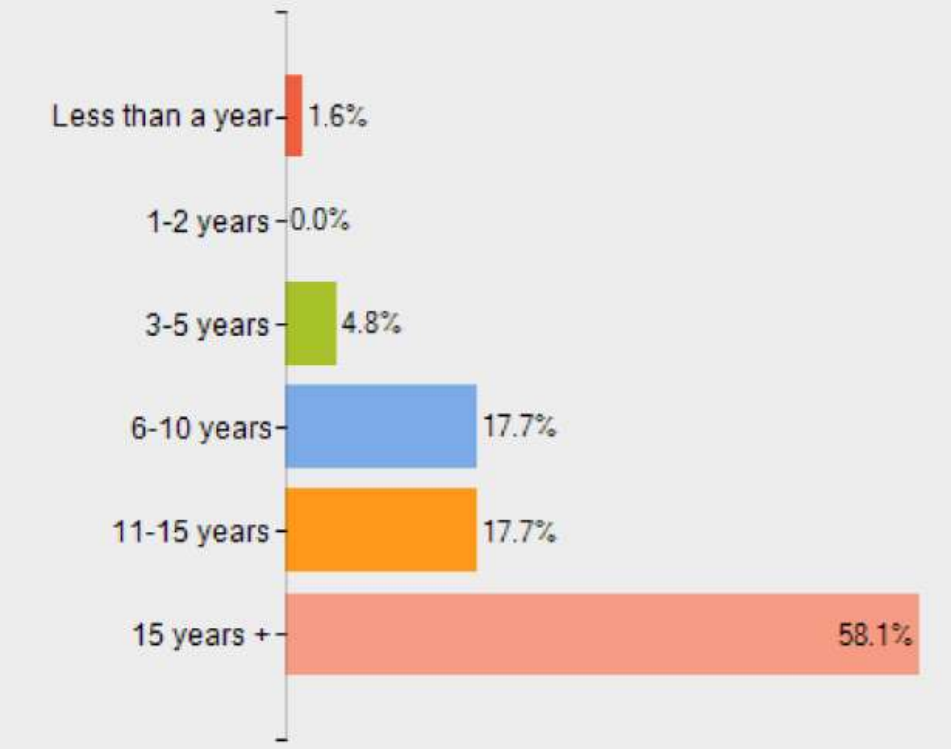

Figure 6: Number of years participating companies have been in business

The majority of participating companies (58.1%) have been in business for more than 15 years, with only 1.6% having been in business for less than a year. 17.7% of firms have existed for between 11-15 years; and a further 17.7% have been established for between 6-10 years. The percentage of companies in business for 3-5 years drops to 4.8%. None of the participating companies fall into the 1-2 year category. This could mean that the timeframe from establishment to reaching the three year milestone is a particularly critical one, or that companies in this category do not have time for surveys. Such organizations would be particularly vulnerable to market volatility caused by the knock-on effects of the global recession, for example; and to other factors such as insufficiently regulated imports.

Overall, 93.5% of the companies participating in the survey have been in business for more than 5 years. This suggests that the survey data comes from companies that are reasonably mature, with business processes that are well “bedded down”. Further inferences and

conclusions based on the data collected in the survey should therefore have a higher degree of credibility.

4.1.11 Levy-paying arrangements

Out of the participating companies, 82.3% pay levies.

Table 14: Levy-paying participating companies

Modality	% Obs.
Yes	82.3%
No	17.7%
Total	100%

The most commonly-cited reason (72.7%) for why the remaining 17.7% do not pay levies, is that their turnover is under R500 000 per annum. 27.3% of companies are new organizations and have not yet registered with a SETA.

Table 15: Reasons for participating companies not paying levies

Modality	% Obs.
Turnover under R500 000 per annum	72.7%
New organisation, not yet registered	27.3%
State-owned enterprise	0.0%
Other	0.0%
Total	**100%**

Out of the levy-paying companies, the majority fall under merSETA (84.3%); 5.9% pay levies to Fibre Processing and Manufacturing (FP & M) SETA; and 2% to the Chemical Industries Education and Training Authority (CHIETA).

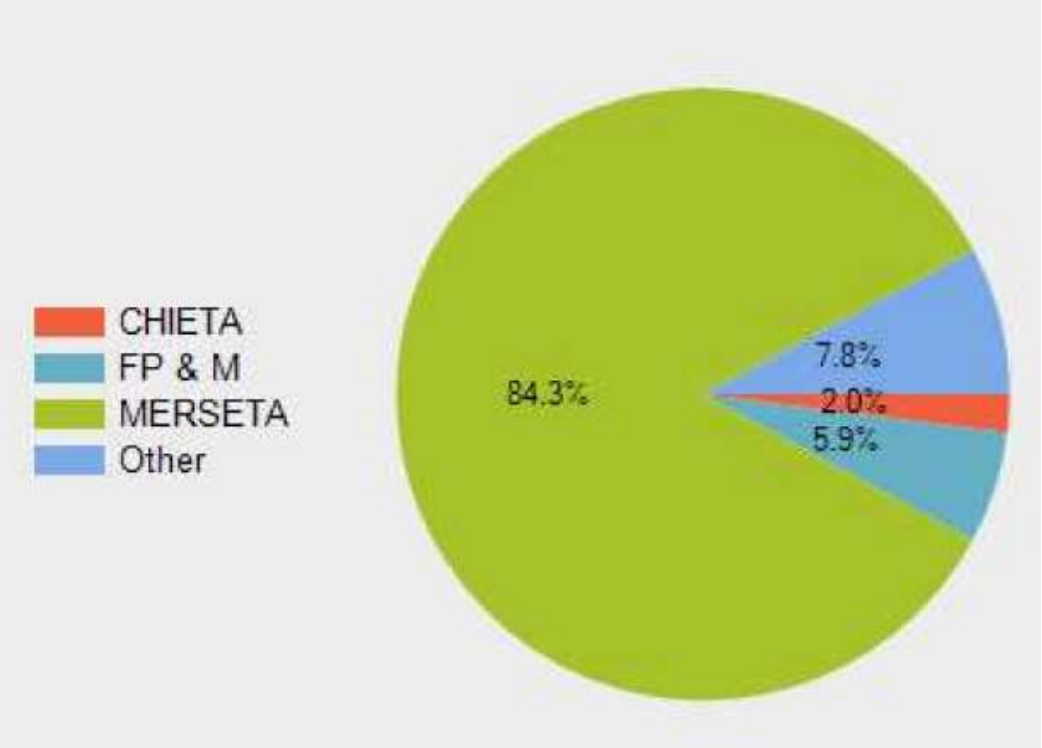

Figure 7: SETAS to which levies are paid

MerSETA is therefore the SETA with responsibility for most of the companies in the Plastics Chamber (based on the sample). However, this serves to highlight that merSETA should be cognizant of the fact that plastics companies also exist in the other sectors. This does have implications: for example it could affect the collection of statistics for the Sector Skills Plans (SSPs); and/ or it could mean a loss of skills to other sectors, or the reverse.

Respondents who ticked the 'Other' category provided the following details:

- Services SETA
- Skills Development Levy
- Unsure

4.1.12 Market/s served

Table 16: Market/s served by participating companies

Modality	% Obs.
Packaging	51.6%
Other	33.9%
Building	32.3%
Medical	30.6%
Agriculture	27.4%
Housewares	25.8%
Electrical/ electronic	25.8%
Toys, sport and leisure	21.0%
Automotive transport	21.0%
Mechanical engineering	16.1%
Furniture	12.9%
Clothing and footwear	11.3%
Total	**309.7%**

Just over half of the participating companies (51.6%) serve the Packaging market; followed by the 'Other' category at 33.9%. Building comes next at 32.3%; the Medical market at 30.6%; Agriculture at 27.4%; the Houseware market and Electrical/electronic markets, both at 25.8%; followed by Toys, sport and leisure and Automotive transport, both at 21%. Next is Furniture at 12.9% and lastly Clothing and footwear at 11.3%. The combined percentage (309.7%) shows that several companies service more than one market.

The following details were supplied by respondents who ticked the 'Other' option.

- Agriculture
- Chemical plants and mining operations
- Explosive industry
- Fibreglass laminating skills development training
- General markets

- Government
- Consulting across the board to the plastics industry
- Logistics
- Marketing
- Advertising
- Mining, leisure, cosmetics
- Power stations
- Retail
- Stationery
- Steel
- Paper
- Printing
- Technical (i.e. jobbing, whatever the customer wants)
- Thermoplastic assembly industries
- Marine leisure
- FMCG
- Beverage
- Food
- Wholesale and Retail
- Textile
- Supplier of plastic raw material

'Agriculture' is already in the list of markets. 'Marine leisure' should fall under 'Toys, sport and leisure'. The items highlighted in red text fall under Packaging. The item in green text falls under the 'Supplier' category.

4.1.13 Business functions

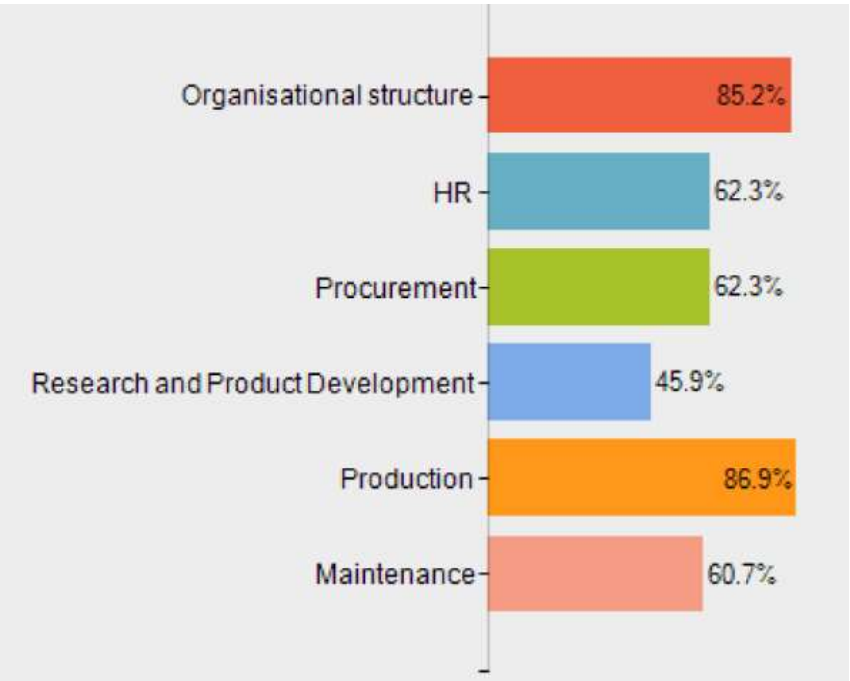

Figure 8: Business functions in participating companies

As would be expected in the industry, most of the participating companies have a Production business function (86.9%). Similarly, most companies (85.2%) have an Organizational Structure business function, which comprises Marketing; Finance and Administration; Management and Safety, Health, Environment Risk (SHER). HR and Procurement follow at 62.3%. The Maintenance business function comes next, at 60.7%. The Research and Product Development business function is present in less than half of the participating companies (45.9%). The next table presents the results of a cross-tabulation of 'size of company' and 'business functions'.

Table 17: Cross-tabulation: Size of company/ Business functions

Size of organization (total no. employees) →	1-49		50-149		150 +		Total	
Business functions ↓	Freq.	%	Freq.		Freq.	%	Freq.	%
Organisational structure (Marketing, Finance & Administration, Management, SHER - Safety, Health,	23	44.2%	16	30.8%	13	25.0%	52	100.0
HR (Human Resources)	15	39.5%	12	31.6%	11	28.9%	38	100.0
Procurement	15	39.5%	13	34.2%	10	26.3%	38	100.0
Research and Product Development (Engineers, Technologists - plastics, packaging, food) etc.	10	35.7%	10	35.7%	8	28.6%	28	100.0
Production	24	45.3%	17	32.1%	12	22.6%	53	100.0
Maintenance (Electrical, Electronic, Mechanical Cleaning, Disposal)	14	37.8%	13	35.1%	10	27.0%	37	100.0
TOTAL	**31**	**50.8%**	**17**	**27.9%**	**13**	**21.3%**	**61**	

It is worth noting that that the number of employees in the Research and Development function is only just marginally less than that in Human Resources, Procurement and Maintenance. In view of the limited amount of interest in Research and Development reported during the 2011 workshops no separate value chain was developed for this function. The Plastics Chamber Operation's Team members also expressed their surprise at these numbers, particularly amongst the small and micro enterprises. One explanation proffered was that in some cases small enterprises were established by individuals who had researched and developed a particular product. The company owner may then perceive him- or herself as forming part of the R&D function and would be more likely to appoint R&D staff. The overall sample size is too small to confirm this set of data as a distinct trend. If this data constitutes a trend, this situation could have implications for the provider system in view of the fact that the universities of technology in Tshwane and Cape Town are phasing out or have already closed their Polymer Technology departments.

Recommendation 5: *The Plastics Chamber should consider more research to confirm if the increase in employee numbers in the category of Research and Development is indeed a new trend.*

A further observation based on the data in Table 21 is that if 85.2% of companies have an Organisational Structure business function, then 14.8% do not. This fits with the picture described earlier of a diverse industry, comprising micro-enterprises as well as large companies. Anecdotal evidence from people who were accepted the invitation to attend the regional workshops, but declined on the day for reasons related to dealing with operational issues that had arisen, suggests that many small companies have little spare capacity and are focusing on day-to-day survival issues: They simply do not have the time or the resources to employ or train people in a formal Organisational Structure business function. Again, the implication for skills training is that it has to be flexible and appropriate to a company's circumstances and needs, perhaps even including management training for Small, Medium and Micro Enterprises (SMMEs). This view is reinforced by the findings from regionals workshops.

The general implication for training is that the focus of training provided or incentivised may have to broaden and include more than just production workers or training related to production. The training has to be able to cater for a wide range of employees, across all of the business functions.

4.1.14 Other departments

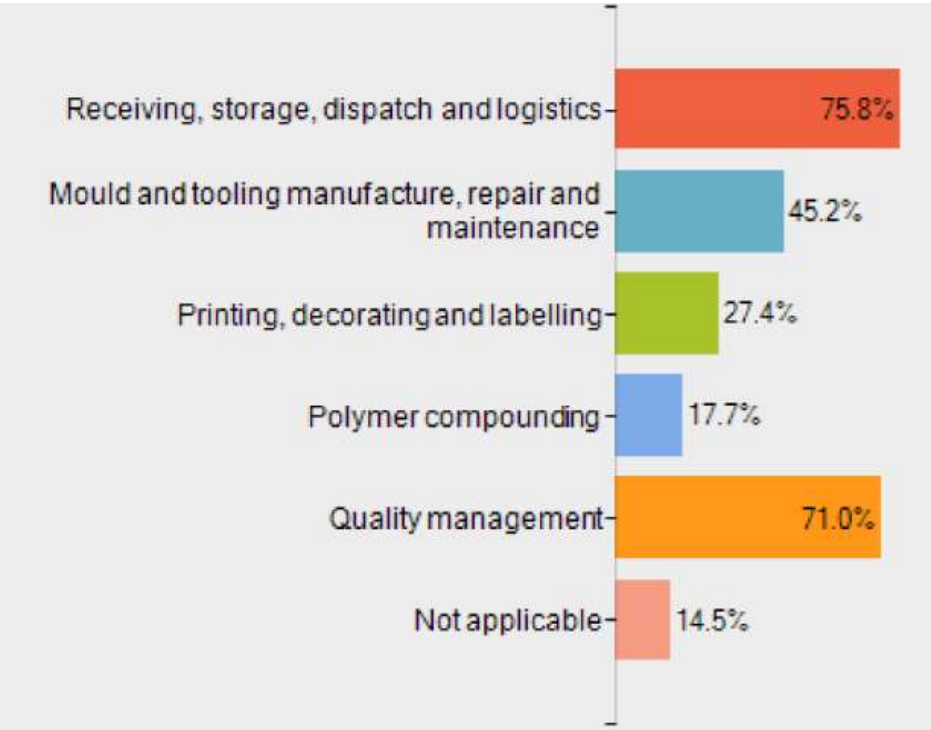

Figure 9: Other departments in participating companies

85.5% of the participating companies have other departments in addition to the business functions discussed in 1.12. 75.8% have a Receiving, storage, dispatch and logistics department; 71% have a department dedicated to Quality management. 45.2% have a Mould and tooling manufacture, repair and maintenance department; 27.4% have a Printing, decorating and labelling department (this is evidence of an overlap with the FP & M sector) and 17.7% have a Polymer compounding department. The findings suggest that, as in the conclusion for 4.1.13 above, the focus of training interventions provided or incentivised to companies in the Plastics Chamber need to take into account "where the needs are" in the industry. This view is reinforced by the findings from regionals workshops.

The cross-tabulation that follows looks at the correlation between the core business of a company (i.e. Supplier or Converter/ Fabricator) and these other departments.

Table 18: Cross-tabulation: Core business of company/ Other departments

Other depts. →	Receiving, storage, dispatch and logistics		Mould and tooling		Printing, decorating and labelling		Polymer compound-ing		Quality Mgt.		N/A		Total	
Core business ↓	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Supplier	11	68.8	5	31.2	2	12.5	5	31.2	7	43.8	4	25.0	16	100
Converter/ Fabricator	35	81.4	23	53.5	15	34.9	6	14.0	36	83.7	4	9.3	43	100
Other	1	33.3	0	0.0	0	0.0	0	0.0	1	33.3	1	33.3	3	100
Total	**47**	**75.8**	**28**	**45.2**	**17**	**27.4**	**11**	**17.7**	**44**	**71.0**	**9**	**14.5**	**62**	

This table demonstrates how much more important quality management has become in the lives of not only the converter/ fabricator but also the supplier. Another observation is that suppliers seem to have some operational capacity as part of their business operations.

Recommendation 6: *Given the relative importance accorded to quality management, it would be worth while investigating this need further. Depending on the nature of the quality management required, this could be included in incentives for specific forms of training.*

4.1.15 Value chains undertaken and/ or outsourced[1]

The next section of the questionnaire provided companies with a list of value chains that had been identified for the plastics industry on the basis of extensive previous research (Vorwerk, 2011). Companies were asked to indicate the processes they undertook themselves and/ or outsourced.

[1] The questionnaire included the following explanatory note: 'Out of the Value Chains listed below, identify those that are undertaken by your organization (either as a manufacturer or as a supplier) and those that are outsourced. You may select more than one. If you use Pultrusion or Filament Winding processes, please choose "volume conversion", even though they are polymer composite products. You will be employing operators rather than laminators. If you manufacture Foams and Expanded Products, please choose "volume conversion" '.

Table 19: Value chains undertaken and/or outsourced by participating companies (in descending order)

Total sample size = 62 *Percentages rounded*	**We undertake the process ourselves (no outsourcing)**		**We only outsource the process**		**We do both**		**Total**	
Value Chain	**Freq.**	**% Obs.**	**Freq.**	**% Obs.**	**Freq.**	**% Obs.**	**Freq.**	**% Obs.**
Receiving, storage, dispatch and logistics	47	75.81	3	4.84	1	1.61	51	82.26
Quality management	46	74.19	1	1.61	0	0	47	75.81
Mould and tooling manufacture, repair and maintenance	18	29.03	15	24.19	7	11.29	40	64.52
Recycling	18	29.03	14	22.6	3	4.84	35	56.45
Printing, decorating and labelling	18	29.03	7	11.29	2	3.23	26	41.94
Volume conversion	21	33.87	2	3.23	0	0	23	37.1
Installation, repair and maintenance of thermoplastic or composite structures, plant or equipment	14	22.6	4	6.45	3	4.84	21	33.87
Thermo-plastic fabrication	9	14.52	3	4.84	3	4.84	15	24.19
Polymer compounding	6	9.68	5	8.06	1	1.61	12	19.35
Polymer composites	7	11.29	4	6.45	0	0	11	17.74
Industrial rubber conversion	4	6.45	2	3.23	0	0	6	9.68

The findings show that several companies undertake a particular process (either as a manufacturer or a supplier), as well as outsourcing it, for example Mould and Tooling (7 companies do both; a percentage of 11.29).

The Receiving, storage, dispatch and logistics value chain is important to 82.26% of the participating companies, of which 75.81% undertake the process completely themselves; 4.84% only outsource the process and 1.61% do both.

75.81% of participating companies indicated that Quality management value chain is important to their business. 74.19% undertake the process themselves; 1.61% only outsource it and none do both.

Mould and tooling manufacture, repair and maintenance comes next, with 64.52% of participating companies indicating that it was an important value chain for their business. 29.03% undertake the process completely themselves; 24.19% only outsource it and 11.29% do both.

The Recycling value chain appears in the responses of 56.45% of the participating companies. 29.03% undertake the process completely themselves; 22.6% only outsource it and 4.84% both undertake the process and outsource it elsewhere.

Next comes the Printing, decorating and labelling value chain, which is mentioned by 41.94% of participating companies. 29.03% undertake the process completely themselves; 11.29% only outsource it and 3.23% do both.

Volume conversion is noted by 37.1% of the participating companies. 33.87% undertake the process completely themselves; only 3.23% outsource it and no companies do both. Given the nature of the plastics industry this figures is not surprising. In all likelihood it would only be companies that are assembling products that would outsource manufacturing of the components.

Next comes the value chain 'Installation, repair and maintenance of thermoplastic or composite structures, plant or equipment'. This appears in the responses of 33.87% of the participating companies. 22.6% undertake the process completely themselves; 6.45% only outsource it and 4.84% both undertake and outsource.

24.19% of companies indicate that the Thermo-plastic fabrication value chain is important to their business. 14.52% undertake the process completely in-house; 4.84% outsource it completely and 4.84% do both.

Polymer compounding is important to 19.35% of the participating companies. 9.68% undertake the process entirely themselves; 8.06% only outsource it and 1.61% do both.

The Polymer composites value chain comes next. 17.74% of participating companies indicate that it is part of their business. 11.29% undertake the value chain 'in-house' only; 6.45% only outsource it and no companies do both.

The Industrial rubber conversion is the least prevalent of the value chains amongst the participating companies at 9.68%. 6.45% companies undertake the process from start to finish; 3.23% outsource it and no companies do both.

This set of data represents the complexity of the current manufacturing environment. Companies form part of complex networks of supplier and service provider networks. They are no longer, as in the past, self-sufficient in much of what they do. They have a greater reliance on other parties and this requires different sets of skills as well as new approaches to general and quality management. Networks of companies such as this form the basis of cluster arrangements, as evidenced by the importance of the Durban Automotive Cluster for the component manufacturers who supply automotive original equipment manufacturers (OEM).

4.1.16 Concluding comments

The survey data from the participating companies, when seen as a whole, rather than as individual components, suggests the following:

- Even though the sample size was relatively small it does represent to a large extent the diversity of the sector;
- By far the majority of the companies (93.6%) have been in business for more than 5 years, suggesting a level of stability and maturity in their processes and that the data they provide should have a good level of accuracy;

- Managing quality is a significant concern to industry and companies – even those with fewer than 50 employees have such a function;
- The approach using value chains has yielded rich information about the range of company activity, the networks required, the balance between having the capability and outsourcing.

Recommendation 7: *It would be very valuable to check the findings through extracting and consolidating information from the Plastics SA dataset, and also by holding a series of follow up focus group workshops around the country.*

What follows presents a summary of the key findings with regard to the "size and shape" of the 62 participating companies, specifically in relation to organisational profile. The sample is too small to make firm generalisations to the overall population, therefore what follows represents a 'snapshot' of the 62 participating companies and the trends and patterns that have been found. Some may well be found in the general population, but this would need to be tested by further empirical research and access to an accurate WSP dataset.

Provincial distribution

The majority of participating companies are situated in three provinces, namely Gauteng (56.5%) and the Western Cape (40.3%), followed by KwaZulu-Natal (21.0%). Several companies have a plant in more than one province, as indicated by the overall combined percentage being higher than 100 %.

Core business

Converter/fabricators make up the bulk of the sample at 69.4%, followed by Suppliers at 25.8%. There is a small category of companies (4.8 %) describing themselves as 'Other'. This includes activities such as consulting and the collection of materials for recycling. For this small percentage of respondents, some of the questions in the survey were difficult to answer, as noted by one respondent in the open-ended, Further Comments section of the

survey: 'We are a distributor of packaging materials, so some questions were not really applicable'.

Although it is a small sample that cannot be generalized to the larger population, the large proportion of converter/fabricators amongst the participating companies would seem to support PSA's estimate that converters make up the bulk of companies in the plastics industry. The 2012 *Industry Overview* indicates that there are 1500 – 1800 converters (PSA, 2012). The market size of these companies is estimated to be between R45 and R53 billion (PSA, 2012). Converter/fabricators in the plastics industry therefore contribute significantly to the South African economy.

Processes undertaken by Converter/Fabricators

The majority of companies in this category are involved in various kinds of Volume Conversion. Of these, Injection moulding represents the highest percentage (47.5%); followed by pipe and profile extrusion (22.5%); thermo-plastic fabrication (17.5%); recycling and blow moulding (12.5%); film extrusion (10%); polymer composites (excluding pultrusion and filament winding), compression moulding, injection stretch (5 %), 'other' kinds of volume conversion (5 %) and lastly roto moulding, sheet extrusion and moulding (all 2.5%). Again, the fact that the combined percentage adds up to 152.5% shows that several companies are involved in a range of conversion/ fabrication process.

Products supplied by Suppliers

Out of the participating companies identifying their core business as 'Suppliers', the highest percentage (46.2%) supply thermoplastic raw materials and compounded materials (polymer compounding). Mould and tooling manufacture, repair and maintenance follow at 38.5%; then semi-finished products (sheets, pipes and profiles) at 23.1% and lastly thermosetting resins (including polyurethanes) at 15.4%. The overall total of 169.4% indicates that several companies supply a range of products.

Scope of coverage

The findings show that several companies undertake or supply a variety of processes and/or products. Some of these are not covered by the current scope of coverage, for example polymer composite/ fiberglass products such as Fibreglass Laminating; GRP gutters/rainwater goods; Architectural mouldings for the construction industry; the Manufacture of large cooling fans; Hand layup and the Manufacture of fiberglass boats. Similarly, Vacuum forming/ thermoforming is not reflected in the current scope of coverage. There may well be others, as these findings are based on only 62 companies in the industry.

Recommendation 8: *The SIC codes should be revisited to take these additional products/ processes into account. Further research should be undertaken to determine whether there are any other processes that are currently not listed in the scope of coverage.*

Ownership

A high majority of the participating companies (93.5%) are privately-owned. A very small percentage are NPOs (1.6%) and 4.8% fall into the 'Other' category, including a division of a JSE listed public company; a JSE, American-owned company and a public company. None of the participating companies are state-owned.

Size of company (number of employees)

Most of the participating companies (51.6%) employ 1-49 people. Just over a quarter (27.4%) employ between 50 and 149 people and 21% employ more than 150 people. This shows that the plastics industry is diverse, ranging from micro-enterprises to large companies. The number of companies in the 150 + range in the sample may be skewing the data, however, therefore this particular finding needs to be treated with caution and tested further.

Tons of material converted/ supplied per month

The PSA *Industry Overview* estimates that 1 300 000 tons of virgin material was converted in 2011, which led to the inclusion of the question of 'tons material converted/supplied per month' in the survey.

Most of the participating companies (27.4%) convert or supply 1-25 tons of material per month. Twenty one percent convert/supply 26-99 tons, followed by 16.1% between 150-499 tons. One thousand tons of material is converted or supplied by 12.9% of the participating companies. 6.5% convert/supply between 500 and 999 tons and 1.6% between 100 and 149 tons per month. 14.5% of participating companies indicated that this question was not applicable to them. These figures correlate with those on company size discussed earlier.

Longevity/ number of years in business

The majority of participating companies (58.1%) have been in business for more than 15 years. Only a small proportion (1.6%) have been in business for less than a year. 17.7% of firms have existed for between 11-15 years; and a further 17.7% have been established for between 6-10 years. The percentage of companies in business for 3-5 years drops to 4.8%. None of the participating companies fall into the 1-2 year category.

Overall, 93.5% of the companies participating in the survey have been in business for more than 5 years. This suggests that the survey data comes from companies that are reasonably mature, with business processes that are well 'bedded down'.

Levy paying companies

Out of the participating companies, 82.3% pay levies and 17.7 % do not, largely because their turnover is under R500 000 per annum, or because they are new organizations and have not yet registered with a SETA. This last point is interesting given the 'longevity' data discussed above, where no companies identified themselves as falling into the 1-2 year category.

Out of the levy-paying companies, 84.3 % fall under the merSETA. A small percentage (5.9%) pay levies to the Fibre Processing and Manufacturing (FP & M) SETA and an even smaller percentage (2%) to the Chemical Industries Education and Training Authority (CHIETA). One respondent listed 'Services SETA' in the 'Other' comments section.

MerSETA is therefore the SETA with responsibility for most of the companies in the Plastics Chamber (based on the sample). However, even from such a small sample, it is evident that plastics companies also exist in the other sectors. This does have implications: for example it could affect the collection of statistics for the Sector Skills Plans (SSPs); it could mean a loss of skills to other sectors, or the reverse. With regard to MerSETA, one respondent made the following remark in the 'Further comments', concluding section of the survey:

> The MerSETA runs very specific things yet doesn't seem to have a proper overview of their own processes. I have been trying to get a trade test for my apprentice since March, and still to date do not have an answer.

Markets served

The sample is too small to make generalisations to the overall population, therefore the findings in this section can only be seen as a 'snapshot' of the participating companies. Just over half (51.6%) serve the Packaging market; 32.3% serve the Building market; 30.6% serve the Medical market; 27.4% the Agriculture market; 25.8% the Housewares market and 25.8% the Electrical/electronic market. Toys, sport and leisure and Automotive transport follow, both at 21%. Next is Furniture at 12.9% and lastly Clothing and footwear at 11.3%. The combined percentage (309.7%) shows that several companies service more than one market.

The findings also show that there are other markets not currently listed. Over a third of participating companies (33.9 %) indicated that they were also involved in the following markets (we have eliminated overlaps and duplications). This gives some indication of the diversity and range of the "Other" category which comprises 33.9% of the markets served:

- Chemical plants

- Mining Explosive industry
- General markets
- Government
- Consulting across the board to the plastics industry
- Logistics
- Marketing
- Advertising
- Mining,
- Cosmetics
- Power stations
- Retail
- Stationery
- Steel
- Paper
- Printing
- Technical (i.e. jobbing, whatever the customer wants)

Business functions in the organisation

As would be expected in the industry, most of the participating companies have a Production business function (86.9%) and an Organizational Structure business function (85.2%), which comprises Marketing; Finance and Administration; Management and Safety, Health, Environment Risk (SHER). HR and Procurement are also present in most companies (62.3%) as is Maintenance, at 60.7%. A surprising finding is that Research and Product Development is present in nearly half the participating companies (45.9%), regardless of size. Another interesting finding is that some of the larger companies outsource their R&D function overseas. One respondent commented in the open-ended section of the survey (names and details have been omitted for reasons of confidentiality):

> Functions such as HR, Health and Safety, Accounting, Drafting, Stores and Procurement are centralized. Our company is an international company and (X product) is made under licence to (X overseas company) where most design and product development is done.

14.8% of companies do not have an Organisational Structure business function. There are two possible explanations for this: anecdotal evidence from participants who were invited to attend the regional workshops but declined due to work pressure suggests that many small companies are focusing on day-to-day survival issues and have neither the time nor the resources to employ or train people in a formal Organisational Structure business function. Another possibility is that multi-tasking is a common phenomenon in Small, Medium and Micro Enterprises (SMMEs). One respondent commented in the Further Comments section of the survey: 'We have many people performing various functions' and another made a similar point:

> We are a very small company, the result being that 1 person fills a lot of different positions at the same time. Example: I am the production manager, but my work also includes QC, HR, maintenance as well as R&D.

Other departments

The findings show that a high percentage (85.5%) of the participating companies have other departments in addition to the business functions discussed above. A Receiving, storage, dispatch and logistics department is present in 75.8% and Quality management is found in 71% of companies. 45.2% have a Mould and tooling manufacture, repair and maintenance department; 27.4% have a Printing, decorating and labelling department (this is evidence of an overlap with the FP & M sector) and 17.7% have a Polymer compounding department.

Quality management is regarded as important by Converter/Fabricators and by Suppliers. 83.7 % of Converter/fabricators have a Quality Management department.

Value chains undertaken and/or outsourced

The findings show that several companies undertake a particular value chain process (either as a manufacturer or a supplier), as well as outsourcing it, for example Mould and Tooling, where 11.29% of the participating companies do both.

82.6 % of companies in the sample are involved in the Receiving, storage, dispatch and logistics value chain; 75.81 % are involved in the Quality management value chain (which correlates with the importance of QM noted above); 64.52 % in Mould and tooling manufacture, repair and maintenance; 56.45 % in Recycling; 41.94 % in Printing, decorating and labelling; 37.1 % in Volume conversion and 33.87 % in the Installation, repair and maintenance of thermoplastic or composite structures, plant or equipment. Looking at the Thermo-plastic fabrication value chain, 24.19 % of companies are involved in this process; 19.35 % in Polymer compounding; 17.74 % in Polymer composites and 9.68 % in Industrial rubber conversion.

Attempts to directly get involvement of rubber companies came very late in the survey process. Despite this the participation rate of 9.68% is not unreasonable. However there was a comment by a respondent in the open-ended section of the survey: 'It was difficult to relate the categories of rubber work to the generic plastic work'. This comment was made despite the fact that there was a value chain for industrial rubber manufacturing. The comment could, however, be understood in the context of the heavy emphasis on plastics, for example the name "Plastics Chamber" and the involvement of Plastics SA and its constituent associations. The same could be said of other related industries such as polymer composites (fibre reinforced plastics) and foams.

What differentiated this survey from others was the use of value chains which allowed a degree of flexibility that is not normally found in such broad surveys. It was clear, however, that some of the respondents had not had access to or could not see the relevance of the value chains and the related job mapping processes.

Recommendation 9: *The Plastics Chamber and merSETA should publicise the value chains and the related jobs. This would lead to their improvement and also ensure that data collected in future would be more accurate.*

4.2 Section 2: Profile of employees

4.2.1 Racial and gender composition of employees (as of 1 August 2012)

In this section of the questionnaire, companies were asked to list the numbers of employees they currently employ using the racial categories 'African; Coloured; Indian and White' and the two gender categories 'Male; Female'.

Table 20: Racial and gender composition of employees across the participating companies

Variable	Mean	Min - Max	Sum	% of total	Sum by race	%
African male	53.82	0 - 861	3337	41.09	4211	51.85
African female	14.1	0 - 267	874	10.76		
Coloured male	21.21	0 - 579	1315	16.2	2202	27.11
Coloured female	14.31	0 - 373	887	10.92		
White male	11.68	0 - 209	724	8.91	1076	13.25
White female	5.68	0 - 125	352	4.33		
Indian male	8.44	0 - 214	523	6.44	633	7.79
Indian female	1.77	0 - 60	110	1.35		
TOTAL NUMBER OF EMPLOYEES				**100**	**8122**	**100**

In terms of the racial composition of the 62 participating companies, the dominant racial group is African (4211 employees); followed by Coloured (2202); White (1076) and Indian (633), giving a total of 8122 employees. Using percentages, the overall racial distribution of the 62 participating companies is 51.85% African; 27.11% Coloured; 13.25% White and 7.79% Indian.

With regard to gender, females are in the minority across all the racial groups. There are 5899 males employed amongst the participating companies and 2223 females. African

males make up the bulk of the workforce in the participating companies, with a mean[2] of 53.82; followed by Coloured males at a mean of 21.21; Coloured females at 14.31; African females at 14.1; White males at 11.68 and Indian males at 8.44. White females (5.68) and Indian females (1.77) are the least represented amongst the participating companies. The overall gender balance in the sample is 72.63% males to 27.38% females.

Looking specifically at minimum and maximum numbers of employees in each category across the participating companies: the number of African males employed by a single company varies from 0-861; the number of Coloured males from 0-579; Coloured females from 0-373; African females from 0-267; Indian males from 0-214; White females from 0-125 and Indian females from 0-60.

The implication for training is that companies will have to be aware that many of their employees are second language speakers of English. Training may need to be conducted in more than one language, or with a translator who will be able to clarify any issues that are unclear in the home language of the trainees, OR training should integrate language into the overall process.

Table 21: Gender and racial composition of employees across the participating companies

Variable	Mean	Min - Max	Sum	Sum by gender	%
African male	53.82	0 - 861	3337	5899	72.63
Coloured male	21.21	0 - 579	1315		
White male	11.68	0 - 209	724		
Indian male	8.44	0 - 214	523		
Coloured female	14.31	0 - 373	887	2223	27.38 %
White female	5.68	0 - 125	352		
African female	14.1	0 - 267	874		
Indian female	1.77	0 - 60	110		

[2] A mean is defined as: 'An average, computed by summing the values of several observations and dividing by the number of observations' (Babbie and Mouton, 2001: 644).

TOTAL NUMBER OF EMPLOYEES		**8122**	**100**

Viewed from a gender perspective, males constitute a total of 5 899 or 72% of the total employment while women only constitute 2223 of the 8 122 or 27.38% of the total number of employees.

4.2.2 Age composition of employees (as of 1 August 2012)

Table 22: Age composition of employees across the participating companies

Variable	Mean	Min-Max	Sum	%
30-39 years	44.69	0- 889	2771	35.04
18-29 years	35.21	0 - 862	2183	27.61
40-49 years	29.42	0 - 492	1824	23.07
50-59 years	14.73	0 - 164	913	11.55
60 + years	3.48	0 - 39	216	2.73
TOTAL NUMBER OF EMPLOYEES			**7907**	**100**

The overall employee figure of 7907 employees (as opposed to the earlier figure of 8122, a difference of 215 employees) indicates that respondents may be working from figures that are not completely up to date or complete. The results should therefore be seen as approximate, rather than a completely accurate reflection of the age demographics across the companies.

With regard to age of employees amongst the participating companies, the highest number (2771) are found in the 30-39 years category (a mean of 44.69 and a percentage of 35.04); followed by the 18-29 year age group (a mean of 35.21 and a percentage of 27.61). The numbers drop off in the 40-49 year category (a mean of 29.42 and a percentage of 23.07), followed by the 50-59 year category (a mean of 14.73 and a percentage of 11.55). There are very few people aged 60 or above in the participating companies (a mean of 3.48, representing a percentage of 2.73).

If we look specifically at the minimum and maximum numbers of employees in a single age category across the participating companies: it is clear that there are some age categories where at least one of the participating companies does not employ anyone (giving the zero result). The maximum number of employees, per age cohort, found in a single company, is also shown. In the 30-39 year cohort, numbers vary from 0-889; in the 18-29 year cohort, from 0-862. The numbers drop off more than 50% in the 40-49 year cohort, with the lowest number of employed in a single company being 0 and the maximum being 492. The downward trend continues in the 50-59 year cohort, with a minimum of 0 and a maximum of 164 employees. The 60+ cohort has a minimum of 0 and maximum of 39 employees.

Graphically the age distribution looks as follows:

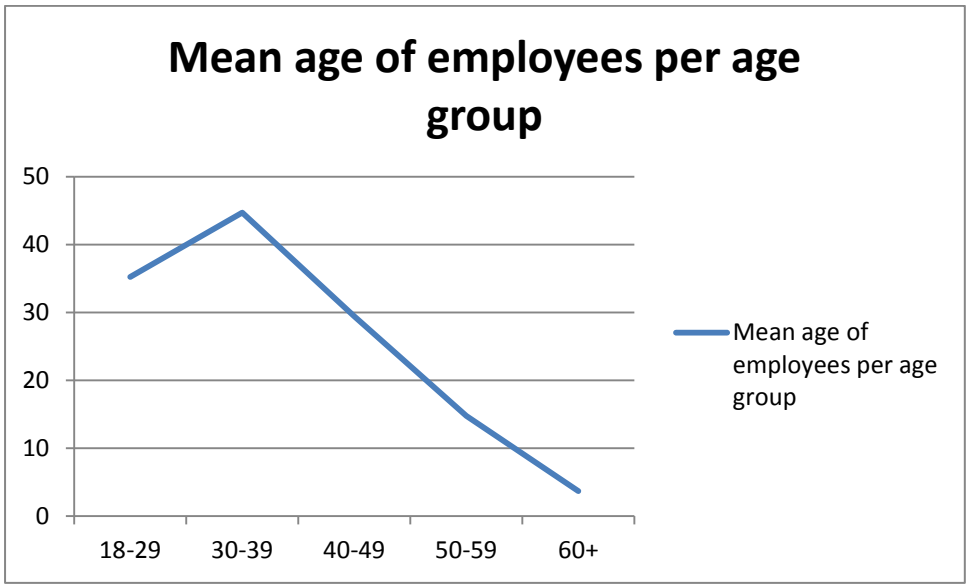

Figure 10: Mean age of employees per age group amongst the participating companies

The distribution of the numbers of employees per age group amongst the participating companies is startling, to say the least. The largest number of employees (62.65%) in the industry is under 40 years old and 85.72% of the employees are under 50 years of age.

The regional workshops gave the impression that there was a significant cohort of skilled, experienced workers who were nearing retirement: the assumption is that they would fall between 55 and 65 years. The statistics from the participating companies do not bear this out, as they seem to indicate that these workers have already retired (and that they have

been retiring early). The cohort is probably a small group of highly experienced and skilled individuals who do not significantly contribute to the employment data.

Recommendation 10: *The figures for the age group distribution should be researched to verify if the survey data is correct.*

One would have to consider other factors that could account for the strange age distribution profile.

- One of the companies at a regional workshop indicated that, after prolonged industrial action, they had fired the entire workforce, rehired very selectively and had taken on much younger workers to take the places of those that weren't rehired. This kind of action could contribute to the above profile, but is too uncommon an occurrence to explain it.
- The above response to an industrial relations issue does, however, remind us of the extensive retrenchments of the early to mid-1990s when many companies shed staff who had been with them since the late 1970s and early 1980s. Companies at this stage were also introducing automation. Previously, many of the devices which automated production were actually removed from the machines, because labour at the time was relatively cheap. Therefore the workforce consisted largely (but not always) of people with very low levels of education, who were performing simple manual tasks. If such workers were hired in 1980 at the age of 20 when the plastics industry was in a very strong growth period, they would have turned 50 in 2010. The lack of a substantial cohort in this age bracket suggests that some companies in the industry may have lost many members of that age group in the last two decades, possibly as early as the 1990s.
- Another company in Kwa-Zulu-Natal explained how, after a change of ownership in the company, younger managers with fresh ideas and the ability to implement them took over. It was worth noting that there were few members of the older cohort in the workshops. The majority of participants were under 55. This judgement is based on personal observation – no accurate record was kept.
- While we have no figures to substantiate the following, the age profile described above may also be a logical progression of the classic U-shaped profile found in industries in South Africa over the last decade. The U-profile shows a large number of young and a large number of older employees who are nearing retirement. If the latter have now retired and the younger workers have now turned thirty (or more), the above profile is simply the next phase of the U-profile. The trough of the wave has now moved to the 50+ age group. If this is so, then the industry would appear to be recruiting fewer youngsters out of school or university than, say, 10 years ago.

We attempted to correlate this information with the Age Profiles in the WSP data but because of the issues described in Chapter 3 we were unable to do so.

- An alternative suggestion amongst the participating companies in the regional workshops was that there was attrition amongst the skilled and knowledgeable. This was not a major discussion point by they were simply pointing out that there was a general loss of skilled employees in the plastics industry. They attributed this to factors such as emigration; people choosing to leave the industry for other sectors; (greener pastures) or because many companies do not have any retention strategies in place.
- The loss of members of a workforce through HIV-AIDS is also a possible contributing factor to the profile.

4.2.3 Highest educational qualification of employees (as of 1 August 2012)

Table 23: Educational level of employees across the participating companies

Variable	Mean	Min - Max	Sum	%
Grade 12 (Matric)	61.73	0 - 1215	3827	48.75
ABET 2-4 (Grade 1-9)	41.32	0 - 957	2562	32.64
Occupational Certificate or Diploma (NQF 4)	7.58	0 - 100	470	5.99
National or Higher Diploma	7.29	0 - 150	452	5.76
First degree or Honours	4.21	0 - 56	261	3.32
ABET 1 (Below school entry level)	3.02	0 - 36	187	2.38
Masters and above	1.47	0 - 20	91	1.16
TOTAL NUMBER OF EMPLOYEES			**7850**	**100**

Once again, the overall employee figure of 7850 employees (as opposed to the figure of 7907 employees in the previous section; and the earlier figure of 8122), indicates that respondents may be working from figures that are not completely up to date or complete. The results should therefore be seen as approximate, rather than a completely accurate reflection of the educational demographics across the companies.

By far the highest number of employees amongst the participating companies (3827, a percentage of 48.75%) have only a Grade 12 (Matric). One company employs 1215 people at this level. ABET 2-4 (Grade 1-9) follows, with 2562 employees falling into this category

across the participating companies (32.64%). There are only 452 workers with an Occupational Certificate or Diploma (NQF 4), a percentage of 5.76. Even fewer employees (261, representing 3.32%) hold a National or Higher Diploma. Only 261 people amongst the participating companies have a first or an Honours degree (3.32%). There are 187 workers across the participating companies with only ABET 1 (below school entry level), a percentage of 2.38. The highest educational qualification (Masters and above) is held by 91 employees (1.16%).

Graphically the distribution of education levels across the sample is as follows:

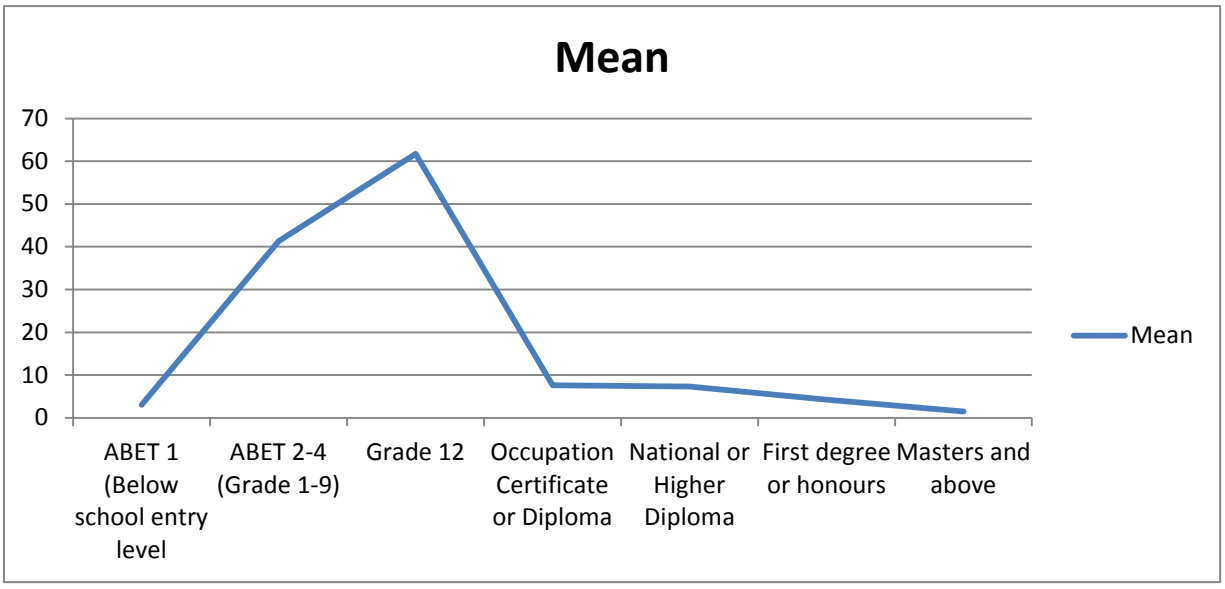

Figure 11: Mean educational level of employees amongst the participating companies

Turning to minimum and maximum numbers in a particular category across the participating companies: the number of employees who have a Grade 12 (Matric) qualification varies from 0-1215; and those with ABET 2-4 (Grade 1-9) qualifications, between 0 and 957. The number of employees with a level of education higher than Matric is proportionally very small. The general picture amongst the participating companies is that the majority of the workforce has low levels of post-school education and training.

4.2.4 Employment status of employees (as of 1 August 2012)

Table 24: Employment status of employees across the participating companies

Variable	Mean	Min - Max	Sum	%
Permanent	115.32	0 - 1919	7150	87.17
Fixed-term contract	12.98	0 - 484	805	9.82
Part-time/ casual	3.98	0 - 76	247	3.01
TOTAL NUMBER OF EMPLOYEES			**8202**	**100**

As noted earlier, the overall employee figure of 8202 differs from those used earlier (7850; 7907; 8122). Again, this could indicate that respondents are working from demographical figures that are not completely up to date or complete. The results should therefore be seen as approximate, rather than a completely accurate reflection of the employment status demographic across the participating companies.

Most employees amongst the participating companies (87.17%) fall into the 'permanent' employment category, with a mean of 115.32. One company employs 1919 people on a permanent basis. There are relatively few people on a fixed-term contract (9.9%), with a mean of 12.98. Part-time or casual labour makes up the smallest proportion at 3.01%, with a mean of 3.98. The overall picture, based on the participating companies, is that the plastics industry is a significant employer in South Africa.

4.2.5 Employee numbers per business function

Table 25: Employee numbers per business function across the participating companies

Variable	Mean	Min - Max	Sum	%
Production	101.79	0 - 2008	6209	77.40
Organisational structure (Marketing, Finance Administration, Management, SHER)	17.06	0 - 262	1058	13.2
Maintenance	7.81	0 - 136	453	5.65
Research and Product Development	2.2	0 - 24	130	1.62
Procurement	1.79	0 - 26	102	1.27
HR	1.19	0 - 9	69	0.86
TOTAL NUMBER OF EMPLOYEES			**8021**	**100**

As before, the overall employee figure of 8021 employees (rather than the earlier figures of 7850; 7907 and 8122), indicates that respondents may be working from figures that are not completely up to date, or that some typographical errors were made by respondents while typing the numbers into the online survey. In addition, some respondents did not fill in every section of the table for this section. The results should therefore be seen as approximate, rather than a completely accurate reflection of the distribution of employees amongst the business functions.

As would be expected in the industry, the highest number of employees in the participating companies (6209, a percentage of 77.4%) is found in Production. One of the participating companies has 2008 employees in this business function, as of August 2012. The Organisational Structure business function, comprising Marketing; Finance and Administration; Management and Safety, Health, Environment Risk (SHER) comes next at 13.2%, with a total of 1058 employees across the participating companies. The maximum number of staff employed in a single company in this business function is 262 employees.

The Maintenance business function (Electrical, Electronic, Mechanical cleaning, Disposal) is next (453 employees across the participating companies, or 5.65%), with a mean of 7.81 and a maximum number of employees in a single company of 136.

Research and Product Development (Engineers; Technologists – plastics, packaging, food) comes next, at 1.62% (a mean of 2.2). 130 people in this category are employed across the participating companies. The data indicates that there is one company that employs as many as 24 people in this business function.

Procurement and HR employ the least number of people, at 1.27% and 0.86% respectively.

The implications for training are that there is no “one size fits all”. The two business functions representing the highest numbers of employees across the participating organizations are Production, followed by Organisational Structure. This means that in terms of training content and process, interventions should be flexible enough to deal with the unique context of a Production environment (taking into account the impact of shifts,

for example). A different type of training is needed for employees in the Organisational Structure; Maintenance; R&D; Procurement and HR departments. Furthermore, training has to take into account the educational levels of employees in a particular company.

4.2.6 Disabled employee numbers per business function (as of 1 August 2012)

Table 26: Disability employee numbers per business function across the participating companies

Variable	Mean	Min - Max	Sum	%
Production	0.92	0 - 15	54	61.36
Organisational structure (Marketing, Finance Administration, Management, SHER)	0.41	0 - 7	24	27.27
Maintenance (Electrical, Electronic, Mechanical Cleaning, Disposal)	0.07	0 - 2	4	4.55
Research and Product Development (Engineers, Technologists – plastics, packaging, food) etc.	0.05	0 - 3	3	3.41
Procurement	0.03	0 - 1	2	2.27
HR	0.02	0 - 1	1	1.14
TOTAL NUMBER OF DISABLED EMPLOYEES			**88**	**100**

Employee numbers per business function all have a mean of less than 1, which indicates that many of the participating companies do not employ people living with disabilities. Not all companies completed this section of the questionnaire, however.

The Production business function employs 54 people in total across the participating companies, a percentage of 61.36. The Organisational Structure business function (Marketing; Finance and Administration; Management and Safety, SHER) is next, employing 24 people living with disabilities, or 27.27%. Maintenance employs 4 employees, a percentage of 4.55 of the total. Research and Product Development is next, with 3 employees (3.41%). Procurement and HR employ the lowest number of disabled employees, at 2.27% and 1.14% respectively.

Given the strength of the disability lobby in South Africa, the plastics industry could consider making more of an effort in this regard.

4.2.7 Employee numbers in the Value Chains

The next section of the questionnaire dealt with the number of employees per value chain. Respondents filled in numbers for only those value chains that they had identified as being relevant to their companies. During the process of analysing the data and writing up the findings, it became evident that some respondents did not understand all of the value chains and that this had affected some of the data. This issue will be discussed further where applicable under each Value Chain.

4.2.7.1 Industrial Rubber Conversion Value Chain

Table 27: Employee numbers in the Industrial Rubber conversion value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Production operator/packer	7.67	12	23	45.10
Raw material mixer	3.67	9	11	21.58
Other	2	4	4	7.84
Production supervisor	1	2	3	5.88
Packer	1.5	2	3	5.88
Machine setter	0.67	1	2	3.92
Granulator operator	1	2	2	3.92
Production manager	0.33	1	1	1.96
Assembly/ finishing supervisor	0.5	1	1	1.96
Finishing equipment operator	0.5	1	1	1.96
Assembly worker	0	0	0	0
TOTAL NUMBER OF EMPLOYEES			**51**	**100**

Amongst participating companies where the Rubber Conversion value chain is present, 'Production operator/packer' is the job with the highest number of employees across the participating companies, at 23 employees (45.10%). 'Raw material mixer' is next, with 11 jobs being recorded (21.58%). Next comes the 'Other' category, which employs 4 people

(7.84%). Survey participants were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' Although some respondents did tick the 'Other' option, no further details of these occupations were supplied.

The remaining occupations only list 2 employees or lower, with 'Assembly worker' scoring a zero response. This seems like an anomaly which could perhaps be explained by the job of 'Assembly worker' being an additional task undertaken by workers in one of the other listed occupations.

4.2.7.2 Employee numbers in the Installation, Repair and Maintenance (of thermoplastic or composite structures, plant or equipment) Value Chain

Table 28: Employee numbers in the Installation, Repair and Maintenance value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Other	3.88	94	132	28.7
Laminator	2.94	80	100	21.74
QC inspector	2.89	35	101	21.96
Fitter	2.06	15	70	15.22
Engineering technician	0.76	8	26	5.65
Welder	0.79	20	26	5.65
Construction supervisor	0.15	3	5	1.08
TOTAL NUMBER OF EMPLOYEES			**460**	**100**

In companies where the Installation, Repair and Maintenance value chain is found, the single occupation with the highest number of employees is the 'Other' category (a percentage of 28.7%, or a total of 132 people); followed by Laminator at 21.74% (100 people); Quality Control (QC) inspector at 21.96% (101 employees); Fitters at 15.22% (70 employees); Engineering technician and Welder (both at 5.65% or 26 employees); and lastly Construction Supervisor at 1.08% (5 employees across the participating companies).

Survey participants who had ticked 'Other' were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following occupations were listed:

- CNC operator
- Perspex fabricator
- CAD-CAM programmer
- Toolmaker
- Extruder
- Colour standards controller
- Chromer
- Embossing operator
- Engraver operator
- Slitter operator
- Packer
- Pouching operator
- Production management
- Woodworker
- Receptionist
- Industrial designer
- Electrician
- Boilermaker
- Chrome polisher
- Messenger
- Filmblowing assistant (sic)
- Handyman
- Marketing
- Engineering design
- Millwright
- Semi-skilled fitters

Those jobs highlighted in red text provide evidence of a misunderstanding of the value chain on the part of some respondents. These occupations are not likely to support the work of a

value chain where plant and equipment, fabricated from thermoplastics and polymer composites, have been erected in client sites. Plant and equipment of this nature is used in custom-made chemical and other processing plant tanks; for liners in waste and water treatment; corrosion control and materials handling applications. The value chain was introduced at the request of thermoplastics and polymer composite fabricators. We can therefore also assume that the companies supplying the information did not make use of the value chains which were published together with the survey.

One respondent added the comment: 'We are a small business and the two owners conduct all the skilled and administration functions required'. This 'multi-tasking' seems to be a trend amongst the small companies in the survey.

4.2.7.3 Employee numbers in the Mould and Tooling Manufacture, Repair and Maintenance Value Chain

Table 29: Employee numbers in the Mould and Tooling Manufacture, Repair and Maintenance value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Toolmaker	2.7	28	100	26.88
Electrician	1.28	16	46	12.37
Milling/ turning operator	1.28	28	46	12.37
Tool maker's assistant	0.83	10	29	7.79
Product designer	0.74	6	26	6.98
Cost estimator	0.54	5	19	5.11
Toolroom supervisor/ foreman	0.49	2	17	4.57
Engineering manager	0.44	2	16	4.3
Toolroom manager	0.38	2	14	3.76
EDM/ Sparking operator	0.33	4	12	3.23
Polisher	0.34	2	12	3.23
Pattern maker	0.26	5	9	2.42
Engineering analyst	0.2	7	7	1.88
Industrial designer	0.17	2	6	1.61

Draftsperson	0.17	4	6	1.61
CAD/ CAM programmer	0.11	1	4	1.08
Heat treatment operator	0.06	1	2	0.54
Other	0.03	1	1	0.27
TOTAL NUMBER OF EMPLOYEES			**372**	**100**

The occupation employing the highest number of people (100 in total) across the participating companies is that of Toolmaker, at 26.88%. This is to be expected, as the toolmaker is the productive entity in this field.

Next come Electrician and Milling/ Turning Operator (46 people, or 12.37%). Twenty nine Toolmakers are employed (7.79%); 26 Product designers (6.98%); 19 Cost estimators (5.11%); 17 Toolroom supervisor/ foreman (4.57%); 16 Engineering managers (4.3%); 14 Tool managers (3.76); 12 EDM/Sparking operators and 12 Polishers (3.23% each); 9 Pattern makers (2.42%); 7 Engineering analysts (1.88%); 6 Industrial designers and 6 Draftspersons (both at 1.61%); 4 CAD/CAM programmers (1.08%) and 2 Heat treatment operators (0.54%).

For the 'Other' category (0.27%), survey participants who had ticked this option were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following additional occupations were provided:

- Apprentice toolmaker
- Machine operator
- Machine setter

The last two occupations would be found in establishments where the toolmaker also has some production facilities.

Worth noting too, is the proportion of high-level skills (Engineering manager, Engineering analyst, Industrial designer and Product designer) and medium-level skills (Cost estimator and Draftsperson) in relation to the productive occupations (Toolmaker, Pattern maker, Milling/ turning operator, Electronic Discharge Machining (EDM)/ sparking operator,

Polisher, Heat treatment operator and Toolmaker's assistant total employed 80:210 or 1:2.625. For every 2.625 persons productively engaged in the toolmaking process, 1 person of high and medium level skills is required. We have not factored in the management positions, e.g. Toolroom manager, supervisor/ foreman and are simply illustrating the need to couple semi-skilled, skills, medium and high-level skills in a critical value chain such as this.

Another interesting statistic is the relatively large number of electricians employed by these operations: 1 electrician for every 2.17 toolmakers. In most establishments an electrician is a maintenance functions and one or two would suffice depending on the size of the business. Given the large proportion of electricians in the survey data we have to assume these electricians to be involved in the production process, i.e. fitting, repairs and maintenance of electrical equipment related to hot runners etc. It is unlikely that tool makers would employ so many electricians for general maintenance purposes. This is an interesting finding which should be checked.

4.2.7.4 Employee numbers in the Polymer Compounding Value Chain

Table 30: Employee numbers in the Polymer Compounding value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Packing assistant	4	36	116	39.45
Material mixer	2.14	15	60	20.41
Other	2.15	50	58	19.73
Compounding operator	1.76	20	51	17.35
Plastics or rubber technologist	0.11	1	3	1.02
Compounding supervisor	0.11	3	3	1.02
Chemist	0.07	1	2	0.68
Compounding manager	0.04	1	1	0.34
TOTAL NUMBER OF EMPLOYEES			**294**	**100**

Out of the occupations listed in the questionnaire, Packing assistant, has the highest number of employees (116, a percentage of 39.45); followed by Material mixer (60, a percentage of 20.41); Other (58 employees making up 19.73%); 51 Compounding operators (17.35%); 3 Plastic or rubber technologists and 3 Compounding supervisors (1.02% respectively); 2 Chemists (0.68%) and 1 Compounding manager (0.34%).

Regarding the 'Other' category, survey participants who had ticked 'Other' were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following additional occupations were listed:

- Material sorter
- Granulator operator
- Wash plant operator
- Band saw operator

The inclusion of these jobs by some respondents suggests that some companies are also recycling plants.

One respondent added the following comment: 'Some of these jobs overlap, so it is difficult to answer the exact number of employees. We have machine operators on each machine (6) and operators' assistants for each operator (8). We also have a weigher, etc.'

4.2.7.5 Employee numbers in the Polymer Composites Value Chain

Table 31: Employee numbers in the Polymer Composites value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Laminator	2.39	30	67	28.76
Mould repairer	1.36	25	38	16.30
Assembly worker	1.29	25	36	15.45
Production manager	1	8	27	11.59
Workshop supervisor	0.61	3	17	7.29
Material/ glass cutter	0.52	10	14	6.01
Grinder	0.43	5	12	5.15
Finishing worker	0.29	4	8	3.43
Polisher/ Release agent applicator	0.18	5	5	2.15
Gel Coater	0.18	3	5	2.15
Resin batcher	0.07	1	2	0.86
Spray painter	0.04	1	1	0.43
Other	0.04	1	1	0.43
Fairer	0	0	0	0
TOTAL NUMBER OF EMPLOYEES			**233**	**100**

Amongst the participating companies where this value chain is present, 'Laminator' is the occupation with the highest overall number of employees (67 people, or 28.76%). One company employs 30 people in this category. The occupation of 'Mould repairer' is next, with 38 people employed across the participating companies (16.3%); followed by 36 Assembly workers (15.45%); 27 Production managers (11.59%); 17 Workshop supervisors (7.29%); 14 Material/glass cutters (6.01%); 12 Grinders (5.15%); 8 Finishing workers (3.43%); 5 Polisher/release agent applicators 2.15%); 5 Gel coaters (2.15%); 2 Resin batchers (0.86%); 1 Spray painter (0.43%) and 1 Other((0.43%).

No employee numbers were noted for the occupation 'Fairer'. This is specifically a boat-building occupation.

Some of the low numbers may be accounted for by the fact that in many cases, the Laminator performs a number of the functions in the value chain, for example Material/glass cutter; Resin batcher; Polisher; Gel coater etc. It is only in larger plants, with high production rates, that these specialised jobs emerge.

With regard to the 'Other' category, survey participants who had ticked 'Other' were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following additional occupations were noted:

- Balancing machine operator
- Woodworker
- Saw operator

4.2.7.6 Employee numbers in the Printing, Decorating and Labelling Value Chain

Table 32: Employee numbers in the Printing, Decorating and Labelling value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Flexographic printer	1.44	19	52	21.31
Finishing equipment operator	1.42	46	51	20.90
Screen printer	1.08	13	39	15.98
Other	0.48	10	16	6.56
Labelling machine operator	0.4	5	14	5.74
Printing manager	0.33	2	12	4.92
Printing foreman	0.31	3	11	4.50
Artwork controller	0.22	3	8	3.28
Screen maker	0.22	2	8	3.28
Ink mixer	0.22	2	8	3.28
Pad printing setter and operator	0.19	3	7	2.87

Quality controller (printing)	0.19	2	7	2.87
Graphic designer	0.14	1	5	2.05
Plate maker	0.08	2	3	1.23
Offset litho printer	0.08	2	3	1.23
TOTAL NUMBER OF EMPLOYEES			**244**	**100**

Across the participating companies where this Value Chain is found, the occupation of 'Flexographic printer' has the highest number of employees (52, a percentage of 21.31); followed by 'Finishing equipment operator' (51 employees; 20.9%). The occupation of Screen Printer is next (39 employees, a percentage of 15.98); then 'Other' (16 employees, a percentage of 6.56). There are 14 Labelling machine operators (5.74%); 12 Printing managers (4.92%); 11 Printing foremen (4.5%); 8 Artwork controllers; 8 Screen makers and 8 Ink mixers (all 3.28%); followed by 7 Pad printing setters and operators and 7 Quality controllers (printing), both at 2.87%. There are 5 Graphic designers (2.05%); 3 Plate makers and 3 Offset litho printers (both 1.23%).

Looking specifically at the maximum numbers of employees employed by a single company in each occupation: the highest number of Finishing equipment operators is 46; for Flexographic printers, 19 and for Screen printers, 13. For the remaining occupations, 5 or fewer employees are the maximum number employed by a single company.

In the 'Other' category, survey participants who had ticked 'Other' were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following additional occupations were listed:

- Granulator operator
- Extruder operator
- Mixer
- Driver
- Loader
- Mounter

- Slitter
- Assistant

These jobs would be more accurately captured under the Production and Logistics value chains, however.

4.2.7.7 Employee numbers in the Quality Management Value Chain

Table 33: Employee numbers in the Quality Management value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Quality inspector	3.83	55	157	44.22
Quality viewer/ checker (plastics)	1.58	30	68	19.15
Quality manager	0.81	4	34	9.58
Quality assurance supervisor	0.8	4	33	9.3
Competent Person	0.35	5	15	4.23
Receiving inspector	0.34	2	14	3.94
Third Party Inspector	0.24	8	10	2.82
Laboratory technician	0.24	4	10	2.82
Quality assurance internal auditor	0.18	1	7	1.97
Laboratory supervisor	0.12	2	5	1.41
Inspector Pressure Vessels	0.02	1	1	0.28
Other	0.03	1	1	0.28
Quality viewer/ checker (rubber)	0	0	0	0
TOTAL NUMBER OF EMPLOYEES			**355**	**100**

Across the participating companies where the Quality Management value chain is present, the occupation of 'Quality inspector' has the highest number of employees (157, or 44.22%; followed by 'Quality viewer/checker (plastics)' (68 employees; or 19.15%). There are 33 Quality assurance supervisors (9.3%); 15 Competent persons (4.23%); 14 Receiving Inspectors (3.94%); 10 Third party Inspectors and 10 Laboratory technicians (both at 2.82%);

7 QA internal auditors (1.97%); 5 Laboratory supervisors (1.41%); 1 Inspector pressure vessels (0.28) and 1 'Other' occupation (0.28%).

Looking at maximum numbers of employees employed by a single company in each occupation: 55 Quality Inspectors are employed by one company; and 30 for 'Quality viewer/checker (plastics)'. There are 8 'Third party inspectors' in one company. The remaining numbers are 5 or below.

No employee numbers were noted in the occupation 'Quality viewer/ checker (rubber)'.

In the 'Other' category, survey participants who had ticked 'Other' were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' No additional occupations were listed, but the following comment was made by one respondent: 'Outsourced as a group resource therefore not measured in this business'.

4.2.7.8 Employee numbers in the Receiving, Storage, Dispatch and Logistics Value Chain

Table 34: Employee numbers in the Receiving, Storage, Dispatch and Logistics value chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Storeman	4.39	147	193	18.94
Truck driver	3.24	73	146	14.33
Truck drivers assistant	2.89	83	130	12.76
Forklift operator	2.77	23	122	11.97
Picker	2.33	30	100	9.81
Material handler	1.57	22	69	6.77
Raw material controller	1.33	31	60	5.9
Buyer	1.11	6	52	5.10
Logistics manager	0.85	14	39	3.83
Purchasing manager	0.77	9	34	3.34
Receiving clerk	0.74	4	32	3.14
Scale operator	0.62	6	26	2.55

Palletiser	0.21	4	9	0.88
Other	0.1	3	4	0.39
Crane driver	0.07	2	3	0.29
TOTAL NUMBER OF EMPLOYEES			**1019**	**100**

The single occupation with the highest number of employees across the participating companies is that of 'Storeman', at 193 (a percentage of 18.94). The occupation of 'Truck driver' comes next, with 146 employees (14.33%); followed by Truck driver's assistant (130, a percentage of 12.76); 122 Forklift operators (11.97%); 100 Pickers (9.81%); 69 Material handlers (6.77%); 60 Raw material controllers (5.9%); 52 Buyers (5.1%); 39 Logistics managers (3.83%); 34 Purchasing Managers (3.34%); 32 Receiving clerks (3.14%); 26 Scale operators (2.55%); 9 Palletisers (0.88%); 4 'Other' occupations (0.39%) and 3 Crane drivers (0.29%).

If we look at the maximum number of employees employed by a single company in a single category, we see that the figure for 'Storeman' is 147. This seems to be a bit high and is possibly the result of a typographical error by a respondent. The maximum figure for 'Truck driver's assistant' is 83 and for 'Truck driver', 73. One company employs 31 'Raw material controllers'. The maximum number of 'Pickers' in a single company is 30. The occupation of 'Forklift operator' follows at 23; then 'Material handler' at 22 and 'Logistics manager' at 14. The remaining occupations fall below 10.

In the 'Other' category, survey participants were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following additional occupations were noted:

- Shipping clerk
- Warehouse assistant

4.2.7.9 Employee numbers in the Recycling Value Chain

Table 35: Employee numbers in the Recycling Value Chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Other	6.16	196	197	25.16
Sorter/ segregator	5.79	126	191	24.39
Extrusion operator	5.3	87	175	22.35
Packer	2.55	45	84	10.73
Shredder operator	1.53	12	52	6.64
Production supervisor	0.85	8	28	3.58
Washer operator	0.67	10	22	2.81
Production manager	0.36	2	12	1.53
Dryer operator	0.36	4	12	1.53
Collector	0.24	5	8	1.02
Collection agent	0.06	1	2	0.26
TOTAL NUMBER OF EMPLOYEES			**783**	**100**

The category with the highest number of employees is 'Other', with 197 employees (a percentage of 25.16). Survey participants who had ticked this option were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following occupation was listed:

- Recycling Consultant

The next occupation with the highest number of employees across the participating companies is that of 'Sorter/ segregator' (191 employees, or 24.39%). This is followed by 'Extrusion operator' (175 employees, or 22.35%); Packer (84 employees, 10.73%) and Shredder operator (52 employees, or 6.64%). There are 28 Production supervisors (3.58%); 22 Washer operators (2.81%); 12 Production managers and 12 Dryer operators (both at 1.53%); 8 Collectors (1.02%) and 2 Collection agents (0.26%).

Looking specifically at maximum numbers in a single occupation employed by a single company: the figure for 'Sorter/ segregator' is 126; 87 for 'Extrusion operator'; 45 for 'Packer' and 12 for 'Shredder operator'. The remaining occupations have a maximum of 10 or less.

One respondent commented: 'We have 8 machine operators and one team leader that perform all functions as required: extruder operator, granulator, collector, scale operators etc.' This is typically the profile of a micro-enterprise. It is only when an establishment grows, and starts to generate large throughputs, those workers become more specialised.

4.2.7.10 Employee numbers in the Volume Conversion Value Chain

Table 36: Employee numbers in the Volume Conversion Value Chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Production operator/ packer	31.19	614	1154	41.95
Packer	19.29	463	656	23.85
Machine setter	9.79	172	333	12.10
Production supervisor	3.35	27	124	4.51
Raw material mixer	2.23	15	78	2.84
Production manager	2.03	43	73	2.65
Assembly worker	1.91	28	65	2.36
Mould changer	1.46	15	51	1.85
Granulator operator	1.55	15	51	1.85
Finishing equipment operator	1.39	46	46	1.67
Other	1.25	40	40	1.45
Production planner	0.89	8	31	1.12
Operations manager	0.83	8	29	1.05
Assembly supervisor	0.3	5	10	0.36
Finishing supervisor	0.24	3	8	0.29
Barcode labeller	0.06	2	2	0.1
Paint kitchen operator	0	0	0	0

Spray painter	0	0	0	0
Robotic spray paint operator	0	0	0	0
TOTAL NUMBER OF EMPLOYEES			**2751**	**100**

The overall employment figures for the Volume Conversion Value Chain are significantly higher than for any of the other value chains. The highest figures are found in the Production operator/ packer category (1154 employees, a percentage of 41.95); followed by Packer (656 employees, or 23.85%) and Machine setter (333 employees, at 12.10%). There are 124 Production supervisors (4.51%); 78 Raw material mixers (2.84%); 73 Production managers (2.65%); 65 Assembly workers (2.36%); 51 Mould changers and 51 Granulator operators (1.85%); 46 Finishing equipment operators (1.67%) and 40 employees in the 'Other' category. Survey participants who had ticked 'Other' were given the opportunity to respond to the question: 'Have any jobs been left out of the list?' The following occupation was listed:

- General assistant

Next come Production planners (31 at 1.12%); Operations managers (29 at 1.05%); 10 Assembly supervisors (0.36%); 8 Finishing supervisors (0.29%) and lastly 2 Barcode operators (0.1%).

No employee numbers were recorded in the following occupations: Paint kitchen operator; Spray painter and Robotic spray paint operator.

With regard to the maximum numbers of employees employed by a single company in one occupation, the figure is 614 for Production operator/ packer; 463 for Packer; 172 for Machine setter; 46 for Finishing equipment operator; 43 for Production manager; 28 for Assembly worker; 27 for Production supervisor and 15 for Mould changer and Granulator operator. The remaining occupations have a maximum of lower than 10.

4.2.7.11 Employee numbers in the Thermoplastic Fabrication Value Chain

Table 37: Employee numbers in the Thermoplastic Fabrication Value Chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Assembly worker	1.62	26	47	48.45
Workshop supervisor	0.38	7	11	11.34
Production manager	0.3	3	9	9.28
Competent Person	0.3	3	9	9.28
Finishing worker	0.27	5	8	8.24
Welder	0.21	4	6	6.19
Cutter	0.21	3	6	6.19
Inspector Pressure Vessels	0.03	1	1	1.03
Third Party Inspector	0	0	0	0
Other	0	0	0	0
TOTAL NUMBER OF EMPLOYEES			**97**	**100**

The single occupation with the highest number of employees across the participating companies is that of Assembly worker (47 workers, comprising 48.45%). Next comes Workshop supervisor (11 employees, or 11.34%). There are 9 Production managers and 9 Competent persons (9.28% respectively); 8 Finishing workers (8.24%); 6 Welders, 6 Cutters (at 6.19% each); and 1 Inspector pressure vessels (1.03%).

Looking specifically at the maximum numbers of employees in a single category: one company employs 26 Assembly workers. The maximum employed in one company in the occupation of Workshop supervisor is 7; for Finishing worker, 5 and for Welder, 4.

The figures for Production manager, Competent person and Cutter are the same, at 3. Only one 'Inspector Pressure Vessels' is employed across the sample. No employee numbers were recorded in the following occupation: 'Third party inspector' and no additional occupations were added by participants in the 'Other' category.

4.2.7.12 Employee numbers for Suppliers of Thermoplastic Raw Materials; Thermosetting Resins, including polyurethanes; or Semi-finished Products (sheets, pipes, profiles)

Table 38: Employee numbers in the Thermoplastic Raw Materials and Thermosetting Resins Value Chain in participating companies

Variable	Mean	Max in a single company	Sum	%
Thermoplastics raw materials	9	45	45	100
Thermosetting resins	0	0	0	0
Semi-finished products	0	0	0	0
TOTAL NUMBER OF EMPLOYEES			**45**	**100**

The only category with a response is that of 'Thermoplastics raw materials', with 45 employees across the participating sample of companies.

4.3 3. Employee Profile - concluding comments

What follows presents a summary of the key findings with regard to the "size and shape" of the 62 participating companies, specifically in relation to the demographical profile of employees and the numbers employed in specific business functions and value chains. The purpose of this section of the questionnaire was also to identify whether there were any occupations in the value chains that were not reflected to date.

As noted with the organisational profile, the sample is too small to make firm generalisations to the overall population, therefore what follows represents a 'snapshot' of the 62 participating companies and the trends and patterns that have been found. Again, some may apply to the general population, but this would need to be tested by further empirical research and/or access to an accurate WSP dataset.

Race and gender

The overall racial distribution of the 62 participating companies is 51.85% African; 27.11% Coloured; 13.25% White and 7.79% Indian, making up a total of 8122 employees across the 62 participating companies.

Females are in the minority across all the racial groups. The overall gender balance in the sample is 72.63% males to 27.38% females.

Looking at race and gender: African males are in the majority, at 41.09%, followed by Coloured males at 16.2%; Coloured females at 10.92%; African females at 10.76%; White males at 8.91%; Indian males at 6.44%; White females at 4.33 % and Indian females at 1.35%.

To what extent the low rate of employment numbers of Indian females is as a result of the low participation of KZN companies in the survey or is a real reflection of the their participation I in the industry is something that needs to be tested further.

Age of employees

The highest percentage of employees is found in the 30-39 cohort (35.04%); followed by the 18-29 year cohort (27.61%); the 40-49 cohort (23.07%); the 50-59 year cohort (11.55%) and lastly, 2.73% of employees in the 60 plus category. This was a very unexpected finding. The largest number of employees (62.65%) in the industry is under 40 years old and 85.72% of the employees are under 50 years of age. This requires further testing and access to an accurate WSP dataset.

The overall employee figure of 7907 employees (as opposed to the earlier figure of 8122 mentioned under Race and Gender, a difference of 215 employees) indicates that respondents may be working from figures that are not completely up to date. The results should therefore be seen as approximate.

Members of the Plastics Chamber Operations Team found this data to conflict with their knowledge and experience of the industry. This finding could have a significant impact on the way the plastics and related industries evolve in future years. It is, therefore, important that this finding be corroborated or refuted against other data, e.g. from cleaned up information from Workplace Skills Plans.

Educational level of employees

Again, it should be noted that the total employee figure of 7850 employees differs from the figures of 7907 and 8122 employees in other sections. This means that the data should therefore be treated as approximate, rather than a completely accurate reflection of the educational demographics across the companies.

The general picture amongst the participating companies is that the majority of employees have low levels of post-school education and training. 48.75% have only a Grade 12 (Matric); 32.64% have ABET 2-4 (Grade 1-9); 2.38 % have ABET 1 (below school entry level). Only 5.76% have an Occupational Certificate or Diploma (NQF 4). Even fewer employees (3.32%) hold a National or Higher Diploma. 3.32 % of employees have a first or an Honours degree (3.32%) and 1.16% of employees have the highest educational qualification (Masters and above).

Employment status

Again, the overall employee figure of 8202 differs from totals in other sections (7850; 7907; 8122); therefore, the figures should be regarded as approximate.

The majority of employees amongst the participating companies fall into the 'permanent' employment category (87.17%). There are relatively few people on a fixed-term contract (9.9%) and part-time or casual labour makes up the smallest proportion at 3.01%. The overall picture, based on the participating companies, is that the plastics industry is a significant employer in South Africa.

Employment numbers per business function

The total number of employees for this item of the survey was 8021 (previous totals being 8202; 7850; 7907 and 8122).

As would be expected in the industry, the highest percentage of employees (77.4%) work in the Production business function. The Organisational Structure business function, comprising Marketing; Finance and Administration; Management and Safety, Health, Environment Risk (SHER) comes next at 13.2%; followed by the Maintenance business function (Electrical, Electronic, Mechanical cleaning, Disposal) at 5.65%; Research and Product Development (Engineers; Technologists – plastics, packaging, food) at 1.62%. Procurement and HR employ the least number of people, at 1.27% and 0.86% respectively.

The R&D figure of 1.62% is interesting in the light of the importance attached to the R&D function noted under the Organisational Profile section. The general picture would seem to be that the R&D functions are staffed by a similar number of employees as for procurement and HR. Whether this proportion is growing needs to be researched further, see *Recommendation 5*, p 54.

The implications for training are that there is no 'one size fits all'. Training interventions should be flexible enough to deal with the different business functions and their unique needs and dynamics (for example shift work in a Production environment). Furthermore, given what was noted earlier regarding educational levels of participating companies, the training that is offered will have to take into account the educational levels of employees in a particular company.

Disability

Only 88 employees with a disability were identified across the participating companies. As noted earlier, the figure for total number of employees varies from 7907 to 8202; therefore the percentage of disabled employees would appear to be in the range of 1.11 % to 1.07 %. Not all companies completed this section of the questionnaire; therefore, the percentages may well be higher than those reflected in the findings.

61.35% of this population of employees living with a disability are employed in Production; 27.27% are employed in the Organisational Structure business function (Marketing; Finance and Administration; Management and Safety, SHER); 4.55% in Maintenance and 3.41% in Research and Product Development. Procurement and HR employ the lowest number of disabled employees, at 2.27% and 1.14% respectively.

Value Chains

The next section of the survey asked respondents to identify the numbers of employees in each Value Chain that their company is involved in. This question linked back directly to the earlier question on Value Chains under Organisational Profile.

The approach using value chains yielded rich information about the range of firm activity in the Plastics Industry and have also identified some missing occupations, for example in the Installation, Repair and Maintenance (of thermoplastic or composite structures, plant or equipment) Value Chain, the following additional occupations were listed:

- Woodworker
- Receptionist
- Industrial designer
- Electrician
- Boilermaker
- Chrome polisher
- Messenger
- Filmblowing assistant (sic)
- Handyman
- Marketing
- Engineering design
- Millwright
- Semi-skilled fitters

In the Mould and Tooling Manufacture, Repair and Maintenance Value Chain, the following additional occupations were listed:

- Apprentice toolmaker
- Machine operator
- Machine setter

The last two occupations would be found in establishments where the toolmaker also has some production facilities.

In the Polymer Compounding Value Chain, the following additional occupations were listed:

- Material sorter
- Granulator operator
- Wash plant operator
- Band saw operator

The inclusion of these jobs by some respondents suggests that some companies are also recycling plants.

In the Polymer Composites Value Chain, three additions were suggested:

- Balancing machine operator
- Woodworker
- Saw operator

For the Printing, Decorating and Labelling Value Chain, the following additions were made:

- Granulator operator
- Extruder operator
- Mixer
- Driver
- Loader
- Mounter

- Slitter
- Assistant

These jobs would be more accurately captured under the Production and Logistics value chains, however.

In the case of the Quality Management Value Chain, no additional occupations were listed, but the following comment was made by one respondent: 'Outsourced as a group resource therefore not measured in this business'.

For the Receiving, Storage, Dispatch and Logistics Value Chain, the following additional occupations were noted:

- Shipping clerk
- Warehouse assistant

One additional occupation was added to the Recycling Value Chain:

- Recycling Consultant

For the Volume Conversion Value Chain, the following suggested addition was made:

- General assistant

No additional occupations were suggested for the Thermoplastic Fabrication Value Chain.

With regard to the number of employees in each Value Chain, some of the figures are less than useful. This could be for a number of reasons:

- It was evident that some of the respondents did not fully understand the value chains. This skewed the numbers.
- The issue noted earlier of employees being involved across a variety of business functions applies equally to the value chains. One respondent noted: 'We have many

people performing various functions. It was quite hard to link the survey to the particular value chains, as our company does not really operate similarly'.

- The comment was also made that it was sometimes difficult to distinguish between occupations within a single value chain, with one respondent noting: 'Some of the jobs obviously overlap, and therefore the job descriptions overlap'.
- A respondent from the rubber industry noted: 'It was difficult to relate the categories of rubber work to the generic plastic work, where possible I have given indication of numbers'.

The survey data from the participating companies, when seen as a whole, rather than as individual components, suggests the following:

- The very skewed age profile in the industry will have implications if the older cohort is to be used for mentoring, coaching and on-the-job training. Such individuals will be rare and become more so in the next five to ten years. To verify if this is valid for the sector as a whole would need further investigation.
- On the other hand it suggests that management is younger and possibly more open to new ventures, new initiatives and more collaborative work. The down side is that they may need to be exposed to a wider variety of dedicated skills development processes. This was touched on in the 2012 regional workshops, i.e. the need for executive courses; exposure to local and overseas expertise; greater collaboration and sharing of intellectual property.
- It would also appear that there is a greater reliance on networks of suppliers and service providers amongst convertors and fabricators. This is a very different type of business model where self-reliance, where possible, was a cornerstone of the business aspiration.
- Finally, the education profile of the industry has changed somewhat from the 1990s and early 2000s, where the owners or general managers of many companies were trained artisans, many of whom started their careers in the late 1960s and 1970s. This generation has retired and a new, more formally educated and younger generation of managers now seems to be at the helm.

The combination of factors points to the emergence a different education and training climate, as well as a different management climate. Many of these trends will be evident in the following chapter dealing with the regional networks.

Chapter 5: Findings from the Regional Workshops

5.1Introduction

AS discussed in the methodology section (Chapter 2) the regional workshops took on a very different flavour from what had been expected and generated some very interesting, new data. This data suggests that the Plastics Chamber and merSETA will have to revisit many of their underlying assumptions and consider alternative approaches to skills development.

5.1. Workshop themes

Common themes emerged at all the workshops. The following have been selected in terms of factors impacting on the future of the plastics industry.

5.3.1 Weaknesses and threats

Macro environment

- Cheap imports, skewed trade protection
- High input costs
- Regulatory and compliance pressure and the high cost of compliance
- Poor image of the plastics industry (lower-end products and environmental concerns)

Industry-internal issues

- A lack of vision, innovation, and of a "driving body for change"[3]
- A lack of a culture of sharing and collaboration
- The challenge and cost of shifting from old to new manufacturing technologies
- Changes required to respond to "green" issues and concerns

A shortage of skills

- Difficulties in attracting and retaining skills, emigration, a lack of career pathing (development and progression opportunities)

[3] Workshop Participant, Cape Town. There was, however, acknowledgement by the group that Plastics | SA was becoming more proactive in this respect

- A lack of good foundational knowledge and skills (poor basic education); a lack of well-trained employees; a negative culture and a poor work ethic
- An inflexible grant system and slow payments; sudden changes to the grant system; a grant system not always appropriate to plastics industry needs, e.g. emphasising artisan development whereas in the plastics industry the need was for production staff

5.3.1 Strengths and Opportunities

Current capabilities

- Current industry experience and expertise (but it is ageing)
- Some world-class companies (or close to being so)
- New technology enabling improved or lower cost solutions
- Some companies have developed IT-based manufacturing systems
- Quality of local products is reasonably good in comparison with the quality of many imports

Improvement programmes

- Government and other incentives and grants
- Cluster initiatives, e.g. Durban Automotive cluster
- Bench marking services
- Original Equipment Manufacturer (OEM) supplier development programmes, e.g. automotive companies
- Technology partnerships with overseas companies

New products and markets

- New technology enabling new solutions, new products and new markets
- Economic downturn creating changes in demand, requiring agile responses, e.g. pack-size variations, down-sizing
- Green solutions involving a greater volume of plastics and new applications for re-used or recycled materials
- Africa as a new market for current products

Networking, collaboration and idea sharing

- Social media to create discussion platforms
- Sharing ideas with other plastics companies
- Technology partnerships

Refocusing training

- Training for executives, production and technical staff
- Training staff for the long-term
- Overseas visits
- Trade shows

Tacit underlying thread: Behind all the discussions was a barely articulated action theory. This action theory can be summarised as follows:

> IF the plastics industry is going to thrive, THEN companies will have to change the way they do business and become more efficient and sustainable
>
> IF plastics companies are going to have to change their way of doing business, THEN management will have to learn new approaches to the manufacturing game
>
> IF management applies the new approaches, THEN they and their staff will require a different set of skills
>
> IF companies want to acquire these new sets of skills, THEN they will need a new kind of training intervention
>
> IF companies engage in training, THEN the training should support company initiatives to innovate, improve and transform

Management "training": Although there were many mid-level managers amongst the participants there was a consistent view that management needed training or, more likely, retraining. 'Maybe we focus training on the wrong people: an executive training programme is also important.' (Workshop participant, Cape Town)

Their underlying concern was that many managers were stuck in old paradigms and applied received or conventional wisdom. Such tried and trusted approaches were no longer useful in an environment of fast change, increased competitiveness and cheap imports. The objective of the retraining was to get managers to consider and apply new ways of managing, manufacturing, and product and market development. The management training

they were considering was not necessarily comprised of formal courses (in fact such courses were unlikely to succeed) but would rather consist of a combination of:

- input from experts,
- overseas visits,
- technology partnerships, and
- information exchange with other local plastics companies.

New approaches to manufacturing: Participants suggested a variety of approaches to creating internal shifts. Most of these were based on a *kaizen* approach of changes realised through continuous improvement projects. Such projects mostly involve cross-function teams and relatively short turn-around times of approximately two weeks. To successfully implement such projects requires changes in work culture, i.e. project-based focus, democratic management style and employee involvement. Several participants noted that:

- for these projects to be successful they needed training support, e.g. team work, problem solving techniques etc.
- that such projects were, in fact, learning processes in themselves and that all members of the team gained additional knowledge and expertise

Collaboration vs. anti-competitive behaviour: There was an acknowledgement that information exchange did run the risk of contravening the Competition Act. There were, however, many general issues that plastics companies shared and these could be tackled without becoming involved in collusion in market share or pricing. One of the examples given was that when Company A brought in an expert to workshop with their senior management, they invited companies in their immediate vicinity to share in the event. The visitors were not allowed into the production or tooling departments. These invited companies were also often not in direct competition: they could be using different processing technologies, producing different products and serving other markets from the host company. Information sharing in these cases could not be confused with collusion. This type of collaboration is often referred to as co-opetition, (see Brandenburger and Nalebuff, 1997).

5.4 Key drivers for the future

Based on the above discussion participants identified the following as the key drivers for the plastics industry for the foreseeable future:

- Sustainability, including managing environmental impact
- Global competitiveness
- Revised and refocused approach to training
- Sharing, communication and networking
- Attraction and retention of high- and medium-level skills
- Research and development capacity

5.5 Possible scenarios for the plastics industry in the foreseeable future

Three scenarios emerged out of the discussions. These were:

Scenario 1: Going down the plughole:

- Lack of incentive to compete against cheap imports, resignation, no innovation or renewal, the industry slows down, factories close.

Scenario 2: The clogged highway:

- Continue as we are, putting up with all the constraints, blockages, toll gates and wild drivers
- Eventually this will become Scenario 1

Scenario 3: The take-off:

- Provide an injection of something into the industry so that it starts growing again; new products; niche markets; export products blossom and industry booms again etc.

Participants considered Scenario 1 an unpalatable option, although a few conceded that it was probably a realistic appraisal of where a number of plastics companies found themselves at present.

Scenario 2 probably best described the current position of the industry as a whole. Given this state of affairs and given that the plastics industry doesn't want to slip into Scenario 1 it will get to the point where the players will have to make a choice: will they close their doors, or will they start to innovate? The plastics industry as a whole was currently quite risk adverse. If it wanted to change it would have to start to take some risks in order to innovate.

Scenario 3 was considered as the only feasible option for survival, let alone growth. It would require a combination of interventions to shift from Scenario 2 to Scenario 3. Training had a key role to play, but not as training was currently conceptualised, implemented or incentivised.

5.6 Impact on skills development

The impact, in turn, of the key drivers on skills development would be as follows:

- A shift from the short-course paradigm to an extended training period for new entrants in apprentice-style programmes
- Change the current training paradigm to encourage knowledge transfer outside of formal courses and a just-in-time focus
- The development of a coherent strategy and approach to attracting talent

There were some intensive discussions about the current training paradigm. On the one hand the current providers were providing a useful service and, in general, the companies attending the workshops made considerable use of their services. On the other hand there was a strong feeling that current content and delivery mechanisms were inadequate. Participants felt that the industry needed to:

- Apply some out-of-the-box thinking to training
- Adapt approaches to training to what suits learners and workplaces
- Consider social media and e- and m-learning and other delivery mechanisms
- Become more flexible – develop "horses-for-courses"
- Redefine content and add general skills that add greater value to company processes, i.e. implementing just-in-time continuous improvement projects, 5S-

housekeeping, energy awareness, and soft skills such as team work; consider integrating these into the technical training

- Shift emphasis from low- to medium- and high-level skills

Shift from formal to informal training: Equally important was the fact that more attention and effort should be given to on-the-job training and a broad exposure to the full production process for all employed in the organisation including non-production staff. There should also be a greater emphasis on improving knowledge transfer from course to workplace. This was the responsibility of employers but they would need guidance on providing more coaching and mentoring on the shop floor. One of the options was to use newly retired people.

Attracting talent: The industry needed a national strategy and process for attracting talent but there also had to be local support for such a process. The strategy had to make the industry more attractive to school and university students before they left the institution. This should also be supported by involving interested students in company visits, follow up sessions and even mentoring.

One company used a strategy of recruiting University of Technology diploma students and employing them on the shop floor, providing them with exposure to all aspects of the business and then training them in that field which interested them the most. The students, mostly but not exclusively engineering students, were either currently studying or had been unemployed for a period of time after graduation. This strategy was a long-term one and as a result fairly costly, but it had been used for approximately 15 years (see “success stories” below).

5.7 Success stories

During the workshops many of the discussions were illustrated by stories from the participants about what they have done. It was clear that these companies were being pro-active. The following are selected examples:

1. Change to LED lighting in a smallish medium-sized company resulting in reduced power consumption and saving of R 80 000 and a pay back on investment within 5 months.
2. A series of projects reduced the carbon footprint significantly.
3. Introduction of IT resource planning and manufacturing systems, in some cases locally developed, resulted in cost savings, more reliable production, greater uptime and better machine utilization. Implementation of the systems requires thinking of your business as a series of value chains; this in turn can lead to implementing other quality improvement systems, such as lean (reducing wastes), de-bottlenecking and process re-engineering.
4. Bench marking processes with local and overseas organisations led to revised and improved manufacturing processes, including the manufacture of tooling.
5. Continuous improvement programmes, such as OEM-led programmes, and cluster initiatives (Durban Automotive Cluster, in particular; at least three plants had implemented a propriety approach called TRACC, which was based on the 5S-housekeeping principles).
6. Use of continuous improvement projects within a company developed capacity to adapt to changes; during the downturn in 2008/9 the company instituted a policy of not retrenching but looking for additional opportunities; they were able to integrate the manufacturing capacity of a series of distressed companies into their own operations. In one case it involved taking over a completely different manufacturing process, optimising it and integrating it into their production capability.
7. Long-term investment in employing and training graduates from universities of technology and Further Education and Training Colleges; the cost was high but when the economic downturn arrived the team was able to making significant changes to manufacturing process, introducing new processing technologies and products changes and the investment paid off.
8. Appointing recently retired persons as shop-floor coaches, resulting in knowledge transfer (during normal work there is insufficient time for this kind of knowledge transfer).

9. Integrating R&D as a core function of business to develop new solutions for clients; solve production problems; investigate customer complaints to provide a rational basis for resolving these issues.

The success stories had an energising effect on other participants and also triggered additional suggestions. Such success stories could be written up and used as examples and as encouragement to other companies in the plastics industry.

Recommendation 11: *Research and write up the selected success stories as cases studies to illustrate how companies can make significant changes to their future.*

Chapter 6: Concluding Comments and Recommendations

6.1 Introduction

The research process was both disappointing and invigorating: disappointing firstly because the response to the on-line survey was below expectations and secondly because the level of support for the regional workshops was not high; invigorating because the research process yielded a considerable amount of rich information, some of it new, some expected and some surprising.

While the sample size of the survey cannot be regarded as representative, the data does provide sufficient indications of possible trends which could be explored further. The piloting and development of an online survey instrument has provided an innovative methodology that can be used and adapted in a variety of contexts. In addition, the Value Chain methodology proved its value.

Data collected at the regional workshops was extremely rich, however. From the inputs at the workshops, we could identify unequivocal trends which were observable in all three of the major economic hubs: Cape Town, Durban and Johannesburg,

Specific recommendations have been made in the concluding comments of each chapter throughout the report – these are not going to be repeated. This section will consider the research context and outcomes more generally and make some additional high-level recommendations that should be considered.

6.2 Lessons from the project implementation

A number of issues arose during the planning and implementation of the project:

- The gap between the initial project proposal at the Inter-Chamber meeting and the detailed planning process in June 2012 was too great
- As a result the initial plan was too ambitious for the level of funds allocated to the project

- It took too long to obtain the Workplace Skills Plans data: there were overlaps in the data collected and the survey could have been more targeted – but in the end this data proved to be unusable, see Chapter 3.
- The project plan did not build in sufficient project management time, or time for communication and other project related activities
- The assumption that people would fill in the survey at the workshops was wrong
- The rubber industry only became involved at a very late stage
- There was a disappointing response to the survey and workshops - despite all the efforts to increase industry awareness and interest
- Few senior managers in the industry were involved – the original planning to have a focus group session with "captains" of industry had to be shelved because of funding constraints
- A regional workshop or workshops in the Eastern Cape also had to cancelled because of funding constraints
- The funding constraints also meant that there was no real space for an extensive literature review or for a detailed data analysis of existing datasets
- The planned times for the workshops were too long

Arising from these issues, a number of lessons can be learned:

- The research agenda should be prioritised and then structured to fit the funding available
- Possible funding partnerships should be investigated
- Workshops should not last longer than 3-4 hours, and should preferably take the form of a structured breakfast session

In addition there were a number of general lessons learned during the research process:

- The regional workshops resulted in considerable information-sharing, not only between participants and researchers, but also amongst participants and the local and national players. This provides for an opportunity in the future.
- The researchers planned and allocated time to collate and process the workshop information directly after each workshop. This proved to be essential given the tight time-frames within which the data collection process took place.

- The capturing of data "live" in the workshops is a powerful tool from a process point of view.

6.3 Lessons learnt from the online survey

In designing and implementing the online survey, several lessons were learned. These should be considered when planning future research projects of this nature.

The low response rate to the survey could have several causes. The data collection part of the research had originally been planned to take place in the first half of the year, but difficulties in concluding the contracts meant that the data collection process only commenced in late August. As pointed out in the Cape Town workshop and confirmed by the Plastics Chamber Operations Team, the plastics industry traditionally becomes busier from August onwards as companies gear up for the summer and Christmas trade. This is particularly true in the packaging market but also affects other markets as well. It was also noteworthy that extending the deadline for completion twice and offering a prize for participating in the survey did not have a marked effect on increasing participation. The bulk of responses came early in September, shortly after the survey was launched.

Considerable efforts were made to ensure the companies in the industry were aware of the survey. Plastics SA apprised all its affiliate associations and used its various communications channels to make companies aware of the importance of the survey. The survey was publicised at well-attended workshops in September and early October organised by Plastics SA and the Department of Trade and Industry (dti). The workshops dealt with the various incentives being offered to manufacturers. Plastics SA regional managers and staff also promoted the survey in their interactions with their clients.

Recommendation 12: *The timing of such surveys should be carefully considered and, where possible, planned for the winter months when the industry is traditionally less busy.*

Other factors that may have contributed to the low response rates include the following:

- Many companies do not have the statistics readily available

- The statistics are not necessarily 100% accurate (this was evident in the variations in employee numbers that was pointed out earlier in Chapter 4)
- Many companies are so focussed on survival that they have little time for such activities

The Plastics Chamber Operations Team also noted the drop in the numbers of Workplace Skills Plans submitted by industry between 2008 and 2012. They attributed this to the change in the system which meant that Skills Development Facilitators (SDF) were no longer as active in the collection and submission of data. The question as to whether there would have been a greater response rate if SDFs could have been mobilised to support the data collection was moot, but interesting.

Plastics SA also noted that it had taken quite a long time for industry to support their recycling surveys. Their methodology was different – they used a single researcher to interview key informants in industry – and they had had several iterations and updates of the survey. It was evident that Plastics SA now had much more support from industry. Industry now valued the information and trusted the research process.

Plastics SA reported that two industry associations were in the process of re-establishing themselves, namely the industrial rubber and the polymer composites associations. Both had indicated an interest in using the survey to establish more clearly the size and shape of their respective industries. If they did so, they would in all probability share the information with the Plastics Chamber.

Recommendation 13: *The Plastics Chamber should continue to use surveys of this nature to collect information but, perhaps, in a more focussed form (i.e. sub-industries) and using additional methods to get greater participation. The alternative is a much larger (and more expensive approach) using a greater number of researchers using one-on-interviews and on-site data capturing.*

6.3.1 Survey data

One of the more intriguing aspects of the survey data is a larger than expected number of people employed in research and development, see Figure 8, p 53. Together with inputs from the regional workshops, we are drawn to the conclusion that there is currently a greater interest in research and development activities, at least in some of the participating companies. It is a fairly generally accepted truth that for an industry to grow, it must innovate; and innovation leads to new products, new ventures and employment growth.

However, in order to innovate, the Plastics Chamber, merSETA, dti and industry bodies will have to work together to grow and support innovation capability. This concept is unpacked in the recommendations, but first the regional workshop process and its outputs need to be reviewed.

6.4 Lessons learnt from the regional workshops

As in 2011, the regional workshops proved a valuable method of collecting information. Based on the lessons learned in 2011 the collection mechanisms were strengthened by the use of recordings and capturing group (or in some cases, individual) feedback verbatim, as described in Chapter 2.

The correlation between the various centres was extremely high and consistent. Very similar views and approaches were articulated during the early parts of the workshops. But, as in 2011, the approach was adopted of testing information gleaned from one workshop in the subsequent workshops. The scenarios developed at the Cape Town workshop were used at subsequent workshops and proved to be valid.

As in 2011, there was also a strong feeling that many of the participants “needed” to be there. There was a deep interest in the current state of the industry, initiatives to bring about improvement and learning from other participants. Each workshop was, in fact, a learning event, a community of practice in action.

In addition, it was also evident that there was a deep commitment from the participants to the future of the plastics and rubber industries, as well to the development of the people employed in it.

So it was disappointing to note that so few merSETA staff and Plastics Chamber members attended the workshops. This was a lost opportunity to engage with actual industry players and hear their views directly instead of through some intermediary. The frustration expressed about the merSETA grant system and the way it is administered has been captured in the text of the report. However, being at the workshop and hearing the tone of voice and the outbreak of spontaneous laughter when these points were raised, is far more eloquent than the words in black and white.

Recommendation 14: *The general approach to these workshops should be retained and repeated regularly as a way of staying in touch with changes in industry and a way of providing a forum for industry to exchange views.*

The one caveat, however, is that the Plastics Chamber and merSETA needs to respond to these inputs. Simply collecting information and not acting on it will ensure that this voice will eventually be stilled.

Recommendation 15: *The information collected at the workshop was very rich and could still be analyzed further – this could be based on the digital sound recordings made at the workshops.*

6.5 Stratifying the industry

There are some inherent difficulties in drawing conclusions from the workshop data without considering the sample size and what portion of the industry the sample size represents. We have no way of establishing that from the data to hand.

In order to arrive at some conclusions about the possible impact of the industry views reflected above on the Plastics Chamber's decision-making processes, one would need to contextualize the particular sample and its views and practices.

One way of classifying the companies that participated is to use the 'future scenarios' as a mechanism to do so. As noted above, the approach and attitude of the majority of companies in the workshop process, as well as some of the comments of third parties, suggests that these companies form a distinct category which makes them different from others in the industry. One of the motivations to attend was to look at solutions for company and industry problems, to learn from others and to try to influence merSETA and industry bodies to become more relevant and more pro-active. They could be classified as forming part of the players in Scenario 3 (Category A in Table 43). We then surmised that those who did not attend could fall into one of two other groups, categorised in the table below as B and C. The resulting stratification is as follows:

Table 39: Categorisation of industry according to the workshop industry scenarios

Category	Description	Adopting	% of industry
A	have made and are making attempts to improve	Scenario 3	10
B	want to improve, but not sure how	Scenario 2	20
C	survivalists	Scenario 1	70

A proportion of the industry, in terms of the number of companies in each category, has been allocated as an intuitive guess to Categories B and C to provide some basis for the recommendations that follow. The Plastics Chamber or the various industry bodies and associations would need to conduct further research in order to establish how valid such a classification is and what proportion of the industry actually falls into each category.

This categorisation would be useful in devising strategies to address the needs of the different players. Instead of providing a broad set of incentives or interventions (the "shotgun" approach), the Plastics Chamber and merSETA could consider more targeted

interventions, (the “rifle” approach). The latter type of intervention can also be structured more appropriately, using an extended logic model approach including evaluation throughout the full life-cycle of the intervention.

6.6 Redefining ‘training’

Embedded in and threaded through the participants’ stories was a growing disillusionment with formal education. Similarly, faith in the efficacy of formal training is also clearly waning. Courses which are constructed as hermetic packages result in little knowledge transfer or uptake. The fault for this does not necessarily lie with the training provider. Companies are also at fault by not encouraging the use and application of the knowledge gained.

There was a very clear sense amongst participants that training on-the-job plays a significant role in the development of their staff and their level of proficiency. Their notion of training has been extended to include workplace learning. From an historical perspective this reverts back to the approach of the 1970s and early 1980s. Workplace learning consists of several elements:

- the integration of the learner into the workplace
- exposure to a range of workplace activities, e.g. production, maintenance, quality and planning
- continuous development within the workplace through involvement, as part of cross-functional teams, in novel activities such as commissioning of new equipment and a variety of continuous improvement projects, as well as traditional self-development through reading and technology transfer visits and events.

It is hardly surprising that this sounds just like the traditional development trajectory of apprentice, artisan and journeyman, or the development of professionals.

Including the on-the-job component in the extended definition of training also means that there should be more learner support during the on-the-job phase. The use of coaches, mentors and recent retirees to transfer knowledge were some of the support mechanisms mentioned during the workshops.

This represents a shift from the pattern of the past[4]. The expectation by many employers in the past 20 years has been that training is the responsibility of others. Consequently they adopted the approach of recruiting staff that had already been trained and who were competent. This approach is still being followed currently, as was pointed out, 'Generally, smaller companies don't train, they just poach staff. Sooner or later, larger companies that do train get fed up with it (and stop training).' (*Workshop participant, Cape Town, 2012)*

In the late 1980s and early 1990s, larger packaging companies closed down their training facilities or substantially reduced their training capacity in response to economic pressures. Their view was that if they needed skills, they could simply recruit them from the labour market. If these companies did appoint unqualified staff or staff without experience, they would send then on training courses and expected them to be proficient on their return. As a result, the notion in the minds of managers of what was meant by training was gradually reduced to formal training interventions in classrooms.

Another fall-back recruitment strategy which is commonly used, especially by small and micro- companies, is simply to appoint new recruits on a first-come, first-served basis (often selecting unemployed persons who are standing at the factory gate). Once appointed, such recruits undergo no formal training and simply assimilate knowledge and skills in a relatively unguided fashion during the working process.

The implications of this expanded definition of training, which includes workplace learning, will be discussed below. It is necessary to first put the expanded definition into context, which we do in the following section.

In many corporate learning circles around the world, there is an increasing awareness that most of our learning is so-called 'informal' learning, i.e. learning on-the-job, learning from experience. Jay Cross (2007) states categorically that:

[4] The following views are those of report author Chris Vorwerk and are based on his more than thirty years of experience in the industrial training field and, in particular, in the plastics industry.

> People learn informally most of what they need to do their jobs. Although every situation is different, a common assertion is that 80 percent of learning in organizations is informal. The number is backed up by the Institute for Research on Learning, the Bureau of Labour and Statistics, the Education Development Centre of Massachusetts, Capitalworks, the eLearning Guild, and Canada's National Research Network on New Approaches to Lifelong Learning. (Cross, 2007:17)

This contention can be backed up visually. The following graphic depicts the human capital pathway for employed black graduates in South Africa (Ederer, 2007a:9).

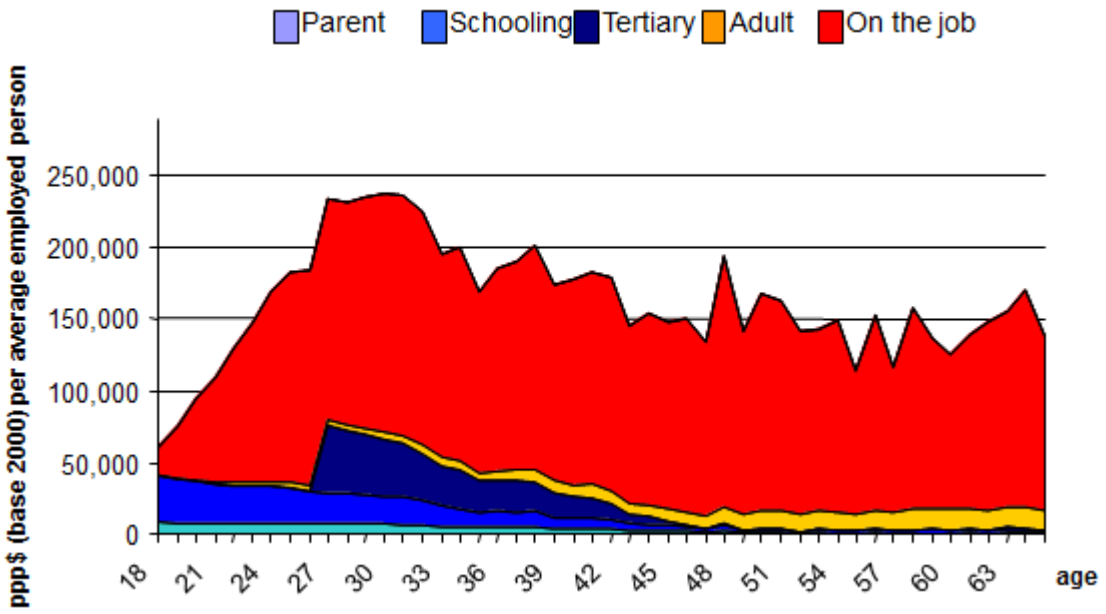

Figure 12: Pursuing a pathway: Black South African with university education in a managerial position n=226 000

Note: ppp$ = purchasing power parity in American dollars

(Source: Ederer, 2007a:15)

The above graph is based on a human capital index Peer Ederer and colleagues developed for the Lisbon Council and Deutschland Denken! in order to measure the development of human capital which would enable comparisons between European Union (EU) countries. The red portion of the graph is what constitutes informal learning.

Human Capital Endowment measures the cost of all types of education and training in a particular country/region per person active in the labour force (i.e. employed person). Specifically, the model accounts for the cost of five different types of learning for each active person: learning on the job, adult education, university, primary and secondary schooling and parental education. The Human Capital Endowment figure is subsequently depreciated to account for the forgetting of knowledge and skills (the biological process), obsolescence of knowledge and skills because of technological progress and the redundancy of knowledge and skills because of declines in specific industrial sectors (Ederer, 2007:9).

From this it appears that the key advantage to be gained by learning is not the formal knowledge that is acquired. Ederer indicated during a question and answer session after his presentation at the conference, (Ederer, 2007a) that the benefit of tertiary education lies in 'the ability to learn more quickly'. So the real value of tertiary education is the ability to learn – and the knowledge and skills that drive innovation are primarily developed in the workplace.

By contrast, the following graphic tells a somewhat different story. This one represents the lack of development at work.

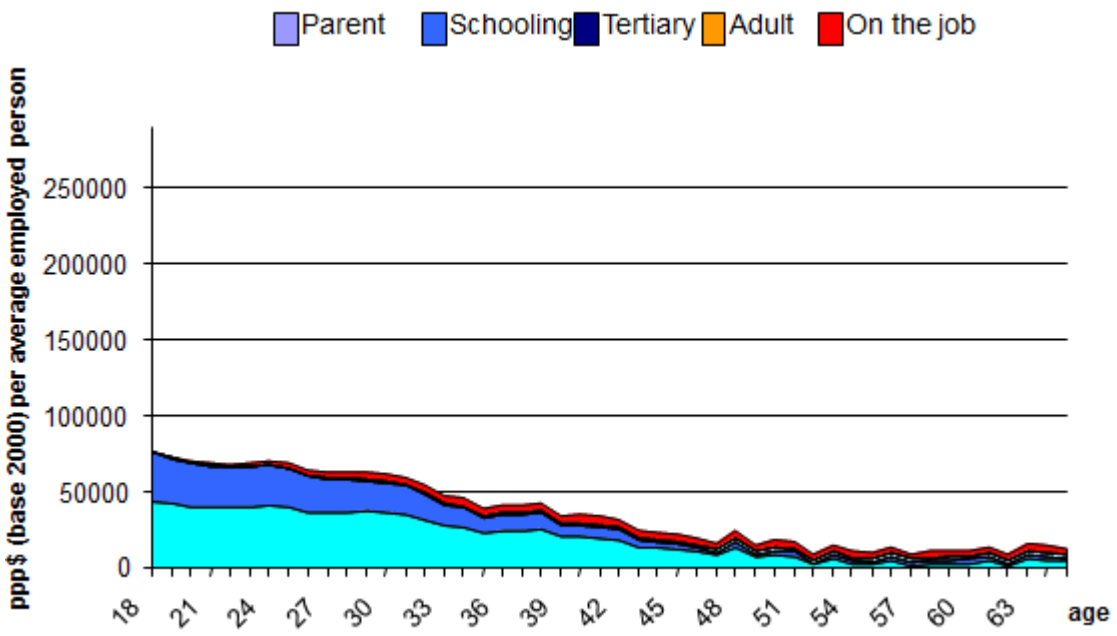

Figure 13: Biographical Human Capital Pathway for a white South African without university education in a blue collar position n- 392 000

(Source: Ederer, 2007a:15)

The lack of development is probably based on:

- the lack of a tertiary education (not necessarily at university level)
- the lack of learning opportunities at work
- repetitive work with little engagement

As Ederer noted in his presentation, at the age of 47 these workers are ripe for retrenchment.

In summary, the notion of "front-end" learning, i.e. putting learners through an extensive initial education and training process may be counter-productive. A dual model, as is used in mainland Europe for vocational education and training, may be a more appropriate model to consider. It would then be a matter of finding an appropriate method of applying the dual model for the local context, one that links learning and work more closely. As Cross (2007) points out, 'Learning = Work; Work = Learning', and such learning can be supported and driven by blending a slew of old and of new learning modalities offered by cell phones, the internet and by social media.

We have arrived at a somewhat heretical position in the context of a sector education and training authority. However, it is clear that the SETA should not just look at formal training interventions. It needs to look at new models of learning and knowledge transfer. One such model, the 70:20:10 learning model[5] has attracted much attention, where:

- the 70 represents learning obtained by experience and practice through tasks and assignments that stretch the learner
- the 20 represents learning obtained through other people, role models, conversation, networks, reflecting on experiences
- the 10 represents learning from formal programmes, books and on-line resources

It is also fair to say that the 70:20:10 model has its detractors[6]. But the model should not be considered as empirical – it presents a method of summarising the intent of many of the regional workshops participants, as captured in the plenary discussions:

- Look at the learning for a variety of needs, “horses of courses”
- Don’t just focus on formal programmes
- Combine formal with on-the-job training
- Information and experience sharing
- Replicate what was happening at the workshops themselves

The 70:20:10 model has also been used to structure and manage innovation in companies such as Google Inc. (Batelle, 2005). In this case the elements represent:

- 70% of time is spent on the core business
- 20% of time is spent on adjacent business related to the core business in interesting ways

[5] The origins of the 70:20:10 model has not been attributed because its origins have been disputed, see Kajewski, and Madsen, 2012.

[6] Most the detractors are from providers of formal education and training

- 10% of time should be spent on projects that are totally new (adapted from Batelle, 2005).

The fact that the same proportion was used in the industry stratification (as shown in Table 43) is no co-incidence. It is also simply a refinement and application of the 80:20 Pareto Principle, i.e. that 20% of the companies in the industry are responsible for 80% of the innovation.

6.7 High-level recommendations

In arriving at these high-level recommendations, we are recommending that the Plastics Chamber and merSETA as a whole need to look at the workplace as the site of learning and then assist industry to build in that capability. This is not just for the new entrants to the industry but also for those who are currently employed – both the educated and the under-educated.

This recommendation is a guarded one – it is not one that can be implemented in an unstructured, formalistic way, using a "shot-gun" approach. It needs to be carefully planned, implemented and evaluated. By considering the industry stratification that has been put forward for discussion, the Plastics Chamber can:

- Investigate more carefully the factors that underpinned the success stories
- Use selected innovative companies to test, support and incentivise the 70:20:10 learning model
- Establish and publicise best practices
- Incentivise the next level of learning, improvement and innovation
- Set up social interaction platforms with moderators to assist and encourage companies to share non-competitive information, e.g. based on LinkedIn

The Plastics Chamber, however, is not well placed to implement and manage such complex and innovative projects. It would have to consider forging partnerships with other merSETA

divisions, with industry bodies, government departments and training providers and also with businesses that are dedicated to developing new practices in organisations.

Fortunately the restructuring of merSETA has created a division specifically for Innovation, Research and Development. The funding for this research project is managed by that division. The Plastics Chamber should actively partner with it to plan, implement, manage and evaluate a complex and innovative projects of this nature. The outcomes would be highly relevant to other companies in the plastics and rubber industries, as well as for the manufacturing, engineering and related services sector as a whole.

6.8 Conclusion

This research project did not turn out quite as originally envisaged for a range of reasons. In many ways, its intentions were too ambitious. It did, however, provide some very useful information which will assist the Plastics Chamber and other role players. The project validated the value-chain approach to classifying jobs and occupations. It also uncovered some very powerful and dynamic changes within the industry, which can inform further research agendas, as well as a revised approach to skills development that supports growth, competitiveness and innovation.

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Appendix 1- Workshop Report – Cape Town

4 September 2012

1 FACTORS IMPACTING ON THE FUTURE OF THE PLASTICS INDUSTRY

1.1 CURRENT WEAKNESSES AND FUTURE THREATS

High input costs

- Resources, especially costs of materials.
- Electricity – high cost.
- Costs of raw products and input costs, especially raw materials.
- Labour costs are so much higher in SA than for overseas companies, like China
- High running costs.
- The weak rand: if you are upgrading and need to buy machinery from overseas, the weak exchange rate makes it very expensive.
- Compliance costs are high for the industry: BBBEE, employment equity etc. This adds to the cost base, which you can't pass on to the consumer.
- As manufacturers, compliance costs us from 5-15% (depending on size of company and process); whereas importers don't have these costs.
- Impact: Lack of ability to compete globally.

Cheap imports and skewed trade protection

- Cheap imports from China and India.
- Import of finished goods affects our markets.

Poor/ inaccurate public image of the industry & lack of "industry branding"

- The plastics industry has a poor image: it is not "selling" itself well enough, or making itself look "sexy".
- Plastics is a neglected science and is incorporated in Chemistry at university level. Robotics is the "glamour science" at the moment.
- Environmental factors: chemicals etc., concerns around health issues.
- Lack of excitement on the part of youngsters about a career in plastics.
- A lot of the emotional hype around plastics is not based on fact.

- People need training on the impact of plastics on the environment & on health issues: there is a lot of ignorance around. People confuse different types of material, for example.
- "Green" has become a big "glory-seeking" phenomenon.
- Impact: One needs to look beyond in-house needs, to the environment and to customers and what they believe or perceive.

Shift from old to new technology & related issues

- We are using old technology in some cases, which could mean we are not producing at the level of speed that is possible.
- Our investment in robotics creates a Catch 22: on the one hand the government wants us to grow job opportunities; on the other hand, speeding up production through using new technology to cut production costs and to make more profit can result in the loss of jobs.
- "Disruptive technologies", e.g. 3D printers: are these going to impact on the industry?
- It is up to each company to decide whether you want to integrate a new technology into your business or not.
- The price is not competitive for some of these new technologies. Sometimes the market is not prepared to pay for the product.

Lack of innovation and research and development

- We are not innovative enough in the Plastics industry in South Africa.
- There is no automotive development locally, it all happens overseas.
- As a general trend, there is not enough local development - there should be an incentive in place to encourage this.
- We come up with ideas, then the "giants" come and dominate them and make them much cheaper - this kills the R&D side of things.
- The tooling cost of R&D is enormous - and there are not a lot of good toolmakers in Cape Town.

Lack of a culture of sharing and collaboration in order to improve the industry & create new markets

- There is often a reluctance to share information with one another.

- The technology is not secret, but we are not prepared to share/ combine issues with our competitors to get business.

Need for a "driving body" for the Plastics Industry

- The restructuring and shift in focus on the part of Plastics SA has made a huge difference, e.g. there is now a Sustainability Council; also Plastics SA now have linkages which they didn't have before, e.g. with the IDC.
- However, Plastics SA is not in a position to drive industry as yet - Plastics SA needs the backing and commitment of companies in the industry in order to make changes. Other plastics associations should also be involved.

Emigration and the resulting "skills drain"

- The industry is experiencing a loss of skills and years of experience through emigration, particularly to New Zealand and Australia.
- There is a resulting "knock on" effect in that there is no transfer of skills or knowledge from these experts to the new generation.

Poor basic education has an impact on workplace performance

- Basic Education, even at school level, needs our attention. Our Maths and Science are not at the level they should be.
- Basic literacy is also lacking. Industry is then expected to do the work of the Department of Basic Education!
- Poor levels of basic education are found amongst trainers as well.

Lack of a skills pipeline

- We have an ageing workforce: this can have an impact on innovation and creativity ("this is the way we have always done things").
- Becoming an artisan is not seen as an attractive career option: in general, artisans are not well paid.
- Not enough youth are coming into the industry. Young people have no ambition to have a career in Plastics. They don't like "getting their hands dirty", or working overtime.
- Where is our source of new entrants?
    - Sourcing entrants is more difficult for small companies. But even in a small company, you can get the Federation to assist you, you can get something back.

- The problem with FETs is that they are a "stagnant dam" and the uptake from them is minimal.

Lack of / inadequate career pathing

- Lack of a clear career path / career guidance in the industry.

Retention issues

- We need to be able to train people and also to retain them.
- Companies train people and then want them to sign contracts or restraints, but in general, people don't want to be bound by contracts.

Low levels of training

- We need to share "good practices" for training people.
- ABET is still a major issue. Unfortunately the problem is often with the teachers – they themselves don't have the skills and don't know how to teach.
- Work experience is about exposure – the more you expose people, the more they learn. Through working at a company, people are exposed to other things, and have an opportunity to shift to a niche that interests them. There are a whole lot of things we have forgotten and that we need to bring back into the training mix.
- Training courses are expensive, especially for smaller companies.
- Skills are lacking at the outset.
- High cost of training.
- New Computer Numeric Control (CNC) operating systems require a reskilling of the workforce.
- Apprentice training and funding for apprentices is lacking.
- MERSETA doesn't understand our industry. For example, we have skewed MERSETA grants which emphasise certain types of apprenticeship training. The plastics industry doesn't require large numbers of engineering apprentices. As a result, there is very little funding left for what the plastics industry really needs, i.e. training in specific plastics manufacturing skills, like setters.
- Poor communication and administrative support from MERSETA, e.g. it takes a long time to get certificates; documents get "lost"
- We don't know how to make a business case for a product and need training on this.

The Green Economy

- If you don't look at your equipment and what it is costing in terms of energy, you are throwing your business down the drain. You have to keep thinking of the green economy as and when you replace machines.
- The green economy has an impact on the kind of skills you need. For example, there might be new technology that you have to train your people on.
- Sometimes setters don't want to work on the old technology, once they get used to the new technology. They focus a lot more on the new technology and don't want to work on the old machines – which can also be a problem.
- The green economy can be very expensive. Old machines can sometimes do production for a quarter of the price of a new machine.
- [The facilitator asked the question: 'What would the development of substitutes for plastics do to our industry?' There was no answer to this question; people couldn't visualise this happening].

Quality issues

- We do have quality issues in our industry. For example, materials supplied to us are not always consistent in quality.
- Sometimes factories use old equipment and it can be more difficult to maintain consistent levels of quality with these machines.

1.2 CURRENT STRENGTHS AND OPPORTUNITIES FOR THE FUTURE

- We do have a good bank of knowledge in the industry - but it is vested in a small group of ageing people.
- We have a doorway to the world's technology, but are we using it to our best advantage?
- In some plastics companies, manufacturing standards are close to World Class.
- Some companies already have formal manufacturing systems in place. These systems have the potential to assist companies to produce on time, reduce waste and cost and ultimately move towards the Japanese idea of "Just In Time " (JIT) production. Materials and Resource Planning (MRP) systems don't have to be expensive. They could help companies to visualise their businesses as a series of

value chains. These can be analysed for performance - and if necessary, "de-bottlenecked".

- The quality of our products is good in comparison to a lot of the cheap imports.
- Maybe we focus training on the wrong people? An executive training programme is also important.
- We need to take full advantage of the incentives and grants offered by the government / IDC and SEDA.

2. KEY DRIVERS FOR THE FUTURE

What is coming at us that is going to change what we are doing?

- The need to be competitive against cheap imports
- The need to innovate to address niche markets
- The need to improve technology, productivity, and to reduce costs

3. POSSIBLE SCENARIOS FOR THE INDUSTRY

- Scenario 1: Going down the "plughole"
- Scenario 2: Keeping going on a "clogged freeway"
- Scenario 3: The "Lift Off" situation

What would be the interventions, programmes and practical steps that we could implement to move the industry into a "lift off scenario"? How do we get the industry to transform and change? What are the mechanisms we could use to influence this?

Put in place a sustainability mechanism to drive development in the Plastics industry

- Industry should work together to improve our prospects. We can do this through the offices of Plastics SA and its constituent members (e.g. to access information about grants etc.).
- We need to take full advantage of the opportunities that do exist. For example, there are organizations that offer financial assistance at good rates, if you have a new contract and have your paperwork in place (e.g. the IDC, or the dti's Green Economy initiatives). These organisations will help you to make a business case for your investment.

- Good things come out of workshops, but there is no sustainability mechanism in place. The momentum "drops off". People start losing interest; it becomes a case of "just another one of those workshops".

Improve sharing, communication and networking

- People are so protective of their "terrain". Companies in the industry should share their successes and not just hold them to themselves. Sometimes they don't even let you into the factory! They won't even show you what their product is, or what new product they are wanting to make.
- We could improve sharing and communication through social media, for example by creating an Industry Facebook page.

Require MERSETA to improve the degree and quality of its support to the plastics industry

- MERSETA needs to address administrative delays in getting certificates, moderators etc.
- There is no support and not enough communication.

Improve the "branding" of the plastics industry and how the public sees us

- We have to try to convince people that plastics are not "cheap and nasty" and that we can't live without them.
- We need to find ways of letting people know about the variety of opportunities that exist in the industry, not only in manufacturing, but in selling as well.
- We need to start educating about plastics at the school level. Children don't know what "toolmaking" is, for example.

Protect the industry by putting in place trade barriers against cheap imports

- Government should put in place stringent regulations and trade barriers to imports in order to save the plastics sector, create jobs and give us the opportunity to develop our product.
- At the moment, people can import product more cheaply than we can produce locally - but when you order equipment and many materials, you pay high duties on them.
- We also need a preferential procurement of local content.

Improve productivity and quality

- Our standards are not always on a par with global standards - we have a big gap to close.
- We could benchmark ourselves against other companies.
- One possible solution is to divide the company into smaller components, i.e. look at cellular production.

Attract and retain people in the workforce

- We need to keep our plastics workforce in the country.
- We could offer bursaries where we train people; they have to work for the company for a minimum number of years.
- We need a clear career pathing for the industry, e.g. a Career Guide covering the occupations, the jobs, the skills and the pay range – this would create excitement around a career in plastics.
- We could create a forum where kids can come and see injection moulding machines (for example); participate in creating something with plastic, welding etc. We need to attract the youngsters and get them into the system. We should target school leavers in std. 7; then get them into a learnership or an apprenticeship; get them skilled in maths and science and what they need in order to work in the industry. We could also participate in events like the Sasol SciFest.

Invest in Research and Development

- There needs to be a place (like SA Plastics, for example) where a customer, or someone with an idea or a dream for a product, can come and get all the answers they need - a “one-stop shop”, rather like an R&D technology hub. At the moment, people have to run around and get prices on everything from a mould to production. Eventually people give up.

Implement targeted skills training

- Improve the skills of our workforce.
- We need to get better technology and make a serious attempt to train the trainers.
- The suppliers of the machinery should spend more time training our staff on new machines.

- There is a general mindset of: “why should we do this training, we don’t have the budget this year…”. This needs to change - enhancing the skills of your workforce is a key source of competitive advantage.
- Education right from Basic Education level needs to be attended to.
- The nature of training is going to change. A shift is taking place from formal learning processes to informal learning processes. Maybe we need to think about structuring learning interventions very differently? Our current model is useful in some contexts, but is inefficient in others. We could explore, for example:
    - shorter, sharper, more focused interventions
    - ten minute training slots
    - the use of media like You Tube
    - Apps that you could download
    - an “on-demand” training system, using modules as and when you need them.

4. WHAT IS THE IMPACT ON SKILLS NEEDS?

- We need apprenticeship-style training to provide a solid base.
- We must come up with a method for effective productivity, getting all the parts of the Value Chain to work. This requires a focus on higher level (not lower level) skills.
- We need to change the way companies work: building relationships, improving communication etc. This requires higher level skills.

4.1 IDENTIFY FACTORS IMPACTING ON SKILLS DEMAND IN EACH SUBSECTOR

- Generally, smaller companies don’t train, they just poach staff. Sooner or later, larger companies that do train get fed up with it, because they lose their staff.
- Although individual companies are growing, the industry is not.
- Incentives are lacking, people perceive the career path in plastics as being limited.
- Lack of interest in training:
    - the negative attitude of management: “just get the job out as quickly as possible”
    - management needs a mindshift about training - management needs to go on a course!

- Automation can affect skills negatively. We still need people who can work on the old machines.
- Sometimes, people with HIV do not want to progress up the ladder. Although you don't know their status, you still need to teach them.
- The old workforce and their attitude can be problematic– "you can't teach old dogs new tricks".
- There is no coach or mentor in the workplace to take people through the process when they come back from attending a training course.
    - There is very little technology transfer with training. The same applies to training on new technology: it is always the top guys that go through the training, then it is filtered down to the lower levels. Some of the vital elements of the training are lost.
- This doesn't make sense, because it is people on the factory floor that do the work.

5. ISSUES RELATING TO THE ATTRACTION AND RETENTION OF PEOPLE IN EACH SUB-SECTOR

Attraction

- Lack of career guidance.
- There is very little support, people "fall off the bus".
- Lack of knowledge of the industry.
- Low status of the industry - it is seen as "blue collar" work; it is not perceived as "sexy" like IT; it is not attractive because of low levels of pay.
- Poor, faulty public perception of the industry as causing damage to the environment.

What could we do to improve things?

- We need career drives at school and career guidance initiatives.
- Create a passion and drive from school level for the industry.
- Approach special needs schools, e.g. Westlake, schools for the blind and deaf.
- Source people from FET colleges (e.g. Northlink).
- Provide support, make people feel that they have a career path ahead of them.

Retention

- Lean manpower, no time for training, "no finances, no budgets".

- Lack of recognition, both in terms of formal qualifications and informal acknowledgement in the workplace.
- Lack of career paths, career development and succession planning.
- Poor relationships between management and workers.
- Emigration.

What could we do to improve things?

- Companies need to develop new entrants through learnerships, apprenticeships etc.
- Take personal initiative and responsibility for changing things and driving the process.
- we often wait for the Federation to do something.
- Provide alternatives to formal training.
- Offer training across the board:
    - a proper needs analysis/ skills audit should be done prior to embarking on a training programme
    - help people to climb the ladder by educating them
    - have qualifications in place, and as people qualify, award a certificate - this means a lot
    - motivate people on the shopfloor to learn - if your sweeper feels "I am just here to sweep floors", you should motivate them to improve their skills
- Offer profit sharing, incentives (e.g. money, share certificates, bonuses)
- Find non-monetary ways of recognising employees
    - e.g. know the birthdays of all your staff; give a personal birthday card
    - make everyone feel valued and that their job is important - do you know the name of your factory sweeper, for example?
- Communicate regularly, right down to the shopfloor:
    - communicate at least quarterly, not only at the end of the year - everyone needs to understand how the company is doing and how their department is doing
    - give employees an opportunity to ask questions.
- Create a good relationship between shop floor and owner:
    - e.g. encourage people to discuss problems directly - this is very rare, except in small companies.

  - Interact with them - building a relationship takes time; people can be suspicious initially.
- Create a positive and safe environment for workers:
  - In big companies overseas, accidents don't happen – they are caused. These companies dig very deeply to find the causes for accidents (for example, no jewellery is allowed anywhere near a drill press). Companies are very strict about a number of things – for example, that when you are going downstairs in the factory, you must hold onto a handrail and not get distracted.
  - People have to be trained in safety, you can't always rely on common sense. Induction should not only be for production staff, it should be for everyone. The emphasis should be on safety first, production second.
- Become an "Undercover Boss":
  - this is a TV programme where company owners make a point of putting on a boiler suit and working in a grinder room (for example), so that they know how it feels to operate a mixer or a machine
  - doing something like this helps a boss to pick up how the workers feel about him/her, about the company, about the hours people work etc.

6. POSSIBLE LEARNING AND CAREER PATHS

- Adult Education/ ABET is a real issue:
  - if people cannot read and write, how can you career path them?
  - many companies don't see ABET as being part of their job - but we have to give people the basic skills they require in order to learn; also all jobs need a certain level of literacy, because of quality systems
  - we should identify the various jobs in the sector and career path people in those jobs.
- The industry needs proper succession planning, not just "on paper". We should actively implement it and create a real career path for people.
- Multi-skilling is about providing different skills, not necessarily leading to a new career.
- Career-pathing can assist succession planning, if it is in place.

7. VALUE CHAINS

7.1 WHERE DO 80% OF YOUR QUALITY ISSUES ARISE?

- In the production and manufacturing side

7.2 DESCRIBE THE QUALITY ISSUES BEING EXPERIENCED

- Company A – in our company, most quality issues are internal, before the product gets to the customer:
    - an example would be when things go wrong in the design and development stage - this could involve faults in thickness, raw materials, colour, dimensions; or technical faults, caused by not using correct machines.
- Company B – in our company, quality issues arise in two areas, namely Pigments and Masterbatch:
    - the quality is not always consistent
    - these faults are external, originating in the supply-side and are not within our control.
- Company C – our quality problem has to do with colour and denting (of bottles).
- Company D – we have quality issues with: the thickness of the product; discolouration; flashing; mixtures; pipping and belling.
- Efficiency is also a quality issue. Quality is not just about the attributes of the product you are producing: it is about the whole system.

7.3 ARE THESE ISSUES RELATED TO A LACK OF TRAINING?

IF YES, WHAT SHOULD THE TRAINING BE FOCUSED ON?

- Training should cover a combination of attitudinal, technical, practical and communications skills.
- An example of “attitudinal” would be the creation of a quality “consciousness” amongst all employees in the organization. This could become a quality assurance mechanism.
    - A QA process and Quality Awareness training should go hand in hand. If you include training on quality, you “lift the conversation”.
    - Does the staff understand Quality? Everyone in the organization should have a sense of what it means; people need to be trained in quality awareness and why it is important to take personal ownership of quality in their section.

- The value chain: everyone must have the "bigger picture" of how everything fits together, where each person's output fits "downstream".
- Coaching and mentoring:
    - Sometimes it is useful to get people from outside the company to mentor
    - Coaching and mentoring often turn into face to face discussions, which is not always productive
    - Ideally, coaching and mentoring should happen "side by side", not in opposition to one another - both are part of a "problem-solving" mode
    - Less talking, more pointing/ showing/ guiding is needed.
- On-the-spot training, closely linked to actual quality issues.
- How to read statistical data.
- How to track problems:
    - If you don't know where in the production line the problem arises, you won't be able to focus on it (for example, have a good ISO system; check the production line every hour and do a final check before delivering the product to the customer).
- Training in how to use equipment properly:
    - Make sure people have the correct tools available and are trained in how to use them, in order to make products to the right specifications.

IF NO, WHAT ARE THE QUALITY ISSUES CAUSED BY?

- Materials supplied are not always consistent in quality.
- Old machinery and equipment - more difficult to maintain consistency.
- Weather conditions.
- External factors: for example if it is too hot in the factory, or too cold, or too noisy, it can influence people's reactions.
- Sometimes people have been through the training, but don't apply the skills they have learnt.
- Lack of a skills matrix/ way of scoring people: you may have a training matrix, but do you have a skills matrix? Who is scoring people on how they do the job?
- The lack of uniform names/ terminology for faults can be a real problem – this is where communication problems sometimes occur, e.g. at shift changes.
- Negligence, e.g. forgetting to wear hairnets.

- Lack of training: for example a fault that arises “post machine”.
- Lack of ownership on the part of employees.
- Some workers are unable to read the results and/or the specs, because of a lack of training/ illiteracy.
- Cases where the company takes your best person, e.g. your extruder operator, and makes him a trainer – when he doesn’t necessarily have the ability to train.
- It is not always a Quality problem, but an Efficiency problem – perhaps training should rather be focused on that. Efficiency ties up with labour costs.
- Poor labour relations:
    - Our South African style of management is often a case of: “I am the boss, you don’t tell me what to do”. People lose respect for management and then flare up at the first opportunity, because of the way they get treated in their workplace.
    - When a machine is broken/ not functioning properly, it is already a safety issue. “If a boss doesn’t care about a worker’s safety, why should that worker care about the product”?

8. WHAT ARE THE EMERGENT COMPETENCY NEEDS GIVEN THE CURRENT STATE OF THE INDUSTRY?

- We need to think “out of the box”.
- Instead of creating new ideas, we should take ideas that are currently available and adapt them to our needs.
- We need to “Wake Up” as an industry.

8.1 WHAT WOULD BE THE EMERGENT COMPETENCY NEEDS FOR THE VARIOUS FUTURE SCENARIOS IDENTIFIED IN THE WORKSHOP?

Provision of training to stimulate Research and Development and innovation

- R&D, new manufacture and maintenance are all critical to the survival of the industry.
- Although R&D is expensive, it must be revived.

- "I think our industry spends very little time on R&D and innovation, researching what the customer really wants. The capacity to develop new products seems to have shrunk".
- Previously, there was a lot of R&D taking place in a number of industries around the country, but it is becoming expensive - R&D is not a "cash cow".
- A lot of companies have chosen to outsource design – but the people you outsource to don't have a passion for your company. "The kind of R&D you get from outsourcing is not driven by a passion for your company".
- "Running a toolroom is very expensive, but at least you are in control. If you outsource, you are putting your company's Intellectual Property (IP) into someone else's hands. You don't get the commitment or work ethic that you expect".
- Companies need to find a niche where they can work, design and produce a product at a price and quality that the imports can't match.
- We are losing a lot of ideas along the way.

Making change happen

- We need more action, we need to put things in place so that good ideas and initiatives don't just remain "on paper".
- People have good plans, but they don't implement them – there is a whole lot of "talking".

Building the level of skills across the industry

- As a whole, we are not putting enough skills back into our industry:
    - the workplace is stagnant and no-one is being trained up to take over
    - we need to get the youth back into our industry.
- Perhaps we could import some skills to train our workforce – for example by doing it on a "swop" basis with another company where you train one another's people in certain skills.
- We need to find ways of using the wisdom, knowledge and vast experience of people who have retired from the industry:
    - There must be some way of bringing this knowledge back, some way of accessing it when we need help.
- Suppliers also need training - there are a lot of companies selling raw materials were the reps don't know their own product!

Managing people and organisations more effectively

- Companies don't realize that their most important resource is their people.
- Training is also about imparting your knowledge to someone else.
- We need to extend this model to not only trainers, but managers, setters, etc.
- It is all about leading and managing change, which is the responsibility of managers:
    - "In 12 years, there has never been a strike in our company".

Competency needs may not require formal training

- Many of the issues we are experiencing do not require "training" but are more about providing good practices we can learn from. For example, what to do in a case of a machine lock out.
- Training can take different forms – this is something that could be explored further. Our current notion of training tends to be a "classroom type".
- Hands-on training is what is needed; real facilitation, as opposed to presentation.

9. SUCCESS STORIES & GOOD PRACTICES

- The pooling of success stories and best practices could help as a training model.
- Our company started a pilot project which has been successful. Trainees are being groomed with a view to retaining them in the future. As a result, people feel they have a career path and a permanent job ahead of them. Of the people who started the project, ten are still part of the company.
- Our company has regular visits of busloads of school children visiting the factory; they see the machinery, the robotics etc. and become excited about the industry.
- At our company, the previous MD knew his people by name and would greet everyone by name at the end of each day. People spend 90% of their time in the workforce. If you have an unhappy workforce, what will you get out of them?
- At our company, because we have a small factory, we can give more attention to people. We try to encourage them to see where the product is going, for example by showing them how using the unit they are making is going to change someone's life. We try to make the work people are doing more personal. We create a nice work environment so that people want to come to work. This is one of the reasons we don't have issues with our quality, in fact, we have only one person working in the

quality department. In the canteen, our people have a TV, a vending machine and a comfortable smoking area. Meals are subsidized, so people don't come to work hungry. It makes a real difference. As a manager, you can do simple things, for example by making your coffee during your workers' tea break, in their coffee venue. Initially they are suspicious, but this soon changes.

- If our company hits target for the month, production is stopped for 2 hours and we all have lunch "on the house". People are thanked and we give them recognition.

Appendix 2- Workshop Report KwaZulu-Natal

11 September 2012

INTRODUCTORY NOTE TO THE KZN WORKSHOP

Many of the suggestions below are not "wish lists" or intentions, but are actually practices that the companies have developed for themselves and that can be considered for broader adoption by the industry as a whole.

1. FACTORS IMPACTING ON THE FUTURE OF THE PLASTICS INDUSTRY

We need a picture of the current strengths, opportunities and threats you as companies are facing.

1.1 CURRENT STRENGTHS AND OPPORTUNITIES FOR THE FUTURE

Current capability

- Trade shows have been used to gather information on trends and new technological advances. Some of these ideas have been implemented, especially as part of a cross-functional group.
- Working according to recognised standards, e.g. SABS, makes it easier to market and sell the product.
- The setting up of cross-functional committees (marketing, production, toolmaking) helps an organisation to evaluate and implement new products.
- A few companies are on the "world class" route.
- All the companies represented in the workshop were working on various improvement projects - see section on Success Stories and Good Practices.

Incentives and grants

- One company has used the Netherlands Trust Fund (through the Durban Automotive Cluster) to sponsor training and implement quality circles, problem solving, etc.

External support programmes and cluster initiatives

- Introducing supplier development programmes and quality improvement practices (such as World Class Manufacturing, Lean Manufacturing etc.) all help companies to focus on improving manufacturing systems
- Working in cluster initiatives, such as the Durban Automotive Cluster (http://www.dbnautocluster.org.za/), is helping companies to network and learn from competitors. Some companies also participate in seminars and events; visit suppliers, companies and customers; take advantage of funded assistance support programmes (e.g. Netherlands Trust Fund for automotive components); visit tool rooms in the Netherlands to see how they do it and get a sense of the company culture and work ethic ("they take 2 - 3 weeks for what takes us 6 - 7 months").
- Benchmarking services can be used to identify strengths and weaknesses and to develop an improvement strategy.

New markets

- There is a need to focus on the African market - there is a need for many products more suitable for rural and less-developed economies.

Technology partners

- Working with partners overseas, including China, to improve production processes; to pick and understand new technologies and to get ideas for new products or product ranges.
- Using newly retired people to coach and mentor the next generation, to transmit the history and values of the company/ industry.

Social media

- The industry could start using LinkedIn and other social media platforms for discussions and the sharing of information.

1.2 CURRENT WEAKNESSES AND FUTURE THREATS

High input costs

- Our main future threat is the high price of materials both locally and from overseas.
- The high price of electricity is affecting the bottom line: there is less profit, because the cost can't easily be recovered from the customer.
- Local suppliers are reluctant to develop specifics grades – they have to rely on overseas suppliers, which increases the costs.
- Profits are shrinking; we need to destroy an attitude of complacency in the industry if we are to survive.

Cheap imports and skewed trade protection

- Growing competition from imported products, e.g. from China.
- New standards to take into account, for example the United Nations standards, which are higher than SABS.

Poor/ inaccurate public image of the industry & lack of "industry branding"

- Plastics doesn't have a high profile in people's minds - therefore it doesn't represent a desirable career choice amongst school leavers and graduates.
- For 80% of people who have worked for a long time in the industry, when asked: 'do you want your child to be in the industry?', they will say "no" - because being involved in production is very time and energy intensive.
- There is a prevailing image of plastics as being a "polluter"; a lack of understanding by the public that plastic bags do not constitute the only plastics product.

Shift from old to new technology & related issues

- Many companies are still stuck in the old paradigm of not sharing information.
- In some areas, we are far behind the rest of the world. We need to learn from companies in other countries, implement what we can and improve our own organizations.
- We lack sufficient local trade shows to expose people to new technologies and options. It would be particularly valuable to have trade shows with production lines actually running, so people can see how plastics products are produced.

- Some customers are leaning towards products with a longer life-span, products that are not made locally and have to be bought in (e.g. replace PE with PET films).
- The industry as a whole is weak on systems that focus on costs, savings and how to improve quality and productivity.

Lack of innovation and research and development

- The design capability that was in the plastics industry seems to have "disappeared". There are very few people with the expertise to make a product. You need a wide range of experience and an understanding of the materials and the process to develop good, marketable products.
- Some of our best people have retired.
- We have a tool room which used to belong to us, but is now outsourced.
- Our design is done in Germany and India.
- We need more entrepreneurial people – otherwise industry will just fade away.

Lack of a culture of sharing and collaboration in order to improve the industry & create new markets

- There have been attempts to create forums, but there is a reluctance in some quarters to share information (there are also issues relating to anti-competitive behaviour).
- As a result, we are making the same mistakes over and over again.
- The lack of a culture of sharing and collaboration is also internal in the industry, e.g. a negative work culture (management and workers); top-down management style; lack of engagement, lack of commitment; lack of loyalty to the company; lack of willingness to change; lack of cleanliness and housekeeping in individual work areas and generally.
- The plastics knowledge base is small and evolving, and every year new information emerges. It is a real challenge to collect and disseminate this knowledge to employees.
- As a field, plastics has a very short history in comparison to traditional materials, e.g. wood, glass, stone, metal. How do you share the little information that exists with people?

"Skills drain" including emigration

- We are losing people with wisdom and experience. We are not ensuring that people who leave pass on their knowledge to the current generation.

Poor basic education has an impact on workplace performance

- Poor labour productivity
- An international observer commented that people in SA tend to work far slower than people overseas. The context is very different, however – we are in a transition period. A lot of the older people have the "just listen to management and do what is required" mentality. Now the new generation is coming in: they are growing up in a different environment. We will see a big change in the next 10 years, where people give input to their companies.
- Targets and incentives work up to a point, but can be counter-productive in the long run, shown for instance by a drop in quality. "Once you start 'dangling carrots', you have a major problem."

Lack of a skills pipeline

- "You are required to do so much training and are investing in people. In my case, over three years it could mean an investment of R100 000 per person, per day. You have to convince them that they are with a forward-looking company and that they will gain training and development opportunities by staying".

Lack of/ inadequate career pathing

- Lack of talent management in the industry as a whole.

Attraction and retention issues

- Today's school leavers and graduates have little loyalty and don't stick with the company for any substantial period of time; they "chase the money".
- Lack of succession planning and multi-skilling.

Low levels of training

- Setters are definitely in short supply and training them in-house doesn't make them good setters. They may learn your machines and then leave for another company.

Or, if you employ someone from another company, they don't necessarily know your materials and your products.

- Arbitrary changes in the merSETA grant system are a problem:
    - "I started off with the 18.2s, then when MERSETA didn't fund anything, I went to the 18.1s – the people in my company already. The industry needs to take on 18.2s, the unemployed – training them in skills & offering them to factories."
    - In past years we could take on 12 -14 learners. This year we only get grants for 2. Training is then uneconomical.
- Plastics is a very small employer – hence there are few courses at FETs and Universities of Technology.
- Every plastics factory is unique – this means that it is difficult to provide tailored training for each company's specifics.
- "Poaching" to solve your skills shortage doesn't always help – e.g. if the setter was trained on small machines, they may be totally intimidated by large machines, or by the challenge of making different products to what they are used to.
- Poor general education – people can't transfer learning from one machine to another; there is a low level of understanding of fields like pneumatics, hydraulics and electronics.

Quality issues

- Recycling of materials:
    - The idea with the waste is to put it into another product and sell it – if you can do it. The problem is to convince the OEMs that it won't affect quality.
    - The whole family of nylons is difficult to recycle – because nylon is heat sensitive and absorbs moisture. Finding the right machines to regrind it is difficult. You have to be very careful of your mixture and recycle not more than 3 times. It is a concern for us. You can't even throw it onto the dump.
    - PET is a major problem for us. Now we have a factory to process it and deal with it. We don't get much for reselling it, however. The collection of PET is also an issue.

- There are difficulties relating to the colouring of plastics: customers requiring special colours for branding purposes; colour matching; colour changeovers requiring large amounts of materials, especially where accumulators and thickness control systems are used (blow moulding); purging compounds are costly and don't necessarily save much material; there are some poor-quality suppliers (e.g. selling you lead-containing masterbatches).
- Older machinery is slower and there are more quality issues.

Regulatory pressures in relation to the environment

- Environmental issues (e.g. the carbon footprint; solvent use; disposal of certain types of plastics waste; increasing legislative and regulatory requirements) all impact on production activities.
- Government will start closing down factories if they don't follow the proper procedures for collecting and disposing of the waste from the products that they make. The industry has closed its eyes to this problem for a long time.
- Recycling still needs a lot of development, especially in the case of problem polymers such as nylon:
    - there is an unintended benefit in that successful recycling may harm importers of cheap products from China
    - Customers are often reluctant to accept products using recycled materials.
- Waste reduction (ISO 18 000).

Culture and work ethics

- People in South Africa work slower than overseas (this was a comment from an overseas visitor to a factory).
- The older generation have a "just do the minimum" type attitude. The younger generation are different.
- In SA, we currently work towards achieving targets – whereas overseas, it is now much more about "working at the right pace" (Takt time).

2. KEY DRIVERS FOR THE FUTURE

"What is coming at us that is going to change what we are doing"

Sustainability

- Making changes to current manufacturing practices
- Recording and monitoring the carbon foot print
- Training people to be aware
- Reducing power consumption

Global competitiveness

- Benchmarking
- Implementing quality improvement systems, e.g. Lean, cellular production (where appropriate)
- Collaborating in formal cluster initiatives
- Collaborating informally with other companies on our own initiative
- Partnerships with overseas organisations
- Licences with technology providers, machinery suppliers etc.
- Accessing various funding opportunities to improve our competitiveness

Revising and refocusing training

- You can't just focus on formal training anymore.
- We are trying to pass the knowledge on. We need more skills in the industry.
- From a SETA side, they should get more involved and sponsor more training courses.
- With today's machinery, you need to have practical on-the-job training in the company. Theory is not enough with all the different types of machinery that we have.
- We need to create a pool of trained people from which industry can draw.
- We need to include info in the training about industry threats like the carbon footprint, new regulations etc. This is all part of the theoretical component and it will change continuously. People need to know that "these were the old regulations, these are the new ones – and this is why they are changing". Doing this changes someone's thinking pattern, because they know *why* things are done. This is the new generation of people: give them the knowledge so that they can make the appropriate choice.

- Current training is aimed primarily at production. Is there a place for training at a higher level? Yes, definitely in the case of technicians. There is also an imbalance in the industry - there has been an influx of managers with little knowledge or expertise. What we need is people who understand the processes and the plastics in the industry! We should do the same thing with plastics injection moulding.
- The reason plastics doesn't feature is that it is a very small employer relatively speaking. It is going to grow in relation to the rest of the industries in SA – but we need these skills. Almost every single plastics factory is unique in its own way: e.g. different machinery; products; processes. As an example: 'My machines are huge, every other factory has small machines - the setters I "stole" from other factories lost hope and never came back! I had to go the route of taking people from college and training them from scratch. Now it is paying off. Similarly, you can't take my people and move them somewhere else'.
- Training has to be company specific at some point, but there is also a lack of general education in that people haven't learnt how to transfer learning from one machine to another. A working knowledge of pneumatics and hydraulics is also in short supply.
- There is a new Plastic Machine Setter apprenticeship being developed at the moment, which is included on the list of trades. It includes three components, i.e. theoretical knowledge, practical knowledge and workplace exposure. Injection moulding; blow moulding and extrusion are also covered. The setter that comes out of this will have had exposure to all three areas. Relevant aspects of the trade qualifications have been included. It is generic, but ensures that a good quality person will come out at the end who will be valuable to industry. By the middle to end of October, we will submit the qualification for accreditation. Information on additives is also included: not just what additives to use when, but how the additives interact.

3. POSSIBLE SCENARIOS FOR THE INDUSTRY

Scenario 1: Going down the "plughole"

- Less incentive to compete against cheap imports, the industry slows down, factories close, no innovation or renewal

Scenario 2: The "clogged highway"

- Continue as we are, putting up with all the constraints, blockages, "toll gates" and "wild drivers" - eventually becomes Scenario 1

Scenario 3: The "take-off" scenario:

- Providing an injection of something into the industry so that it starts booming again; new products; niche markets; exporting products etc.

3.1 KEY INTERVENTIONS TO ADDRESS INDUSTRY CHALLENGES

What would be the interventions, programmes, practical steps we could implement to move the industry into the "lift off scenario"? How do we get the industry to transform and change? What are the mechanisms we could use to influence this?

Put in place sustainability mechanisms to drive development in the Plastics industry

- Introduce manufacturing systems and good manufacturing processes (along the full value chain, from suppliers through to logistics), e.g. quality circles, problem solving routines, involving everyone in continuous improvement.
- Explore new ways of doing things to save costs.
- Look at the life-cycle costs of machinery and equipment - cheap machines don't last as long and after a few years the repair costs make them very expensive.
- Review the full production value chain and identify areas for improvement.
- Become more flexible - respond rapidly to changes in the market.
- Set improvement targets and then CIPs (continuous improvement projects).
- Introduce Gemba walks with multi-functional teams: inspect, find problem areas, develop plan, do presentation to management, allocate responsibilities, and report back in one week.
- Stop the practice of employing cleaners - let everyone keep their own areas clean.

- Do cross-training (multi-skilling) of people, so if changes come they can be moved around.
- Invest in new equipment to take advantage of improved technology and ability to provide new solutions to customers.
- See adversity as a way of polishing skills, developing people's and organisational capabilities.
- Develop a good product mix in a variety of markets.
- Monitor markets carefully - when recession came, changed to smaller pack sizes.
- Focus on the carbon footprint, reduce power consumption, reduce water needs, reduce solvents, recycle, improve disposal methods.
- If we increase productivity through training and development, it will help us when we benchmark with companies overseas, and win business locally in South Africa.
- Being in the automotive sector can provide development opportunities. It exposes one to world class manufacturing, Just-in-Time, quality circles, problem solving techniques, managing top down and bottom up etc. It changes the mind-set of a company being "a big warehouse" to making things Just-in-Time.
- The traditional attitude of management was "our people are useless". But introducing these Manufacturing Systems creates a mind-set shift towards workers. We now need to think "how can we help them on the work that they are doing?" This increases efficiency and productivity. "They started bringing the problems to us".
- Use quiet times in the year to introduce new technology, so that by the time high season comes, you are ready.
- Consider introducing new technology to solve customer problems, e.g. multi-layer containers for improved shelf life.
- Offer new solutions to customers, e.g. improved polymers (this helps to increase market share).

Improve sharing, communication and networking

- Set up forums for sharing ideas about problems - (versus a "hot" salesman who tries to sell you a solution and then disappears).
- We have tried forums before, but there is reluctance.

- PISA evenings have become events where people sell their services; but they are good for networking and building trust.
- There are a lot of neutral things that we could share.
- Networking is crucial in this industry. Networks help build up trust so you are more willing to share.
- We need more focused themes at these forums, e.g. they could focus on specific aspects of the manufacturing process, especially quality.

Improve the "branding" of the plastics industry and how the public sees us

- The Plastics Federation PR team needs to actively engage industry.
- The Plastics Federation PR team needs to educate the public about plastics - "what's under the hood".

Attract and retain people in the workforce

- People coming out of universities/ leaving school should know that there is an option to go into the plastics industry. A lot of people have "fallen" into the plastics industry because they didn't have an option. That scenario should change: people should know that "these are the jobs available" etc. You will then get the top brains coming into the industry, people who are motivated, who want to be professionals. "At the moment, we get what's left from the other industries".
- This will generate entrepreneurs in the industry, because we will be getting highly motivated people. Otherwise there isn't a future for this industry. "We made it work because it was a new industry and were fascinated by it. How much more can you get from someone who chooses this career path and is driven by a passion for the industry?"
- The Value Chains will provide a useful starting point for career choices, progression and guidance etc. If we attract the right people, we can expect more ideas, more companies, more growth.
- It is all about mentorship: how you mentor new people coming into the industry.
- We need to bring school children to the factories on tours, to show them what the industry is all about. It has been done in the past, but there was no follow up. After the initial session, we could invite those that are interested to an unofficial once a month mentorship process. There could be projects they could get involved in and opportunities to ask questions. Obviously there is a safety factor, but if you mentor

them for 2 years, you will know the person, you will have their attendance record; etc. The mentorship should be a structured thing. If we get the top brains in the country, then the industry will fly!

- Plastics needs to become a degree, so that people can walk around proudly and say what they do. At the moment, if you say "I am a plastics technician", no-one knows what this is.
- We need to make a career in plastics look glamorous and attractive. With computer technology and all the changes that are happening, the time is right.
- We should look at keeping retirees on a contract basis, to train, mentor, pass on knowledge and wisdom.
- We should implement good people development practices, identify talent, train, cross-train and do succession planning.

Invest in Research and Development

- Plastics is a highly competitive market. Some businesses run differently, some work ethically, others not; some employ people on contracts for years on end, and others not; some people working in the industry are only out to make quick money from a machine in their garage!
- We need to focus on existing customer needs. Are there other issues/ lacks that can be addressed by plastics?
- Identify niche markets.
- Set up Joint Ventures or licensing agreements with technology partners, especially in other countries.
- Expose people to new ideas, e.g. trade shows, literature, seminars, visits to other factories (locally and overseas).
- Send people to overseas trade shows. "Yes it is expensive, but they come back with plenty of new ideas for improved performance, new products, new markets to target etc. Take an engineer with you to the trade show, so that he can assist in making the product when you come back to South Africa".
- After this kind of visit, there should be a seminar where you present your experiences and ideas to management.
- Put information and photos on a common drive/ server to allow others in the company to have access to these resources - it may trigger something new.

- Link up to other initiatives, e.g. the Netherlands Trust Fund for improving auto industry.
- Put together a technical committee including marketing, production, tool making etc. who can all sit together and put plans together.
- In the volume business, there are lots of competitors, so it means the survival of the fittest – we need to provide a full service, from R&D through to technical support.
- Set up an R&D function (or develop a partnership with outsourced specialists). When problems arise with the product, use the R&D function to investigate problems. This breaks down the "blame game" where parties point fingers at one another.
- Work under licence with leading companies overseas; in this way you develop your capabilities in the medium term.
- Deliberately expose your company to world class manufacturing, Just-in-Time, quality circles, problem solving techniques, managing top down and bottom up etc.
- "Our product design is done in Germany and India and we recently started working with China because of pricing - but the quality is better locally".

Grow new markets

- Look at Africa, there are particular market needs here that are not found elsewhere.
- Use the economic downturn to find extra business – for example, where other companies are stressed, take over their operations to ensure the customer stays supplied.
- Have a good product mix across a range of sectors, so that as the demand for one product goes down, you can focus on others.
- Improve the quality of your product, using different materials (e.g. for longer life, reusability etc.)

Share your vision for your company

- If you have a vision for where you want to be as a company, you need to get people to think along those lines as well.

Implement energy saving initiatives

- Change over from conventional lighting to LEDs
- Stagger machine start-ups to avoid peak loads
- Use power factor rectifiers to reduce the start-up load

Be innovative about recycling

- Identify companies that can use your waste
- Use recycled material as a filler
- Export recycled materials to China

4. WHAT IS THE IMPACT ON SKILLS NEEDS?

IDENTIFY FACTORS IMPACTING ON SKILLS DEMAND IN EACH SUBSECTOR

General

- There should be a good basic grounding, i.e. an apprenticeship-style programme, then training on medium and higher level skills.
- There should be more on "soft skills" like problem solving, leading teams, implementing Continuous Improvement Projects etc.
- There needs to be a rethink from the SETA side on what they are doing; need to get more involved to understand the industry, sponsor more training, look at developing a pool of 18.2 labour.
- There is a lack of consistency in grants; for example we started training 18.2s, but then the grant system changed, so we went back to training 18.1s.
- Training also needs to focus on industry threats, e.g. the carbon footprint and new regulations. This is all part of the "theoretical" component to the training. The new generation needs to understand how things were in the industry and what the new changes are, so that they can change their thinking patterns.
- We need to start focusing on technicians, not just production.
- There should be more on pneumatics, hydraulics, and electronics (as background information, not in-depth).

Environment

- Carbon footprint, emissions etc.
- Supplying disposable products – have to set up collection and recycling systems.
- Recycling – still needs a lot of development, especially problem polymers such as nylon.
- Image of plastics as a polluter, people can only "see" plastic bags.
- Reduce waste (ISO 18 000)

- There need to demonstrate recycling etc. may have unintended benefit, importers of cheap products from China etc. might find it difficult to demonstrate this

Reluctance from the workforce to engage in training

- For example, setters are still in short supply.
- The older generation aren't keen on training courses, unlike the younger generation.

Poor transfer from formal training to the workplace

- People are not allowed to implement what they learned on training courses, which affects skills transfer.

5. ISSUES RELATING TO THE ATTRACTION AND RETENTION OF PEOPLE

5.1 Attraction

- Lack of career guidance.
- Low status and image of plastics industry.

What could we do to improve things?

Provide career guides

- Recruit people at university level, get the top brains (too many arrive by accident).

Arrange school and College visits

- Arrange tours of factories for school children.
- Follow up with a mentorship programme for those that are interested.

Improve the image of plastics and plastics industry

- The Plastics PR team needs to engage with industry.

5.2 Retention

- Lack of recognition
- Lack of career development (talent management)
- Emigration

What could we do to improve things?

Develop new entrants through learnerships, apprenticeships etc.

- Mentoring: link each person to a mentor in the company.
- Provide a good base of general and plastic specific training; then identify people's talent and strengths and do additional training to develop the kind of people that you need. This will give them a good understanding of the business as a whole.

Find alternatives to formal training

- Understand the value of people's prior experience, i.e. those who have worked in the industry for a while. Look at retaining retired people on contract for the sole purpose of training the younger generation.
- Guide new people coming in and provide coaching early on.
- Train staff for impact (improve performance) and opportunity (career development) in line with the NQF framework.
- Have meetings and symposiums, where you invite people from overseas.

Put in place various forms of recognition

- Ensure you recognise people.
- "Involving people in solving problems makes them feel recognised - they are not just there from 8-5".

5.3 POSSIBLE LEARNING AND CAREER PATHS

- This should depend on the interests and aptitudes of the employees.
- Give people a good basic grounding on the factory floor.
- Look at the talent within each person and train them accordingly.
- "If they want to become something else afterwards, e.g. an electrician or manager, then even when they qualify, they will be able to understand what problems people are experiencing on the shop floor, because they have worked on the machines and processes first hand".
- Give everyone a mentor who will provide guidance when needed.
- Do all the training in line with the NQF. These are the basic building blocks.

6. VALUE CHAINS

6.1 WHERE DO 80% OF YOUR QUALITY ISSUES ARISE?

- Production

6.2 DESCRIBE THE QUALITY ISSUES BEING EXPERIENCED

- Various
- Quality used not to be such an issue – now it is a big factor.

6.3 ARE THESE ISSUES RELATED TO A LACK OF TRAINING?

IF YES, WHAT SHOULD THE TRAINING BE FOCUSED ON?

- We need quality training that also focuses on additional issues, e.g. safety, environment, SABS and even UN standards.
- It is about training: if a person understands the purpose of SOPs - critical manufacturing factors (e.g. mixing of raw material), for example, they would make sure they achieve the customer's specifications.
- We tend to send people for training on a learnership, but when they come back to the factory, they need to be mentored. The problem is that we don't know the skills level of the people who are mentoring them. We don't want people to learn bad tricks!
- A lot of people are retiring from the industry and those skills are lost to the industry. Perhaps factories should retain people who are retired/ retiring and use them as mentors.
- A lot of the skills are largely experimental on the production floor, because of the diversity of products, machinery and processes. No-one can be an expert in everything relating to plastics: it is a big mix of information. To take someone out of the Plastics Federation and expect him to deal with all these things is impossible. There should be a space for people to come back into the factory, e.g. for one day a week, for further training and mentoring. It is not just the formal training, but the informal that is important.

IF NO, WHAT ARE THE QUALITY ISSUES CAUSED BY?

Colour

- We find colour variation is very difficult in SA, depending on the materials you are using. Our industry is not very geared up for it.
- Colour matching: this is very poor in SA. It takes about 6 months to get to an "in between" standard which is not yet at the level you are looking for.
- More and more colour manufacturers in SA are closing down.
- Our colours are very unique – the motor industry is very fussy. There is a minimum order for quantities as well – you sit with a lot of leftover material. We have done away with liquid pigments, because it takes such a long time to purge.
- Are liquid pigments making a comeback? It does seem to be a trend at the trade shows. The suppliers are willing to do the modifications to your machines as well, at no cost. They guarantee a saving of half the usage.
- If you just go on price, you may end up dealing with companies that take short cuts and you end up with pigments are not good for the machines or for the product, e.g. those with lead in them. We would rather use reputable suppliers, rather than someone who is cheap and where there is no guarantee.
- We lose a lot of time on colour changes. Overseas, there are not as many variations, e.g. there is only one shade of green and one shade of blue. It is a problem particularly with the Thickness Control Systems (TCS) in blow moulders, because it takes a long time to clean out the machines. All the nooks and crannies have to be cleaned in the accumulator heads. You also have to use special compounds for cleaning. To change from black to natural can take you up to 18 hours just to purge the machine. Purging compounds are not cheap and may cut down on purging time by only by 3-4 hours at most. If the whole industry could standardize colours, it would make a big difference.
- Blow moulders and film extruders are a big problem to clean. Injection moulders are not as bad.

7. WHAT ARE THE EMERGENT COMPETENCY NEEDS GIVEN THE CURRENT STATE OF THE INDUSTRY?

Provision of training to stimulate research, development and innovation

- What we need isn't necessarily formal training.
- A lot of the skills are largely experimental on the production floor, because of the diversity of products, machinery and processes in the industry. No-one can be an expert in everything relating to plastics: it is a big mix of information. To take someone out of the Plastics Federation and expect him to deal with all these things is impossible. There should be a space for people to come back into the factory, e.g. for one day a week, to mentor. It is not just the formal training, but the informal that is also important. We need to bring in people from the outside, e.g. professors or experts. Their stature reinforces the message.
- Run training courses and include other companies to reduce costs (handle potential confidentiality issues by stating which areas are out of bounds).
- Focus the training on things that add value, especially Continuous Improvement Projects (e.g. project teams, including operators, who solve the problem together).
- Train in the 5S, not just housekeeping, but on quality as well.
- Well rounded people will be flexible and can continue to polish their skills.

Making change happen

- Medium level skills, e.g. problem identification, Continuous Improvement Projects.

Building the level of skills across the industry

- Multi-skilling (cross-training) to ensure flexibility.
- Work on ensuring that our people have a good solid foundation in plastics.

Managing people and organisations more effectively

- Management training
- Overseas visits to see how managers in other countries do things

8. SUCCESS STORIES & GOOD PRACTICES

8.1 Reducing electrical consumption

- We have changed all our lighting systems to LEDs. We are seeing a turnaround now. We save R80 000 per month.

- Staggering your start-ups: instead of putting all your machines on at the same time, you phase them in. This is how the municipality charges you. Power factor rectifiers are also a way of saving electricity. Cutting down on peak period usage saves a lot.

8.2 Waste materials

- We have a company in PE that buys some of our waste.
- Plastic can be used as a filler for a lot of things. Some people are exporting scrap to China.
- The idea with the waste is to put it into another product and sell it – if you can do it.

8.3 Introducing manufacturing systems and productivity improvements

In our plant, we have an online monitoring system which measures efficiencies, quality, utilization etc. If 88% is not achieved, we know that there must be some problem – we look for it, deal with the root cause, guide people and mentor them where necessary. If there is a breakdown, you must have a tool, e.g. root cause analysis, to diagnose and manage what is going on.

In our factory, we have a sewing section as well. There has been a huge culture change since it started. We believe that our people can do the job. We have increased production from 20-30 bags an hour to 100 bags an hour, simply by working on methods of how the people operate by moving from production line layout to a cellular layout.

By introducing these things and involving people, they are starting to think far more about the underlying process. They are able to look at the manufacturing system and to identify where the problems are.

Working on constantly improving systems by implementing problem solving in quality circles; and continuous improvement projects breaks down the barriers between management and the workforce. We work on the problems together.

8.4 Investment in training

About 12 years back, I started my own training. I took people from DUT (Durban University of Technology) with engineering/ electronics degrees and started training them in plastics. I did the training for two years at a time in the same set. It worked out well, although it wasn't formal – what I knew, I taught them. I did this for 3 sets of people.

Plastics SA then came on board with the learnerships – this made it easier for me and took the weight off me in terms of the theoretical side of things. They sourced the people for me and I carried on with them.

I take an operator: for the first year, he stays on the floor and gets familiar with the machinery. Then he goes to Plastics SA for 3 years. Then back on the floor for 2 years. Then to a course that is more advanced in plastics.

At the end of the day, the person should be able to stand on their two feet and start a company. I don't take anyone with less than Matric education, because you need that.

It is working out well: all my people are trained now.

I also have people who came in and have now finished their trade tests as electricians - and we now employ them as electricians. It has been a long journey but it has worked out.

Our big problem was explaining to management why this kind of training is necessary. It came out of my bottom line at one stage. It is paying off in production – it was an investment rather than a cost in the long run. Production has reached levels of 95%. These are intelligent people who can sort out problems. This is a big plus. I am leaving a legacy now of people who have hope for the future; and that industry can grow.

The downturn is affecting us now – it didn't affect us then. Now it is all about multi-skilling and getting things done better at a lower cost. We need to make changes in the way we work. One of the biggest changes will be changing the mind-sets of people. Everyone has been complacent, because we have been making profits – but they have been getting lower and lower. Soon there will be no profits. Now I am busy speaking to the teams, talking about doing things a new way and saving costs. I have a fantastic team, I know they can do it. ...One of the answers is being flexible and having well rounded people in terms of training. Adversity gives people the chance to start polishing their skills and to know their capabilities. I am seeing it as an opportunity, not an adversity – something people can use to their advantage. We all need to rise up to the challenge.

With the downturn in the economy in 2008, we saw it coming. It was very difficult for us, but instead of putting people off (it is one of our policies not to retrench people, as far as possible), we used it as an opportunity. The first thing we did was to offer training. We knew that we needed new business. An opportunity came: we gained business from Toyota. One of their suppliers that used to make the sidesteps was letting them down in Gauteng. It was just before the April mini shutdown when the client came to us on the Friday and told us that we had to be up and running by the following Wednesday. We battled at the very beginning, but we trained and moved staff around and were successful. We had another opportunity towards the end of the year, when the downturn came. We had come out tops

with Toyota and so were offered the opportunity when a company in Durban wasn't delivering. We worked through Christmas, but managed to retain all our staff. It was something unknown: we normally do a lot of research before we take on projects. We used the downturn to our advantage. Another opportunity came with the disaster in Thailand because of the floods etc., when Toyota asked us to produce sidesteps for exporting. The only reason we got the business is because of our turnaround time. We got recognition from Toyota, even Toyota Japan, for our contribution to the motor industry. We had a visit from the Japanese VP, who showed gratitude to the whole staff. When you start building relationships like that, you market yourself.

A lot of people are retiring from the industry and those skills are leaving the industry. Perhaps factories should keep back people who are retired and use them as mentors.

The Automotive Sector plays an important part in the development of our company, because it gives us an opportunity to be exposed to WCM, JIT etc.

Whereas initially we used to outsource jobs that were too big for us, we now see R&D as core to our business.

Appendix 3 – Workshop Report Gauteng

13 September 2012

1. FACTORS IMPACTING ON THE FUTURE OF THE PLASTICS INDUSTRY

1.1 CURRENT WEAKNESSES AND FUTURE THREATS

Macro environment

- We have a small local market (although this gives us an opportunity to export) and it is on the verge of shrinking even further.
- Plastic usage/ consumption per capita in SA is low compared to elsewhere in the world. It is around 25-27 kilos per person in SA, whereas for developed countries it is around 120.
- China is a huge market – and is the biggest consumer of the world's plastic. The global plastics industry almost closes down over Chinese New Year as a result.

High input costs

- High labour cost
- The weakening of the exchange rate will, in general, work against us.
- The industry is capital intensive; this increases the cost of moving up the technology chain
- Some raw materials are import-based.

Cheap imports and skewed trade protection

- External competition, cheap imports.
- Finished goods coming into the country (e.g. from China), are often highly subsidized with rebates from their governments. The problem with the threat from China is that for pipe extrusion and the making of many fittings, e.g. injection moulding, they have

huge machines and economies of scale. Their labour is not nearly as expensive as ours. (*A participant subsequently commented on this statement in the report saying that he was not aware of plastics pipes being imported*)

- Should we have import protection? With SA being part of BRICS, this is very difficult. But look at what happened to the textile industry, with no protection – will the plastics industry go the same way?
- There is a growing secondary economy that operates "under the radar".
- The problem is that we don't have a very good grasp of exactly what is coming in, and how it could or should be controlled. For example, if you are bringing something in on a different tariff heading, who checks it? There may be spot checks, but we don't have control over it. We can't monitor the amount of imports coming in. This represents money and opportunities that are lost to local manufacturing. The stats don't tell us what is really happening. Every year, growth is reported - but why is the plastics industry's contribution declining? This proves that imports are coming in from other countries, e.g. China. Our factories are closing down because so many things are being imported.
- Local products are copied as well. They are taken to China, produced and then brought back in to the country at a cheaper price. Local plants then become "white elephant" factories.
- We do have very good regulations, but they are not being enforced properly. The guys at the bottom are not following them and the guys at the top don't see this.
- The guys at the bottom (e.g. customs officials) are often untrained and do not know how to link the contents of containers to specific tariff codes. This creates huge loopholes in the regulations.
- PPPFA is supposed to stimulate local manufacturing as it gives preference to local goods – but the person on the ground sees no difference at all. There is some loophole in the chain that is being bypassed. Guys at the bottom are not complying.
- Government has no monitoring regime to ensure that the policy is being implemented and that regulations are being enforced.
- What does the SABS do if a regulation is not being complied with?
- Products are being brought in cheaply for the RDP market, which is government funded

- No enforcement; no standards
- The CIDB (regulatory body for construction) sits under the Department of Public Works. On an open platform, both parties found out that the Department does not comply to CIDB rules! These regulatory bodies really do need to be separated out if they are to make an impact.

Lack of innovation and research and development

- There doesn't seem to be a lot of innovation happening that could make the industry stronger.
- As an example: a solar panel was developed at the University of Johannesburg (UJ), but no-one wanted to fund it. Eventually it was bought by someone in Germany. This represents an innovation that is lost to the country.
    - Initially, the designer had wanted to create a cheap solution for SA and Africa. Germany will now market it as a product and we will end up importing it!
- We get told all the time about the opportunities that are emerging in Africa. Countries in Europe and Asia are coming in as a result, but not many of our local companies are taking advantage!
- Many companies in our industry are really risk averse – partly because we feel we have to do exactly what our licence tells us to do. This is limiting from an innovation point of view.
- Some companies have laboratories, some have R&D divisions, others not.
- A few years ago, Nampak was going to close down its R&D centre – now they have reversed this decision, because they see the competitive value of innovation and keeping it "in-house".

Lack of a culture of sharing and collaboration in order to improve the industry & create new markets

- Plastics manufacturers need to co-operate with one another (outside of the Competition Act!)
- We have a lot of legislation, which is forcing organizations to operate in silos.
- Companies don't communicate or share information, because the consequences are so severe.

- We tend to focus on the punitive consequences, rather than on the benefits of sharing.

Poor/ inaccurate public image of the industry & lack of "'industry branding"

- The industry is perceived as "unattractive". This holds true for many jobs involving a high number of manual tasks.
- There is a general lack of understanding and knowledge about the industry. People don't like identifying with things that are "plastic". Many myths about the industry exist.
- We need a sustained effort from the industry to showcase itself, like the way in which Consol ran a highly successful glass campaign. We need to punt our successes as an industry; we need to be innovative and to place a high importance on attracting young people through marketing, advertising, etc. One way of doing this would be to use "dramatic" products to capture people's imaginations. For example we could showcase the role of plastics in:
    - the use of composites to replace existing plane components
    - F1 racing car parts
    - cycles
    - wind turbines
    - cell phones
    - computers
    - IPads etc
- We could feature companies that are making innovative/ attractive products in magazines in order to rebrand the plastics industry in the eyes of the public and help them become more aware of how "plastics makes things possible".
- A lot of people don't know what plastic involves and how it touches so many aspects of daily life – e.g. parts of your cell phone and parts of your car are made of plastic.
- We should capitalise on the fact that the attraction of IT is in the industry already - in the form of control panels. The link between the two could be showcased.

Lack of a skills pipeline

- We need to make the industry more "sexy", more attractive for young people to go into when they are choosing careers. They should see opportunities and growth in the plastics industry.
- At the moment, plastics is competing against other university faculties that are doing a better job. Many young people ask themselves: "What will I be doing in 5 years' time?" If they see themselves as being operators for the rest of their lives, they won't be attracted to the industry.
- Young, unemployed people don't always see the opportunity in the industry and there isn't always the funding for them either. Do you stay unemployed, or do you decide to go and skill yourself in what might initially seem an "unattractive" industry?
- Skills are so badly needed in the metals industry - yet they also struggle to attract the next generation. Young people would rather go into Information Technology (IT). They don't want to "get their hands dirty". But the IT industry has now reached saturation point.
- There is a big market for young people to find out about an industry they hadn't yet thought of for a career.
- Sasol have been running a successful Techno X initiative for years – but very few people have heard of it. It is a small exhibition that runs for 5 days and Sasol uses it as an opportunity to display the various technologies it is using. It is innovative, interactive and shows people how beautiful science can be. There could be many other initiatives like this; schools should be encouraged to participate (it is often cost-related, however, e.g. the cost of hiring a school bus).
- Despite the problems, there are companies taking school kids through the plants, e.g. DPI, Cobra Sanitary Ware. They have a whole department dedicated to taking people through the plants so that they understand how taps are manufactured from composites.
- It is also to do with the development of entrepreneurs. When people come out of school, they don't think of being an entrepreneur. This highlights the need for proper career guidance from schools.

Low levels of training

- Lack of skills, from the design stage up, including shop floor and actual production skills.
- Lack of funding for training.
- "I find it sad that I when I go to training centres to follow up with apprentices preparing for trade tests, the centres often have old machinery and are standing half empty".
- Difficulty in accessing funding for training:
    - Is this because there is not enough funding? Or is there a problem with MERSETA's administration? As an example, grants are often released in "dribs and drabs" and are often very difficult to reconcile.
- The SETAs are using money "like a carrot" to make the industry work – but they are not investing it in the right place; and are not doing things properly, which results in disillusionment. The system is not working as it should, so it collapses.
- There are not enough incentives for apprentices to build their skills in the industry.

Lack of knowledge/ high level skills at a governmental/ municipal level

- The industry suffers the "knock on" effect of a high level lack of skills and knowledge at a governmental and municipal level.
- For example, people who have the task of specifying components or bills of quantities for government projects do not have the knowledge or skills required to do the job properly. Bills of quantities are where all projects start. Also, if someone has a particular perception of plastics (based on faulty information), they tend to carry this misinformation into their projects.
- As an example: the CEO of SAICE went to Umzinto on business and found potholes everywhere. On investigation, it was found that there was no civil engineer employed by the municipality. In fact, most municipalities don't have qualified civil engineers – this explains why piping systems are not installed properly and projects aren't managed as they should be. It is because the municipalities don't have the skills "in-house". Although many projects are about to start or are pending, they are being delayed because of the inability of municipalities to implement.
- The housing backlog of 2.7 million is another example of the lack of high level skills.

- There is a real opportunity there, however - it is a "pie" that is right there, waiting for us to grab. If we can deliver and build those houses, we will automatically grow the industry.

1.2 CURRENT STRENGTHS AND OPPORTUNITIES FOR THE FUTURE

Incentives and grants

- There are a variety of incentives in place for a range of activities and many opportunities we can start tapping into if we want to grow the industry.
- Now that the recession has come, there is a huge opportunity to get help. We should encourage companies in the Plastics Chamber to take full advantage of incentives and grants in order to improve their business sustainability.
- We do have the PPPFA, for example, which encourages the local sourcing of materials. This should be stimulating the local market in terms of growth and displacing finished goods that are coming in - but it will only be successful if it is well regulated.

Government's planned spend on infrastructure development

- The 780 billion allocated by government over the next 10 years creates a lot of opportunity for the future - many polymers are used in the construction industry, e.g. PVC.

Replacement of traditional materials with plastics

- Developed countries use polymers to a significant extent in the construction industry: e.g. for the manufacture of window frames, pipes, PVC claddings etc.
- In the US, PVC claddings are regarded as standard building materials, whereas they are still regarded as alternative materials here.

Growth in the per capita consumption of polymers as South Africa develops

- Developing countries like South Africa have a lower per capita consumption of polymers. This provides us with an opportunity. As people become more self-sufficient and have more disposable income, their need for, and consumption of polymer products will grow.

Opportunities offered by the Green economy

- The green movement is growing and there are potential benefits and opportunities for the plastics industry. For example, as soon as energy efficiency and waste recycling start taking off in the construction industry, there will be benefits for the plastics industry in terms of job creation.
- Waste recycling will also improve the image of plastics in the public eye.

Opportunities to export into Africa

- This provides a huge opportunity for the automotive industry - but what are we doing about it? South Africa used to be the gateway to Africa, but now other countries are becoming gateways. Admittedly, there are some differences in specifications: e.g. cars manufactured in SA won't be used in Nigeria unless they are modified, because of the left hand/ right hand steering difference.
- Many compounds in the automotive industry come from the plastics industry. But we have lost an opportunity: bumpers are being produced locally, but the compounds used to manufacture them come in from overseas. We need to change this mind-set.
- Government is involved in the whole automotive industry on an on-going basis, e.g. through the Department of Trade and Industry (DTI). It is not in the government's interests to allow the plastics industry to get into the doldrums, because of its role as a major employer in South Africa.

2. KEY DRIVERS FOR THE FUTURE

"What is coming at us that is going to change what we are doing"

- no specific items captured under this heading – they are implicit in the other contributions

3. POSSIBLE SCENARIOS FOR THE INDUSTRY

SCENARIO 1: GOING DOWN THE "PLUGHOLE"

- Less incentive to compete against cheap imports, the industry slows down, factories close, no innovation or renewal

SCENARIO 2: THE "CLOGGED HIGHWAY"

- Continue as we are, putting up with all the constraints, blockages, "toll gates" and "wild drivers" - eventually becomes Scenario 1

SCENARIO 3: THE "TAKE-OFF" SCENARIO:

- Providing an injection of something into the industry so that it starts booming again; new products; niche markets; exporting products etc.

From your perspective, what is your sense of which scenario will prevail in the next 5-10 years in the Plastics Industry?

- Looking at Scenario 1: if we "continue as we are", we will be going downhill as an industry. This takes Scenario 1 out of the equation.
- Looking at Scenario 2: if we are going to stagnate and decline, we will get to the point where we have to make a decision: to close doors, or to start to innovate. As an industry, we are getting to the point where we have to change and stop being so risk-averse.
- Scenario 3 is the only option for growth.

4. WHAT IS THE IMPACT ON SKILLS NEEDS?

IDENTIFY FACTORS IMPACTING ON SKILLS DEMAND IN EACH SUBSECTOR

- Somehow, industry isn't prepared to put money into the technikons, perhaps because the technikons haven't always delivered in the past.
- Industry needs people who are being trained to work on the shop floor - but management at technikons wants to create the "MIT for Africa"! We need to find a balance between being close to MIT and developing the youth for future employment.
- The word "technician" should refer to designers and testers – not artisans.
- We need a complementary strategy: both types are needed (technicians and artisans). If we don't have a systemic model, we don't have a business.
- We need "horses for courses". The type of course and the style of learning being offered have to be suited to a certain level and a certain place in industry.

- People working in factories, "hands on" people, are not going to look at online learning.
    - Is this true? Let's turn this assertion on its head: young people today understand computers and social media better than we do!

4.1. POSSIBLE LEARNING AND CAREER PATHS

Would the use of value chains for career guidance (to give a visual picture and describe occupations) be useful?

- Yes - it does condense text into a more diagrammatical format.
- Young people are asked "where do you want to be in 5 years"? At the moment, they have no idea of what the process is and what is available to them. We need to be able to show these young people what is out there and that it will be worth the effort.

Is there a place for Plastics SA to become a career advice centre?

- There are lots of instruments around to determine what people's interests are and where they are best suited. We could offer options, for example.
- Learning and career pathing seems to be more around selling existing courses and qualifications at the moment.
- It is important to bear in mind that career development is not just for youngsters, but also for people within the plant.

5. Value Chains

5.1 WHERE DO 80% OF YOUR QUALITY ISSUES ARISE?

- In the conversion process – this is where you catch most of the quality problems, **or** where they become apparent.

5.2 DESCRIBE THE QUALITY ISSUES BEING EXPERIENCED

- Usually what causes the problem is the human factor (an error; not responding to the problem immediately; lack of understanding of the implications and consequences; someone having an "off" day).

- People need to understand why they are doing something – as well as what the total process is. Otherwise they won't understand the impact of their step on the others following.
- People often lack the ability to read/ understand results.
- People don't always see the influence each person has on the end result:
    - for example, if the corona discharge units trip out and the operator doesn't see it or understand the significance, then often the problem will only show up when it is too late, e.g. when the printed film reaches the customer, or goes onto a bag maker.
- "There is a general lack of understanding that exists about the material properties, the parameters of the machine, what comes out at the end and the tweaking that goes on. People don't understand how what they did influenced what came out at the end".
- In the manufacturing environment, production can go down for a variety of reasons.
    - The guy in charge of that section will then run his machine as fast as possible, so that he can play "catch up" against his targets. This often happens on nightshift, where employees want to get their OEEs up and so secure more incentives. This is bad for the machines and often results in errors, which you only pick up on later on.
- It is very punitive at the moment, the way things are done – we focus on getting production up, but in fact, this causes more damage than good.
- "Output should only be seen as output if it is quality output".
- Errors happen in the supply chain as well, where material gets transported - for example through the way in which people handle the material.
- If you look at the question "what is your scrap rate", human error is one factor. This means there is actually a lot of opportunity for training. People don't always understand why they are doing something.
- When errors occur, it is important to have a skilled person on hand who can sort things out, who will look at the whole setup, do a causal analysis and then test out their diagnosis.
- Skills are not only lacking at production level. Management does not always understand what happens on the floor, resulting in poor decisions being made - for

example the introduction of incentive schemes which are counter-productive in the long run.

- There is a vertical value chain in management: if your operations manager does not have the training to understand how important every component in the value chain is, you are "recycling" the wrong kind of attitudes and behaviour. People need to be educated in value chains not only at an operator or technician level, but at a management level as well.
- In a lot of companies, quality is not seen as everyone's responsibility. It should be. Everyone needs to take ownership and accountability - including people working in production.
- Lack of total quality awareness:
    - There should be more of an emphasis about quality, and what affects quality, including a person's behaviour and how s/he should be managed.
    - It is a management skills issue. People need to understand why they are doing something – what the steps are. Otherwise they don't understand the impact of their particular step on others.
- Sometimes the technical experts get "shot down" by people who are not willing to listen to them, because they are "chasing the numbers".

5.3 ARE THESE ISSUES RELATED TO A LACK OF TRAINING?

- Sometimes, but not always.

IF YES, WHAT SHOULD THE TRAINING BE FOCUSED ON?

- How to read and interpret results/ statistics etc.
- Seeing the whole picture, the whole value chain and the importance of everyone's part.
- Quality and how it is part of everyone's job and responsibility.

IF NO, WHAT ARE THE QUALITY ISSUES CAUSED BY?

- Training takes a lot of blame for problems they can't fix. Sometimes it could be the manufacturing system at fault.

6. WHAT ARE THE EMERGENT COMPETENCY NEEDS GIVEN THE CURRENT STATE OF THE INDUSTRY?

Do the changes the industry is experiencing require new skills or competencies?

For example, are there new jobs, or new "top ups" to what people are currently doing?

- There are no new jobs on the horizon – we just need more people to be trained on certain aspects of their jobs, including "management" and "people communication". Both skills are required when discussing quality issues.

Is there a drive now to multi-skill people, rather than having specialized positions?

- Small companies can't afford the specialists. People are often skilled up in more than one process.
- There does seem to be more "on- the- job" skilling going on.

There is a new SETA qualification that has been registered as a trade. This has 3 dimensions: training in injection moulder, blow moulder and extruder skills. Wherever the learner is placed in his workplace is where he will specialise.

Our machinery is on average 10-15 years old. Now with electricity prices rising, and people starting to have more money as the country comes out of the recession, will there be an interest in renewing this equipment? Will there be new skills that have to be imparted to upskill the people currently working on the old equipment?

- There will be a gap that has to be addressed.
- People will need training on new machinery and will need to understand how electro pneumatics and hydraulics affect what they are doing.
- What about the possibility that the new equipment will need fewer people; or fewer people with a high level of skills?

What about "disruptive technologies" - could 3D printing be an example?

What if you had a whole factory of 3 D printers? There is already production capacity there, it is not just about printing a prototype. What would this do to the plastics industry?

- No response

What about the "carbon footprint" issue?

Are you measuring yours? How many people are skilled in measuring a carbon footprint?

- Our company tracks our carbon footprint on a daily and weekly basis.

7. SUCCESS STORIES/ GOOD PRACTICES

- "In our company, we prepare packs for each product. We take the trolley with these packs to the work station".
- "Our company takes on technicians. As of May this year, we have taken part in the NITP project (which is for tooling) for a 3 year programme. We have had 16 students in the company. Initially we thought we would only take people at level 3".
- "Our company is involved with tool and die makers for metal and plastics, working in small groups".
- We have taught our employees statistical process control, which helps them to understand what is happening. Previously the foreman would confront the operator – but once the statistical process control was implemented, they would stand side by side, looking at the piece of paper. The whole dynamic changed from playing the "blame game" to problem solving. The one approach is proactive, the other is reactive.
- We have installed a system that measures Overall Equipment Efficiency (OEE) per department, per shift etc., linked to the overall production plan. Out of the total, it identifies what was scrap and what was production. "There has been a lot of training on it. It is on every computer. The system is linked to incentives. Managers can be sitting at home and can see what machines are running, which ones have stopped and for what reason. The major training has involved teaching operators to enter the correct codes".

Appendix D – List of recommendations

Recommendation 1: *To attract senior managers, future regional workshops should not be longer than four hours.* p 29

Recommendation 2 *merSETA should investigate the causes and find ways of preventing the inclusion of non-plastics companies in plastics –related data.* p 34

Recommendation 3: *The SIC codes should be revisited to take these additional products/ processes into account and that a comprehensive list is generated.* p 44

Recommendation 4: *Industry bodies take up the issue of overlapping SIC codes with the Department of Trade and Industry OR future research projects should distinguish between codes that relate to manufacturing processes and codes which relate to the production of specific products (by whatever process).*p 45

Recommendation 5: *The Plastics Chamber should consider more research to confirm if the increase in employee numbers in the category of Research and Development is indeed a new trend.* P 54

Recommendation 6: *Given the relative importance accorded to quality management, it would be worth while investigating this need further. Depending on the nature of the quality management required, this could be formulated in incentives for specific forms of training.* p 57

Recommendation 7: *It would be very valuable to check the findings through extracting and consolidating information from the Plastics SA dataset, and also by holding a series of follow up focus group workshops around the country.* P 62

Recommendation 8: *The SIC codes should be revisited to take these additional products/ processes into account. Further research should be undertaken to determine whether there are any other processes that are currently not listed in the scope of coverage.* P 64

Recommendation 9: *The Plastics Chamber and merSETA should publicise the value chains and the related jobs. This would lead to their improvement and also ensure that data collected would be more accurate.* p 69

Recommendation 10: *The figures for the age group distribution should be researched to verify if the survey data is correct.* p73

Recommendation 11: *Research and write up the selected success stories as cases studies to illustrate how companies can make significant changes to their future.* P113

Recommendation 12: *The timing of this kind of survey should be carefully considered and, where possible, planned for the winter months when the industry is traditionally less busy.* p 117

Recommendation 13: *The Plastics Chamber should continue with surveys of this nature to collect information but in a more focussed form (i.e. sub-industries) and using additional methods to get greater participation. The alternative is a much larger (and more expensive approach) using a greater using one-on-interviews and on-site data capturing.* p 118

Recommendation 14: *The general approach to these workshops should be retained and they should be repeated regularly as a way of staying in touch with changes in industry and a way of providing a forum for industry to exchange views. p 120*

Recommendation 15: *The information collected at the workshop was very rich and could still be analyzed further – this could be based on the digital sound recordings.* p 120

High-level recommendations: p127